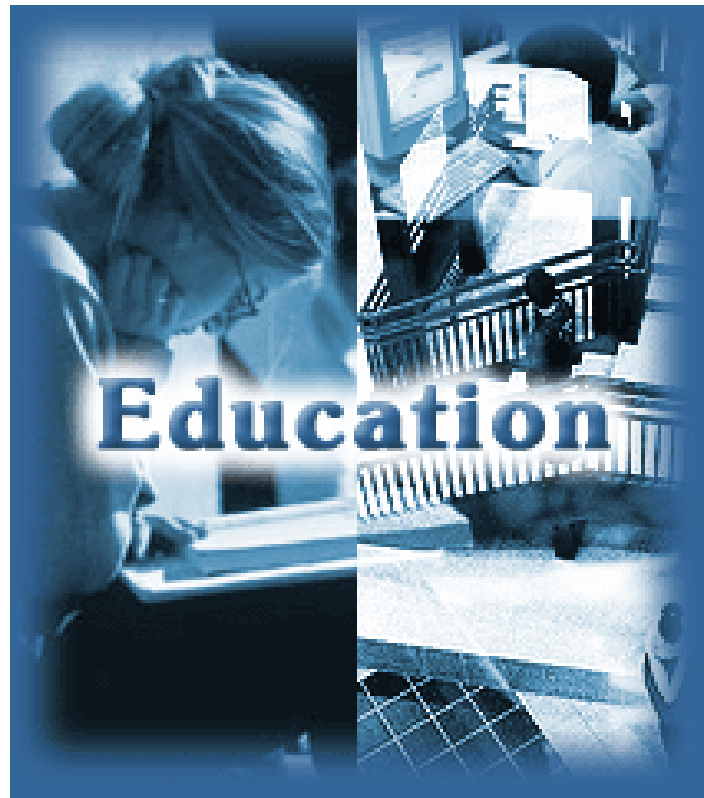


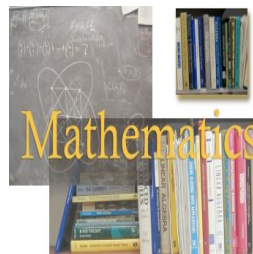
# Evaluation of Student Success Initiative

## TEACHER TRAINING ACADEMIES

December 1, 2004



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## ***EXECUTIVE SUMMARY***

### **Overview**

In June 2004, the Texas Education Agency (TEA) commissioned an independent study to evaluate three specific statewide initiatives to provide targeted teacher training, and ultimately improve student achievement. The Teacher Reading Academy (TRA), the Teacher Mathematics Academy (TMA) and Science Teacher Quality Grants were a component of the state's Student Success Initiative (SSI), a concerted effort by the Texas Legislature to improve student performance.

This study addresses several important evaluation questions, each related to the overriding issues of whether or not the programs were effective in improving student achievement and efficient in their use of state funds. Below are the major conclusions of this study.

- Based on statistical analysis, on-site observations and survey results, the TRAs were consistently effective, while the TMAs showed mixed results.
- Both academies were basically sound from a content standpoint, and were cost-effective on a cost-per-participant basis when compared against industry standards and similar training programs in other states. However, the TMA was not delivered as effectively as the TRA.
- A positive statistical relationship between teacher participation and lower teacher turnover was found to have existed in the TRAs, particularly for African American teachers. The State Board of Educator Certification estimates that teacher turnover costs Texas between \$329 million to \$1.2 billion annually.
- Both academies, if reinstated, could be improved in terms of instructional content, delivery methods, program support, and cost efficiency.
- Participation and cost data were not tracked in a manner that allowed online teacher training programs to be fully evaluated.

The Science Teacher Quality Grants program is in its first year of training delivery. Accordingly, the evaluation was limited to an assessment of the program structure, delivery mechanisms, and suggestions for ongoing program evaluation.

It is important to place these conclusions in the context of key program characteristics and differences. The TRA was implemented for four consecutive years with similar financial commitments by the state

each year. The program continued in the fifth year but with substantially reduced funding. The TMA was implemented for two years, but second year program funding was not available to support the full implementation of the next grade level academy. Texas school teachers and administrators perceived the state's commitment to the reading academies as stronger than its commitment to the mathematics academies, and this in turn appeared to strengthen their own resolve to implement and realize benefits from this program. In short, teachers and administrators more enthusiastically implemented a program in which the state had demonstrated a consistent and longer term commitment.

Further, attainable benefits—and flaws—of teacher training programs cannot be completely identified unless the program has been implemented for a time period long enough to provide a meaningful pattern of results. Of the three programs evaluated, only the TRA was implemented for more than one year at a consistent funding level. The TMA, first delivered in the summer of 2002, was not fully implemented before funding was discontinued. With state funding no longer available, the manner in which these academies were delivered in subsequent years changed and teacher participation dropped markedly. The Science Teacher Quality Grants have not been fully implemented and have, therefore, been evaluated differently than the TRA and TMA. These issues notwithstanding, this evaluation report provides a useful assessment tool and specific recommendations for the Texas Education Agency and the State Legislature to consider should any of these programs be reinstated, continued, or expanded.

The vast majority of the teacher training provided through the reading and mathematics academies occurred during the summer months. This is important in several respects. First, training occurred outside the teacher contract period. To promote participation, both academies started with daily stipends for participating teachers. This strategy worked, as teacher participation was initially strong, but dropped significantly in both academies after the funding for teacher stipends was eliminated. Second, because these academies occurred during the summer, they did not compete with other in-service training needs scheduled during the school year. The summer academies provided a focused, intensive, consecutive-day training on teaching strategies. However, both teachers and school administrators expressed a need for training and follow-up during the school year, closer to the moment of instruction. If these programs are reinstated, a combination of both delivery strategies would be more effective, but consideration should be given to the possible displacement of other important in-service training.

The remainder of this executive summary provides a historical overview of the SSI, a summary assessment of each program, and recommendations to improve their effectiveness and efficiency.

## **Introduction**

Since the passage of the federal No Child Left Behind (NCLB) Act in 2001, all states have implemented programs designed to increase standards for student academic performance, particularly in the areas of reading, mathematics and science. This emphasis by the federal government on setting academic standards and benchmarking student performance has brought about changes in the way states develop academic curriculum, allocate financial resources, and implement professional development programs for teachers. However, even prior to the passage of NCLB, Texas made significant commitments to improve student achievement. During the 76<sup>th</sup> legislative session (1999), the Texas Legislature implemented the Student Success Initiatives (SSI) through Senate Bill (SB) 103.

The goal of the Texas SSI was to ensure that all students receive the instruction and support they need to be academically successful in reading and mathematics at their grade level. In particular, the following requirements, measured by student performance on the Texas Assessment of Knowledge and Skills (TAKS) tests, were established to ensure that students would meet grade level standards before being promoted to the next grade level:

- Students must pass Grade 3 TAKS in reading, beginning in 2002 – 2003;
- Students must pass Grade 5 TAKS in reading and mathematics, beginning in 2004 – 2005; and
- Students must pass Grade 8 TAKS for reading and mathematics, beginning in 2007 – 2008.

To achieve these grade level standards, policymakers recognized the importance of providing teachers with the necessary tools and support to positively affect student achievement. One of the tools provided was professional development training that focused on research-based teaching strategies in content areas covered by the TAKS tests. Over the following five years, the state implemented three specialized teacher training initiatives: the Teacher Reading Academy (TRA), the Teacher Mathematics Academy (TMA), and Science Teacher Quality Grants.

The 76<sup>th</sup> Texas Legislature, with the passage of SB 472, provided TEA with emergency appropriations for the development of the first TRA, which emphasized scientifically-validated instructional practices in the teaching of reading. It was initially provided to Kindergarten teachers in the summer of 1999, and implemented in subsequent years for Grades 1 - 3. Grade 4 teacher training materials were also developed under the SSI initiative, but funding was not available to conduct the training. Since its creation in 1999, approximately 66,000 Texas teachers have received TRA training in one or more grade levels. A web-

based version of the TRA, the Online Teacher Reading Academy (OTRA), was also developed through this initiative and made available to Texas teachers.

The TMA was designed to address best practices in mathematics instruction. The TMA was initially developed for Grade 5 and 6 teachers, and was deployed in the summer of 2002. A mathematics academy for Grade 7 and 8 teachers was developed, but funding was not available to complete the training. Since the initiation of the TMAs in 2002, approximately 14,000 Texas teachers have received TMA training in one or more grade levels.

For both the reading and mathematics academies, TEA funded the development of academy training materials and the training of trainers. The agency provided additional grant funding to the Education Service Centers (ESCs) to administer the program and deliver the academy training to participating teachers. In order to encourage participation in the academies, teachers who attended three or four-day academy training sessions received stipends. Virtually all teacher training was conducted during the summer.

In 2002, Governor Rick Perry announced a plan to make science a top educational priority in Texas schools. In response, the 78<sup>th</sup> Texas Legislature (regular session, 2003) enacted a series of policies aligned with this plan that aimed to eliminate student performance gaps in science through enhanced professional development training for science teachers, higher academic standards for science education, and intensive science instruction for struggling students. In December 2003, TEA, in cooperation with the Texas Higher Education Coordinating Board (THECB), issued a Request for Proposals (RFP) for Type A Teacher Quality Grants, as designated by the federal NCLB Act of 2001, to achieve these policy goals. The Type A grants were awarded to grantees responsible for developing the course content for training modules in both mathematics and science. In February 2004, TEA and THECB issued an RFP for Teacher Quality Type B Grants, which were awarded to grantees responsible for using the training modules developed by the Type A grantees to train teachers in select low performing school districts. While the Type A training modules were developed prior to the completion of this study, the teacher training portion of the Type B grants has not been fully implemented.

### **Purpose of This Report**

This report evaluates whether the TRA, OTRA and TMA programs funded through the Texas SSI met their original policy goals by addressing the following research questions:

- How do the reading and mathematics academies compare with best practices?
- How did the reading and mathematics academies impact classroom practices?
- How did the Texas professional development academies impact student achievement in reading and mathematics?
- How cost-effective were the reading and mathematics academies and are there opportunities to improve the cost-effectiveness of these programs?
- What impact did the Texas professional development academies have on teacher retention and movement among districts, campuses and grade levels?

Given that the Science Teacher Quality Grants have not been fully implemented, it is premature to assess their impact on student performance. However, this report does review the need for improving student performance in science in Texas, and provides some guidance to TEA and policymakers on how to more effectively implement and evaluate professional development models for science teachers across the state.

In order to adequately address each of the research questions for this study, the evaluation team applied a combination of qualitative, quantitative, and expert review methodologies. Specific elements of the evaluation approach included:

- **Statistical Analysis of Public Education Information Management System (PEIMS) data collected by TEA, TAKS test results, data collected by the Education Service Centers (ESCs), and school district survey data** to examine the impact of the reading and mathematics teacher training activities on student achievement (i.e., TAKS results and grade retention) and teacher retention;
- **Analysis of financial data** to assess the cost-effectiveness of the TRA, TMA, OTRA, and Science Teacher Quality Grant programs;
- **Expert reviews of academy training materials** to determine whether the TRA, TMA, and OTRA training materials reflect “best practices” in teacher professional development using national standards and recent research on teacher professional development;
- **On-site visits, teacher and administrator interviews, and focus groups with academy participants and non-participants** to observe the degree to which academy participants implemented what they learned in the training activities, and to assess the implementation and application of the academies’ objectives across campuses; and,

- **Surveys of both academy participants and administrators** to gauge perceptions regarding the perceived effectiveness of the teacher training activities and whether the training resulted in changes in classroom practices.

Specific findings related to the evaluation of the TRA, OTRA, and TMA are discussed in this summary, as well as an assessment of the need for the Science Teacher Quality Grant program and the impact of academy training on teacher retention. This summary concludes with a set of policy recommendations to enhance the quality and cost-effectiveness of the teacher training academies if they are reinstated in the future.

### **Evaluation of the Teacher Reading Academies**

The evaluation of the TRAs showed positive results, which were consistent across all aspects of the evaluation (e.g., the expert reviews of training materials, statistical analysis of impact on student achievement outcomes and teacher turnover, teacher and administrator surveys, and on-site visits and classroom observations).

#### *Positive Student Outcomes*

When students' TAKS scores were analyzed using a statistical model, the results showed that schools with a higher percentage of teachers who participated in the TRA experienced:

- Higher overall student performance on the TAKS test at the passing standard;
- Moderately higher student performance at the commended level;
- A decreased need for accelerated (remedial) instruction;
- Lower percentages of students who were retained and not promoted to the next grade level; and
- Similar improved student achievement results for economically disadvantaged students.

Student outcomes for the OTRA could not be calculated due to the lack of a mechanism to track teacher participants.

#### *Cost-Effective Approach*

From 1999 to 2002, the state invested \$75 million in the TRA. Approximately \$17.8 million was incurred to develop and deliver training for the Kindergarten academy, \$20.6 million for the Grade 1 academy, \$18.2 million for the Grade 2 academy, and \$18.4 million for the Grade 3 academy. It should be

noted that these TRA expenditures have been adjusted to include in-kind and indirect costs that were not charged directly against the TEA grants by ESCs.

Overall, the costs to develop and deliver the TRA training materials to academy participants were lower than expected for this type of professional development program—ranging between \$1,100 and \$1,200 per academy participant over a four year period. These costs included the development of the content for the training materials, the cost of training the state trainers, the delivery of the training to teachers, and the stipends paid to teachers for participation during the summer months. When compared to similar professional development programs in other states, the cost to develop and deliver the TRA training in Texas compared favorably.

Teacher stipends accounted for approximately 50 percent of the total TRA cost. Teachers were paid \$150 per day for attending the four-day sessions outside their contract period. Program development costs represented approximately one-sixth of the total cost, while program delivery accounted for one-third of the total cost. It is important to note that once the funding for the teacher stipends was eliminated, teacher participation in the TRA dropped precipitously.

Neither cost data nor participation data was available for online training provided through the OTRA.

#### *Favorable Reviews by National Experts*

National experts on reading and professional development concluded that the TRA and OTRA training materials were grounded in research and exhibited nine of the twelve professional development standards recommended by the National Staff Development Council (NSDC). Among the strongest features of the TRA and OTRA training materials were the scope and sequence of reading materials across grade levels and the training's alignment with national staff development standards on design, learning, equity, and teaching quality.

Recommendations for improving the quality of TRA and OTRA training materials included: improving reading assessment tools, increasing student reading expectations at each grade level, and improving the ongoing evaluation of the TRA and OTRA training materials. The national experts also recommended that the TRA extend training opportunities to teacher participants throughout the school year rather than limit training to a finite four day session in order to provide greater opportunities for the introduction of new training topics, while continuing to reinforce basic teaching strategies for reading. For the OTRA, the experts recommended building in more opportunities to interact with peers and instructors, as well as



additional activities that engaged the participants in application, syntheses and evaluation of important ideas and techniques.

#### *Positive Feedback from On-Site Observations*

Fifty-four classrooms in ten Texas school districts were visited to interview teachers and administrators, and observe classroom practices. Education service centers recommended school districts to include in the review based on academy participation. Districts were then selected to reflect the diversity of the state in terms of size, location, and student demographics.

Information obtained from site visits and focus groups confirmed that academy participants consistently used several formal and informal diagnostic tools recommended by the TRA, such as the use of early reading instruments, when these diagnostic tools aligned with their previous teaching practices.

Classroom observations with TRA participants also indicate that these teachers have implemented a variety of the differentiated instructional techniques taught in the academies. TRA participants who were observed also provided ample opportunities for supplemental instruction to support struggling learners using strategies promoted in the TRA training materials such as the promotion of additional academically-focused classes, supplemental instructional time for individual students, reading-based mentoring and tutoring.

TRA participants, whose classrooms were observed for this study, easily implemented the TRA-promoted diagnostic tools and instructional strategies into their daily teaching practices due to three major factors. First, the TRA training modeled how to apply the teaching strategies in a classroom setting. Second, the teaching strategies and supporting materials were well designed and required little preparation time. Lastly, the TRA resource notebooks provided clear and comprehensive instructions for implementation.

#### *Positive Teacher and Administrator Survey Results*

Surveys of both academy participants and school administrators were conducted to obtain perceptions regarding the overall quality of the TRA and OTRA trainings, the factors that contributed to teachers' and administrators' decisions to participate in the academies, and whether the trainings resulted in changes in classroom practice. Overall, survey responses regarding the TRA and OTRA were very positive, indicating that teachers and school administrators felt that the TRA and OTRA provided valuable professional development experiences that were easy to implement in the classroom and resulted in improved teaching practices. Key survey findings were:

- Participants in the TRA and OTRA and campus administrators who responded to the survey indicated that the overall quality of the academies was “good” or “very good”. A higher percentage of respondents who participated in the face-to-face training rated the academy as “good” or “very good” (91 percent) compared to online academy survey respondents (82 percent).
- The vast majority of TRA participants who responded to the survey indicated that they received a stipend for their participation. Open-ended survey responses also suggested that the stipends were the best way to encourage teachers to attend the academies. However, when asked the extent to which a variety of factors influenced their decisions to attend the TRA, 44 percent of the respondents indicated that the availability of stipends strongly influenced their decision to attend the academy. Among the other factors that were considered influential were the teachers’ principals, district administrators, and state or district requirements.
- Most teachers rated their level of implementation of TRA teaching strategies quite high; the majority of respondents generally reported using the TRA strategies often or all the time. Further, 93 percent of survey respondents “agreed” or “strongly agreed” that the TRA strategies were easy to implement and 74 percent have shared the strategies with others in their schools or districts. Finally, 77 percent of survey respondents “agreed” or “strongly agreed” that their teaching had improved as a result of the academy training, while 72 percent “agreed” or “strongly agreed” that their students’ reading achievement improved as a result of the academy training.
- Survey respondents who participated in the OTRA reported somewhat similar experiences as the participants of the face-to-face academies, but overall, the OTRA survey respondents reported ratings that were lower than those who participated in the face-to-face reading academies.
- Administrators who had recommended or required their teachers to participate in the reading academies tended to be more familiar with the training, reported higher levels of teacher participation in the academies, and generally reported higher levels of teacher implementation of TRA strategies.

### **Evaluation of the Teacher Mathematics Academy**

The TMA evaluation showed mixed results, and was not as strong as the TRA in instructional content. Teacher participation rates were also lower for the TMA trainings, yet the cost-per-participant was lower than the reading academies.

#### *Mixed Results on Student Performance*

The results of the statistical analysis shows that schools with a higher percentage of teachers who attended the TMA for Grades 6 and 7 had higher TAKS scores than schools with lower teacher TMA participation rates. However, a higher percentage of teachers who received TMA training for Grade 5 (when the Grade 5 was in an elementary school) resulted in lower TAKS scores, and TMA training appeared to have no impact on TAKS scores for Grade 5 students in middle schools. Insights as to why this occurred are presented later in this section.

#### *Cost-Effective Approach*

The state invested \$12.4 million to design and deliver the TMA in the first year of its implementation. This amount includes some in-kind and indirect costs incurred by ESCs that were not charged to the grant program. The average cost to develop and deliver the TMA training for Grades 5 and 6 was \$987 per participant, including the teacher stipends. Program development costs were higher than the reading academies on a per-participant basis, but the delivery cost was lower. Stipend expenditures were also lower, since \$150 of the \$600 total stipend was contingent on the completion of teacher assignments after the initial training. Since some teachers did not exercise this option, the average stipend paid was less than \$500 per participant. These expenditure levels, like the reading academies, compare favorably to similar professional development programs in other states and industry benchmarks – even with the teacher stipend. Teacher stipends represented 50 percent of the total cost, and program delivery and program development comprised 29 percent and 21 percent, respectively.

Because funding for teacher stipends was discontinued during the implementation of the TMA for Grades 7 and 8, and since the ESCs were not required to track training delivery costs for the Grades 7 and 8 academies after the TMA grant funding was discontinued, the overall cost-effectiveness of these TMAs for middle school teachers could not be fully evaluated.

#### *Generally Favorable Reviews by National Experts*

Reviews by national mathematics education experts concluded that the TMA training materials were grounded in research and demonstrated a clinical knowledge of teaching and learning mathematics, particularly in the areas of standards-based instruction, instructional content, and current research on multiplicative reasoning and rational numbers. The TMA training materials contained nine of the twelve professional development standards recommended by the National State Development Council (NSDC), and in general, reflected the same strengths and weaknesses as the TRA training materials. Areas for improvement in the content of TMA materials included a more thorough use of research-based approaches for teaching at-risk learners and a stronger emphasis on more challenging mathematics.

*Mixed Feedback from On-Site Observations*

The same 54 schools visited for the reading academies were also evaluated for the mathematics academies. The evaluation team interviewed teachers and observed classes, and like reading, met with teachers who did and who did not participate in academy training.

Overall, site visits found that teachers used TMA-promoted diagnostic tools and instructional strategies in daily practice when these tools and strategies supported what the teachers were already doing prior to TMA training. Interviews with TMA participants found that many of the TMA objectives did align with participants' previous teaching practices. However, when TMA teaching strategies differed from existing diagnostic tools, there appeared to be less enthusiasm for implementation. Since many of the TMA teaching strategies were similar to those that teachers already used, the participating teachers felt that TMA training simply validated and fortified their existing teaching strategies.

Information gathered during site visits and focus groups indicated that teachers who participated in the TMA thought the delivery of the TMA training material was too rigid. Less experienced teachers stated that they benefited from the content of the TMA training materials and the TMA's focus on vertical alignment, but felt that either the content should have been limited over the three-day training period or the time allotted to training extended. Teachers with more experience viewed the academy content as repetitive.

*Survey Results Favorable, but not as Strong as Reading*

For the most part, survey responses regarding the TMA were favorable, however, in comparison to the perceptions regarding the TRA training, the TMA participants tended to rate the overall quality and impact of the TMA lower than TRA participants. Key survey findings were:

- Almost three quarters (73 percent) of TMA participants responding to the survey indicated that the overall quality of the academies was "good" or "very good," while 56 percent of school administrators rated the quality of the academies as "very good" or "excellent." However, when asked to compare the TMA to other mathematics training experiences, three out of five respondents (60 percent) who participated in the training rated the TMAs as "average" and only one-fourth rated them as "above average."

- When asked the extent to which a variety of factors influenced their decisions to attend the TMA, the majority of the respondents indicated that the availability of stipends strongly influenced their decision to attend the academy. Also influential however, were teachers' principals, district administrators, and the content of the training.
- The large majority of survey respondents agreed or strongly agreed that the TMA strategies were easy to implement. However respondents provided mixed opinions about the potential teaching and student outcomes from participating in the TMA training. In contrast to the teachers who attended the TRA trainings, smaller percentages of TMA participants indicated that they perceive these outcomes as a result of the training. Notably, 22 percent of the TMA respondents indicated that the TMAs resulted in instructional change in their district in contrast to 60 percent of the reading teachers who attended TRA trainings.
- Similar to the TRA findings, administrators who had recommended or required their teachers to participate in the TMAs tended to be more familiar with the training, reported higher levels of teacher participation in the academies, and generally reported higher levels of teacher implementation of TMA strategies. However, in comparison to the reported outcomes of the TRA, administrators were less likely to agree that the TMA improved mathematics instruction and students' mathematics achievement at their schools with large percentages of administrators reporting no opinion rather than expressing agreement.
- Sixty percent of the TMA participants responding to the survey reported that they knew "most or all" of the teaching strategies covered in the TMA and 81 percent indicated that they know "most or all" of the subject matter.

### **Evaluation of Science Teacher Quality Grant Program**

Historically, student performance in science has differed considerably from that in reading and mathematics. During 2003, 80 percent of all Grade 5 students met the TAKS passing standard in reading and 86 percent met the passing standard in mathematics, compared to only 75 percent of Grade 5 students in science. In addition, the gap between the performance of all students and economically disadvantaged students, in meeting these performance standards is greater for science than either reading or mathematics. For example, the difference in the percentage of all students and economically disadvantaged students who achieved the panel recommended standard on the 2003 Grade 5 TAKS test is greater for science (42 percent vs. 25 percent) than for either reading (73 percent vs. 62 percent) or mathematics (57 percent vs. 46 percent). Even larger gaps exist on both the 2003 and 2004 Grade 10 and

11 science TAKS tests and provide the underlying rationale for the Science Teacher Quality Grant program.

The Science Teacher Quality Grant program is fundamentally different from the mathematics and reading academies in terms of its structure and delivery. The program is comprised of two primary components:

- Federal Type A grants – these grants support the development and statewide dissemination of comprehensive professional development modules in middle school and high school science
- Federal Type B grants – these grants support the delivery of modules developed with Type A Grants for the professional development of middle school and high school science teachers.

The two middle school science modules focus on the Texas Essential Knowledge and Skills (TEKS) standards for students in Grades 6 and 7, and separately for Grade 8. The science modules for high school students include Biology, Chemistry, Physics, and Integrated Physics and Chemistry (IPC).

The evaluation of the Science Teacher Quality Grants included a review of these programs against the following National Science Standards for professional development:

- Professional development for science teachers requires learning essential science content through the perspectives and methods of inquiry;
- Professional development for science teachers requires integrating knowledge of science, learning, pedagogy, and students; it also requires applying that knowledge to science teaching;
- Professional development for science teachers requires building understanding and ability for lifelong learning; and
- Professional development programs for science teachers must be coherent and integrated.

The professional development criteria for the Science Teacher Quality Grant program appear to be generally aligned with these national standards and require alignment with the TEKS. However, in comparison with the TRA and TMA, a notable difference in the Science Teacher Quality Grant program is the apparent absence of a consistent message and commitment to provide research-based professional development to every teacher in the state. Results from this study show that this kind of strong message was especially effective in the TRA. However, with the variety of professional development modules

created by multiple developers under the Type A grants, the potential exists that less consistent messages will be delivered.

Regardless of the type of professional development for science teachers the state chooses to implement, the evaluation team suggests using a scientifically-based research design to evaluate the impact of these programs on a pilot basis. The design should use mixed methods, similar to the types of varied methods used in the evaluation of the TRA and TMA, to assess the impact of specialized science professional development training on the performance of students taught by pilot project teachers (treatment group) as compared to a matched cohort comparison group of students who are taught by teachers that do not receive the specialized professional development training (control group).

### **Impact of Academy Participation on Teacher Retention**

In addition to improving student achievement in reading, there appears to be a stronger statistical relationship between teacher participation in the TRA and a teacher's decision to remain in the teaching profession, particularly for African American teachers. Teachers who participated in the TRA also have a higher tendency to remain employed at the same grade level, the same grade span (e.g., elementary), and even in the same school district. Many other factors obviously affect teacher turnover statistics, but the strength of the statistical relationship is noteworthy.

The findings on TRA participation and teacher retention are particularly significant in terms of potential cost savings to the state. Teacher turnover is estimated by the State Board of Educator Certification to cost Texas from \$329 million to \$1.2 billion annually. If there is in fact a causal relationship between teacher TRA participation and teacher retention, this program could essentially pay for itself.

The impact of TMA training on teacher retention cannot be measured with any scientific validity given the very brief amount of time that these academies were in place. Further, teacher participation in the TMAs declined significantly after the initial year when funding for teacher stipends was discontinued.

### **Conclusion and Policy Recommendations**

This study used five different evaluation methods to assess teacher training programs related to reading, mathematics, and science, and within each program the varied approaches—performed by different evaluators—yielded consistent results. The TRA was shown to be effective in improving student achievement in reading and grade promotion and was very favorably received by school teachers and

administrators. The TMA also showed some success, but the results were mixed across the board. Both programs were cost-effective, and TRA participation showed a strong statistical relationship to higher teacher retention.

If the state decides to reinstate, expand or continue any of these programs, the evaluation team believes that improvements should be made to improve the effectiveness and efficiency of the professional development academies. An overview of these recommendations is presented below:

**1. Ensure that Texas teachers have access to high quality professional development opportunities structured to foster broad participation in training activities.**

- Require administrator and/or principal training sessions;
- Provide incentives or compensation for teacher participation outside of their contract period;
- Consider a more expansive training network to deliver science training; and
- Require attendance by teachers at low-performing schools.

**2. Improve the quality and effectiveness of academies.**

- Revise the instructional content of the mathematics academy to be more research-based;
- Provide awareness training to administrators to increase use of training tools and obtain buy-in by school leadership before implementation;
- Expand the time period over which the academies occur – to be closer to the in-school use of teaching strategies; and
- Provide follow-up training and support for academy participants to ensure successful implementation of teaching strategies.

**3. Improve cost-effectiveness of academies.**

- Develop a standardized cost reporting framework – within the existing state account code structure—to provide more meaningful, consistent and complete program cost information for face-to-face and online training;
- Clearly articulate allowable costs under the grant programs;
- Base the number of trainers on projected academy enrollment to reduce overall cost.
- Schedule training based on geographic needs; and
- Maximize the number of participants reached through training.



**4. Build into each teacher training program an evaluation component to monitor and modify the effectiveness and efficiency of teacher training initiatives.**

- Establish evaluation goals, objectives, and methodologies as integral parts of statewide professional development initiatives, regardless of topic or timelines; and
- Establish a consistent data tracking mechanism for participants in all future academy programs, including online programs, and for participants in the Science Teacher Quality Grant program.

## I. INTRODUCTION

In April 2004, the Texas Education Agency (TEA) issued a Request for Proposals (RFP) for a third-party consultant to evaluate teacher training activities funded through the Texas Student Success Initiative (SSI), which encompasses the Texas Reading, Mathematics, and Science Initiatives, in accordance with the requirements of Rider 45 (g), *General Appropriations Act*, (78<sup>th</sup> Legislature, Regular Session, 2003). Two primary areas were to be reviewed by the selected evaluation team:

- The effectiveness of teacher training programs in furthering student achievement outcomes; and
- The efficiency of these programs in using state allocated funding.

In June 2004, TEA selected the proposal submitted by Gibson Consulting Group, Inc. (Gibson). Gibson combined the expertise of five firms to conduct the study. Each firm was responsible for different elements of the study, with Gibson providing overall project management for the study. The study was broken down into the following segments:

- Resources for Learning conducted site visits to randomly selected school districts to interview and observe teachers in the classroom to determine if strategies introduced in the training programs were being implemented.
- Southwest Education Development Laboratories conducted a literature review of “best practices” in professional development, expert reviews of the academy training materials and resources, and surveys to ascertain how teachers perceived the training and if they were implementing the strategies in the classroom.
- Academic Information Management, Inc. analyzed student performance and teacher retention data to determine if there was a relationship between these variables and the training provided as part of the SSI.
- Gibson evaluated expenditures related to the development and delivery of the training to determine whether the training was cost-effective.
- Dr. Ann Smisko reviewed policy implications surrounding the training initiatives of the reading and mathematics academies.

## **Background of the Texas Student Success Initiative**

With the advent of performance requirements related to the No Child Left Behind (NCLB) Act of 2001, all states have implemented programs designed to meet Adequate Yearly Progress (AYP). The increasing standards for student performance at “proficient” levels have brought about changes in curriculum and instruction, allocation of resources, and professional development. Prior to NCLB, Texas focused efforts in reading, mathematics, and science through a series of initiatives originating during the 76<sup>th</sup> Texas Legislature (1999) in accordance with Senate Bill (SB) 103. The goal of the Texas SSI is to ensure that all students receive the instruction and support they need to be academically successful in reading and mathematics at their grade-level. In particular, the following requirements were established to ensure that students would meet grade level standards before being promoted to the next grade level:

- Students must pass Grade 3 TAKS in reading, beginning in 2002 – 2003;
- Students must pass Grade 5 TAKS in reading and mathematics, beginning in 2004 – 2005; and
- Students must pass Grade 8 TAKS for both reading and mathematics, beginning in 2007 – 2008.

In order to address the significant challenges these requirements presented for many school districts in Texas, the SSI provided for diagnostic assessments, training stipends for teachers, and additional funding to districts. The first diagnostic assessment, Texas Primary Reading Inventory (TPRI), was designed to determine students’ progress toward reading standards in Kindergarten and Grades 1 and 2.

A critical component of the SSI was to ensure that teachers were provided with the necessary tools to impact student achievement. It was important that teachers received adequate training to become familiar with research-based teaching strategies that they could integrate into their teaching methods. This was accomplished through the development of both reading and mathematics academies.

The first professional development academy, designed to ensure that teachers were knowledgeable of the scientifically-based reading research, was the Kindergarten Teacher Reading Academy (KTRA), provided to Kindergarten teachers in the summer of 1999. Reading academies were developed and delivered in subsequent years for Grades 1-3 emphasizing scientifically-validated instructional practices in the teaching of reading. Grade 4 training materials were developed under this initiative, but funding was not available to conduct the training.

In the area of mathematics, the SSI provided an online diagnostic assessment for use with students in Grades 5-8. The first professional development academy designed to address best practices in mathematics instruction was developed for Grades 5 and 6 delivered in the summer of 2002. A mathematics academy for Grades 7 and 8 was developed but funding was not available to fully implement the initiative. Grade 7 mathematics training was ultimately conducted in the summer of 2003.

For both the reading and mathematics academies, teachers received stipends for attendance at the academy (through 2002) and, in some cases, for participating in structured follow-up activities.

## **Reading**

There has been a national focus placed on reading and literacy, with the underlying assumption being that reading is a basic life skill. Statistics provided by the Texas Center for Reading and Language Arts have shown that the reading and literacy problem is approaching a national crisis. They indicate that:

- About 20 percent of elementary students nationwide have significant problems learning to read;
- At least 20 percent of all elementary students do not read fluently enough to enjoy or engage in independent reading;
- Reading failure for African American, Hispanic, limited-English speakers and poor children ranges from 60 to 70 percent;
- One-third of poor readers nationwide are from college-educated families; and
- Twenty-five percent of adults in this country lack the basic literacy skills required in a typical job.

The State of Texas took a long-term comprehensive approach to ensuring that all students had the best possible preparation to meet the 2003 requirement that students meet the Grade 3 TAKS standard in order to be promoted. The 76<sup>th</sup> Texas Legislature, with the passage of SB 472, provided emergency appropriations for the development of the first Teacher Reading Academy (TRA). The cohort of students entering Kindergarten in 1999 was the first group of students who would be required to pass the Grade 3 reading assessment. Multiple supports were put into place to ensure that by the time this group reached Grade 3, they would be the “best prepared third graders.” Accordingly, their teachers were trained in the KTRA during the summer of 1999, prior to the cohort’s entry into Kindergarten.

Districts were provided, at no cost, a choice of validated diagnostic reading inventories, including the TPRI, to use in diagnosing needs and monitoring progress prior to the Grade 3 state assessment. Training seminars conducted in coordination with the education service centers (ESCs) were provided around the state. In addition, districts received an additional amount of funding, termed Accelerated Reading Instruction (ARI) program, to support additional programs and interventions that were deemed necessary for at-risk students.<sup>1</sup>

These supports were extended from grade to grade over the years as the cohort moved from Kindergarten to Grade 1, to Grade 2 and to Grade 3. The overall purpose of the Texas Reading Academies (TRAs) was to provide systemic professional development in comprehensive reading instruction in the areas of:

- Leadership development;
- Diagnostic assessment;
- Comprehensive curriculum to meet standards set out in the Texas Essential Knowledge and Skills (TEKS);
- Immediate intervention; and
- On-going progress monitoring; and end-of-year student performance analysis.

While their basic components have remained in place, state-level funding support has eroded over time. The stipends paid to teachers to attend reading academies were phased out. The academies themselves were originally provided as face-to-face training funded and administered through the ESCs. Districts now have the option to review training materials in booklets or on CD-ROM, no longer supported through state funding, or pay to attend face-to-face training sessions through their ESC.

## **Mathematics**

The Texas Reading Initiative in cooperation with the TRAs allowed educators to focus their attention on building the reading skill of Texas school children. The same need was recognized in mathematics. Texas legislators and educators have agreed that Texas children will be expected to perform successfully in a world of dynamic technological changes. In order to succeed, they will have to develop strong problem solving skills that incorporate reasoning and logic into their decision making processes.

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<sup>1</sup> ARI funds are distributed to local education agencies on a formula basis, calculated from the number of students not passing the reading portion Grade 3 state assessment (TAAS or TAKS, depending upon the year).

In response to this need, a portion of House Bill (HB) 1144 (77<sup>th</sup> Legislature, 2001) created a new state mathematics initiative, which offers mathematics educators assistance ranging from help grading mathematics homework to conducting scientifically-based research of effective instructional strategies to improving student performance in mathematics. The initiative provides funding for research and student assessment to examine the success of high-performing schools, study effective teaching methods, evaluate student performance, and change teacher instructional practices following professional development training. The goals of the Texas Mathematics Initiative (TMI) include:

- Identify best practices and proven research-based models for mathematics instruction;
- Give teachers a clear understanding of the mathematics skills expected of students and the best instructional practices to enhance student performance;
- Bring together teachers, administrators, and mathematics experts to build consensus on reform efforts;
- Empower teachers, parents, and school districts to enact meaningful changes that will provide measurable results;
- Provide alignment between TEKS, textbooks, and assessments;
- Recruit and retain more highly-trained mathematics teachers; and
- Ensure that students are afforded the opportunity for intensive instruction if they fall behind their classmates.

A component of the TMI was to develop mathematics academies similar to the reading academies created under the TRI. The first Teacher Mathematics Academy (TMA) was delivered in the summer of 2002 for Grades 5 and 6 teachers. Grade 7 teachers were trained in the summer of 2003. Teachers attending the three-day training received a stipend with an additional amount available for completion of a diagnostic assessment program (Texas Mathematics Diagnostic System) on a fourth day.

## **Science**

In 2002, Governor Rick Perry announced a plan to make science a top educational priority in Texas schools. In 2003, the 78<sup>th</sup> Texas Legislature enacted a series of policies, aligned with this plan, that aim to eliminate student performance gaps in science by developing and implementing training for science

educators, create higher standards for science education, and provide intensive science instruction for struggling students.

In December 2003, the TEA, at the request of the Governor's Office, and in cooperation with the Texas Higher Education Coordinating Board (THECB) issued an RFP for Teacher Quality Grants – Type A - under the federal No Child Left Behind Act of 2001 (Type A). The Type A grants were awarded to grantees responsible for developing the course content for training modules in both mathematics and science.

In February 2004, TEA and THECB issued an RFP for Teacher Quality Type B Grants (Type B). The Type B grants were awarded to grantees responsible for delivering the training in coordination with a low performing school district partner.

This study will only address the science portion of these grants. The purpose of the Teacher Quality Grants program is to provide assistance to help teachers and other staff gain access to core academic subjects, that:

- Are sufficiently sustained, intensive, and of high quality to have a lasting and positive effect on the teachers' classroom performance;
- Are tied to challenging state content standards and challenging state student performance standards;
- Are integrated in to the systemic reform efforts of states, school districts, and individual schools;
- Reflects recent scientifically-based research on teaching and learning;
- Includes strong academic content and content-specific pedagogical elements; incorporates activities and effective strategies for serving historically underserved and underrepresented populations to promote learning and career advancement; and
- Are part of the everyday life of the school and creates an orientation toward continuous improvement throughout the school.

The content areas covered under the Teacher Quality Grants, Type A and B, include:

- Middle School Science, Part I (Grades 6-7)
- Middle School Science, Part II (Grade 8)
- Integrated Physics & Chemistry
- Biology

- Physics
- Chemistry

One key difference between the teacher quality grants and the reading and mathematics academies is the intended participant group. The reading and mathematics academies were broad-based and intended to reach teachers throughout the state, regardless of whether they taught on low-performing campuses. The Type B grants are more focused in that they involve cooperative planning and agreements with either an individual high-need school district or a consortium of high-need districts.

The module content was completed in August 2004 and the Type B grantees will begin rolling out the training in early 2005.

### **Purpose of Evaluating the Academies**

The TRA and TMA involved tremendous resources, both human and financial. However, when the academies were established, they did not include an evaluation component. There was no mechanism to determine whether the academies had the desired effect—improving student performance in reading and mathematics. The state had never undertaken an initiative of this kind and on this scope prior to the advent of these academies. If these types of initiatives were going to be expanded, some type of evaluation mechanism had to be developed to ensure the resources were being applied appropriately and both the state and the individual participants were receiving the desired outcome, both fiscally and in terms of academic achievement.

In addition to evaluating the effectiveness of the academies, the state is trying to determine whether additional funding should be appropriated to bring back these academies. In doing so, TEA must understand what components of the past academies were successful and what aspects should be changed in order to improve the academies. Very little cost analysis has been performed on professional development in general. The academies were no exception. The reality is that reinstating these academies will require a substantial investment by the state. It is therefore important that all stakeholders understand how the money has been used in the past and what lessons have been learned for the future. Knowledge gained in these evaluations will serve to inform future endeavors aimed at increasing teacher effectiveness and student achievement. Future funding will be money well spent if it does indeed translate into academic excellence.



## **Key Evaluation Questions for Reading and Mathematics Academies**

The evaluation team focused on the following five evaluation questions in its analysis of the reading and mathematics academies:

- How do the reading and mathematics academies compare with best practices?
- How did the reading and mathematics academies impact classroom practices?
- How did the Texas professional development academies impact student achievement in reading and mathematics?
- How cost effective were the Reading and Mathematics academies and are there opportunities to improve the cost effectiveness of these programs?
- What impact did the Texas professional development academies have on teacher retention and movement among districts, campuses and grade levels?

Each of these questions will be addressed in detail in subsequent sections of this report. The first four evaluation questions will be applied to the reading and mathematics academies. The final evaluation question will address the professional development academies as a whole. The more recently implemented science program will be evaluated utilizing a different set of elements:

1. A descriptive analysis of 2003-2004 student assessment data to assess the scope of the problem of students not meeting standards on the science portion of the TAKS test. This analysis will include a comparison of the scope of science-related TAKS failures to the percentages of students not meeting standards in mathematics and English language arts.
2. Based on the number of failing students in science and the literature review of best practices, the team will provide guidance on how to best implement selected professional development models in Texas.
3. A description of the professional development model currently employed in Texas (e.g., the Type A and Type B grants awarded through a TEA/THECB collaboration).
4. A brief summary of the model for professional development in science versus the face-to-face and online academy approach employed for reading and mathematics, including a review of existing literature supported by research for best practices in professional development in science.
5. Recommendations for an effective model of evaluating statewide professional development initiatives.

## **Report Format**

Following this introduction, a literature review will present the research that has previously been conducted on the impact of professional development.

The methodology section will describe the methods used by the evaluation team to answer the evaluation questions. This section will discuss the five approaches the evaluation team used in its analysis:

- Surveys of academy participants and administrators;
- Site visits and focus groups;
- Expert reviews of academy training materials;
- Data analysis of student performance and teacher/student retention); and
- Financial analysis regarding the cost effectiveness of the academies.

The next two sections of this report will present the evaluation of the reading and mathematics academies. This includes an assessment of the content of the academy training, how training impacted classroom practices, what impact training had on student achievement (e.g., TAKS passing rates, grade retention rates-not being promoted to next grade), and the cost effectiveness of the training programs.

The next section will present a preliminary review of the professional development program designed for science teachers in Texas. In the next section the reader will find the evaluation team's discussion of the impact that these academies have had on teacher retention. Finally, the evaluation team's conclusions and recommendations will be provided. Additional data to support the findings of this study can be found in the appendices at the end of this report.

## II. PREVIOUS STUDIES ON PROFESSIONAL DEVELOPMENT

A review of literature on high-quality professional development related to the reading, mathematics, and science teacher training activities suggests that improved teacher and student learning outcomes can be achieved through professional development programs that encompass key elements of high-quality professional development. Previous studies on the impact of professional development programs also indicate that professional development initiatives are also more effective if they include an evaluation process to monitor the extent to which the key characteristics are present and help educators progress toward specific student and teacher learning goals.

### Consensus View of Professional Development

The need for high quality, effective professional development for our nation's public school teachers has become more urgent due, in part, to the federal agendas of No Child Left Behind (NCLB) to help students meet high academic standards. The U.S. Department of Education released the revised and expanded version of the *Improving Teacher Quality State Grants, Non-Regulatory Guidance* on January 16, 2004 pertaining to the teacher quality provisions in *No Child Left Behind*.<sup>2</sup> This *Non-Regulatory Guidance* explains how state and local educational agencies can use *Title II, Part A* funds to ensure that all teachers are highly qualified and effective. According to the revised guidance, the term "high-quality professional development" means professional development that includes, but is not limited to, activities that:

- Improve and increase teachers' knowledge of academic subjects and enable teachers to become highly qualified;
- Are an integral part of broad school-wide and district-wide educational improvement plans;
- Give teachers and principals the knowledge and skills to help students meet challenging state academic standards;
- Improve classroom management skills;
- Are sustained, intensive, and classroom-focused and are not one-day or short-term workshops;

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<sup>2</sup> The revised non-regulatory guidance included a definition of professional development contained in the *Title IX*, Section 9101(34) of ESEA. This was retrieved on April 2, 2004 from [www.ed.gov/programs/teacherqual/guidance.doc](http://www.ed.gov/programs/teacherqual/guidance.doc)

- Advance teacher understanding of effective instruction strategies that are based on scientifically based research; and
- Are developed with extensive participation of teachers, principals, parents, and administrators.

Even before NCLB, working definitions of effective, high quality professional development began to converge on a set of similar characteristics and design principles resulting in what has come to be known as a “consensus view” of professional development (Corcoran, McVay, & Riordan, 2003; Elmore, 2002; Hawley and Valli, 1999). For example, the National Staff Development Council (NSDC), drawing on years of research and practical experience, developed twelve standards for high quality professional development, which offer a comprehensive framework for guiding the planning, implementation, and assessment of effective staff development.<sup>3</sup> Using these twelve NSDC standards, Sparks and Hirsh (1999) synthesized the characteristics of high quality, effective professional development. High quality, effective professional development:

- Is job-embedded and results-driven professional development which can be incorporated into every teacher’s work day;
- Focuses on improving student learning that deeply immerses teachers in their subject matter and instructional methods;
- Is curriculum-centered and standards-based;
- Is sustained, intellectually rigorous, and provides cumulative opportunities for implementing the content learned; and
- Requires strong leadership at all levels of the system to facilitate implementation.

The following sections provide a brief overview of the previous research on professional development, organized by these key characteristics.

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<sup>3</sup> National Staff Development Council (2001). NSDC standards for staff development (Rev. ed) Retrieved 4/2/2004 from <http://www.nsdc.org/standards/index.cfm>.

### **Job-Embedded Learning Opportunities**

Wood and McQuarrie (1999) described job-embedded learning as that which occurs as teachers and administrators complete their daily work activities, and does not necessarily relegate professional development to specific “in-service days.” As a part of the everyday work life, schools with high quality staff development programs embed learning structures for teachers into daily activities that include such elements as study groups, action research, and reflective logs (Joyce & Showers, 2002). They also provide teachers with ongoing opportunities for collaborative lesson planning, reflection on classroom experiences, and discussions of new understandings with each other, creating a culture of shared inquiry (Fullan & Miles, 1992; Sparks, 2000; Sparks & Hirsh, 1999; WestEd, 2000; Wood & McQuarrie, 1999).

### **Focus on Student Learning and Classroom Practices**

The relationship between professional development and student achievement is a complicated, indirect association (Guskey & Sparks, 1996; Joyce & Showers, 2002). Several factors, both internal and external to professional development programs (i.e., curriculum, school organization materials, support, leadership, student socio-economic status, parental involvement and expectations) makes it difficult to establish a direct link between teacher training and student outcomes. This becomes even more difficult to ascertain when long periods of time have passed between training and measurement. Because of the complex nature of these internal and external factors and the costs of conducting this type of research, there are only a few studies that examine the relationship between changes in teacher practices as a result of professional development and their effects on student achievement. Nevertheless, the studies that exist support the notion that teacher professional development impacts student achievement, particularly when the focus is on student learning goals and classroom practices.

For example, in a national study of Grade 8 students taking the National Assessment of Educational Progress (NAEP) in 1996, Wenglinsky (2000) found:

- In math, students whose teachers received professional development in working with special populations outperformed their peers by more than a full grade, and students whose teachers received professional development in higher-order thinking skills outperformed their peers by 40 percent of a grade level.
- In science, students whose teachers received professional development in laboratory skills outperformed their peers by more than 40 percent of a grade level.

In another national survey of elementary and secondary teachers about school reform, Alexander, Heaviside, Farris, & Burns (1998) reported that teachers who attended professional development activities which focused on academic standards were much more likely to teach using reform activities that raise student achievement.

Similarly, the National Reading Panel (NRP, 2000) reviewed several studies that measured the effects of teacher in-service professional development opportunities on student achievement. Thirteen of the fifteen studies reviewed that measured both teacher and student outcomes reported that professional development interventions resulted in improvements in student achievement. The authors of the NRP review concluded that, “[s]o long as the interventions themselves are based on solid research findings, the interventions in teacher education should produce positive results for teachers and their students” (NRP, 2000).

In another study, Huffman, Thomas, and Lawrenz (2003) examined the relationship between different types of professional development interventions, teachers’ instructional practices, and student achievement in mathematics and science. The types of professional development interventions included in this study were immersion, examining practice, curriculum implementation, curriculum development, and collaborative work. In general, the study found that examining practice and curriculum development were better predictors of standards-based instructional practices, but only curriculum development was related to student achievement. The study also concluded that professional development alone is not enough to improve student achievement, which reinforces the fact that student outcomes are dependent on a number of other factors, such as school culture and contexts (Sparks, 2002).

In a review of studies that examine the effects of professional development on student achievement, Kennedy (1999) found that the content of professional development (e.g., knowledge of how students learn specific subject matter and classroom management) was a better predictor of the benefit to students than the delivery or form of professional development (e.g., total contact hours, in-class visits from trainers, and whether whole faculties were involved). This suggests that the content of professional development may be more important than structural and organizational features of the professional development.

However, a focus on subject matter content and academic standards alone may not be sufficient for improving student achievement or in helping teachers meet the needs of diverse student populations. Scribner and Scribner (2001) highlighted the need to provide teachers with professional development focused not just on academic standards, but also on students' prior knowledge and cultural backgrounds in connection with standards, curriculum, and instructional techniques. And according to Clair and Adger (1999) and Garcia and Guerra (2004), professional development is more effective if it provides teachers with opportunities to discuss their beliefs and expectations about culturally and linguistically diverse students in a collaborative, ongoing manner.

While mixed, the findings from the range of studies just described indicate the importance of professional development that focuses on what students and teachers need to know and be able to do to ensure that all students achieve at high levels.

### **Collaborative Problem Solving**

Evidence from studies of award-winning professional development programs suggests that the most effective professional development occurs in a highly collaborative school environment or learning community where teachers and school staff work together to identify and solve problems (Hassel, 1999; WestEd, 2000). In studies of professional learning communities, researchers have found that school-wide improvement efforts are more likely to happen in an environment where there are opportunities for teachers to (1) observe one another's classrooms and provide feedback; (2) compare and discuss student work; and (3) initiate research projects designed to address areas of concern (Hord, 1997; Little, 1997; SEDL, 1997). In addition, Wood and McQuarrie (1999) offer a variety of suggestions for reducing teacher isolation and breaking down the "culture of privacy" to create collaborative practices for ongoing learning opportunities, such as study groups, action research, mentoring, and coaching. They conclude:

*"It is through experience, reflection, analysis and sharing and discussing that job-embedded learning becomes useful to the individual learner, and thus available to a school staff for improving the current practice. The more these learnings are generated and shared, the greater the chances that best practices of each individual in the school will become common practice across the school (p. 13)."*

In a four-year study of a team-based schooling initiative in a medium-sized urban district, Supovitz (2002) identified three attributes of teacher collaboration that were related to student performance:

- Effective professional learning communities prepare for instruction collaboratively, taking advantage of preparation as a learning opportunity. They examine and discuss student work in relation to standards and how it is differentially produced through a variety of instructional approaches.
- Community members sometimes teach together, often observe each other in the act of teaching, and always feel safe in doing so. Based on these common experiences, they offer constructive criticism of each other's strategies.
- Communities flexibly and purposefully regroup their students to take advantage of both the strengths of team members and the advantages of small student groups for particular instructional purposes (p. 1,617).

Schools that are successful at creating these collaborative practices make concerted efforts to reallocate time to make it happen and they track the progress of teachers' efforts and whether they have an impact on student learning (Hassel, 1999).

### **Consistent and Sustained Use of Professional Development**

Professional development is likely to be of higher quality if it occurs over a period of time and involves many hours of participation. In a national study of science and mathematics teachers, researchers concluded that the duration (i.e., both time span and contact hours) of a professional development session predicted its success (Garet, Porter, Desimone, Birman, & Yoon, 2001). Teachers reported greater improvement in teaching practice when their activities extended over a longer period of time. Furthermore, the likelihood of teachers implementing what they learned increased if teachers had ample opportunities to try out new practices and discuss the use of the new practices with their peers (National Partnership for Excellence and Accountability in Teaching, 1999). This ongoing approach to professional development requires commitment by the schools and districts over a sustained period of time. In a study of high-poverty, high-performing schools, districts reportedly shifted their professional development offerings from a large menu of disconnected issues to a focus on carefully designed professional development days targeting key topics over longer periods of time to focus on the most important needs that emerged from the data. One district administrator in this study explained: "Professional development must be comprehensive, not just the feel-good flavor of the month. We have pushed to get away from something different every day. We look to address issues in depth" (Togneri & Anderson, 2003).



Ensuring that professional development is consistent and sustained requires a well-designed, long-term plan that includes a focus on specific student and teacher learning outcomes as well as specific strategies for providing teachers with the time and resources necessary to continuously improve upon their knowledge and skills related to the learning outcomes desired (Guskey, 1999; Joyce & Showers, 2002). Citing Little's 1997 study of numerous restructuring schools, Hassel (1999) explains that highly effective schools are those that are able to "weather the conflicting policy mandates and practices to which they are subjected and maintain a clear path with well-established goals" (p. 94). One important element of sustaining consistent professional development efforts is to find regular time for teachers to engage in ongoing learning opportunities in their schools. Watts and Castle (1993) identified five ways that schools and districts created time for teacher professional development:

- They "freed up time" using teaching assistants, college interns, parents, and administrators to cover classes; regularly scheduled early release days;
- They "restructured or rescheduled time" lengthening school day on four days with early release on day five;
- They "better-used time" using regular staff or district meetings for planning and professional growth rather than for informational or administrative purposes;
- They utilized "common time" scheduling common planning periods for colleagues having similar assignments; and
- They "purchased time" establishing a substitute bank of 30-40 days per year, which teachers can tap when they participate in committee work or professional development activities.

### **Organizational Support and Resource Allocation**

Successful professional development requires strong instructional leadership as well as organizational structures to support teacher learning (Harris, 2003; NSDC, 2001; Wiley, 2001). For example, in a comparison of three school improvement projects in three different countries that have been identified as "successful" in sustaining organizational and pedagogical change, a key finding was that, "changing organizational arrangements within schools will do little to promote pedagogical improvement without concurrent attention to building an infrastructure to support collaboration and mutual learning" (Harris, 2003, p. 379).

Effective professional development also requires that schools and districts devote significant resources to teacher learning opportunities so that teachers have sufficient time to engage in collaborative activities and receive adequate training, guidance, and materials. Several studies on school finance and resource allocation have found that the typical school district spends professional development dollars in an uncoordinated, non-strategic fashion and that significant funds could be freed up through reallocation (Miles, 2000; Miles, Bouchard, Winner, Cohen, and Guiney, 1999). In contrast, districts that have been successful in improving student achievement allocate resources in ways that increase and coordinate the amount of resources (including money, time, staffing, and space) dedicated to improving instruction (SEDL, 2003).

Known as “needs-based budgeting,” this approach to resource allocation emphasizes the importance of aligning resources to the accomplishment of student learning goals, including those dedicated to professional development opportunities. SEDL’s report of fiscal and staffing patterns in four states “underscores the fact that aligning resources to improvement goals is a way of doing business and not simply a reflection of expenditure line items or intentions stated in an improvement plan” (SEDL, 2003). Districts that take the time to conduct a thorough review of all existing resources and how they are being spent are better able to consolidate and focus existing resources to address their most important goals (Hassel 1999).

The following sections describe what are considered to be the most important research findings specifically related to reading, mathematics, science, and online teacher professional development. While these content areas of professional development reiterate the need for many or all of the characteristics of high quality professional development described above, each discipline has unique concerns in the current educational reform setting.

### **Reading Professional Development**

In the area of reading, recent research has focused on early childhood reading and reading in the primary grades. In a national report, *Preventing Reading Difficulties in Young Children*, a National Academy of Science Committee concluded that “quality classroom instruction in kindergarten and the primary grades is the single best weapon against reading failure” (Snow, Burns, & Griffin, 1998). According to the report, effective early reading instruction requires that children:

- Use reading to obtain meaning from print;
- Have frequent and intensive opportunities to read;
- Are exposed to frequent, regular spelling-sound relationships;
- Learn about the nature of the alphabetic writing system; and
- Understand the structure of spoken words.

According to a CIERA (Center for the Improvement of Early Reading Achievement) *Beat the Odds* study of effective schools and accomplished primary grade teachers (Taylor, Pearson, Clark, & Walpole, 1999), the best reading practices among teachers in the most effective schools included small group instruction; more communication with parents; children engaged in independent reading; more coaching during reading as a way to help children apply phonics knowledge; and more higher level comprehension questions.

In their review of research on the impact of teacher professional development on student performance, the National Reading Panel found a growing body of evidence that supports the relationship between what teachers' education and student achievement (National Institutes of Health, 2000). They concluded that "although this body of research does not, at present, converge on highly explicit and specific recommendations for teacher education, it does suggest that teacher education is successful in most contexts...and that when teacher education is successful, student performance improves as well" (chapter 5, p. 13). The panel also concluded that reading teachers need extensive support (both money and time) and that this support should be continued for an extended period of time.

These conclusions were also supported by CIERA in their description of principles for sustained professional development, which include the following guidelines for improving reading instructional practices:

- Concentrate on the relationship between curriculum standards and student performance;
- Think about the implications of reading improvement activities for the students in the classrooms;
- Consider both the content and design of these activities;
- Engage in collaborative problem-solving with fellow teachers;
- Ensure that professional development is ongoing, adequately funded, and soundly supported by school administrators;

- Inform professional learning decisions by evaluating student performance and program effectiveness, using multiple forms of assessment; and
- Embed professional learning activities within a comprehensive school change process (Birdyshaw, 2001).

## **Mathematics Professional Development**

Specific to mathematics professional development, recent research has emphasized the need to improve teachers' content knowledge and pedagogical content knowledge. Ma (1999), Ingersoll (1999), Cohen and Ball (1999) and others have found that teachers often lack a deep understanding of mathematical content and the methods to teach that content well.

According to Ball, Lubienski, and Mewborn (2001), there have been two primary areas of research focused on this problem, one focused on teacher qualifications (how many courses, degrees or certifications a teacher has acquired) and another focused on what kind of knowledge teachers need to teach. This knowledge, often called pedagogical content knowledge (Shulman, 1987) "is an intertwining of knowledge about how ideas might be represented, how students learn, and what they find difficult" (Ball, Lubienski, & Mewborn, 2001, p. 441). Because teachers are in charge of instruction, "their interpretation of educational materials affects curriculum potential and use, and their understanding of students affects students' opportunities to learn" (Cohen & Ball, 1999, p. 4). If teachers' understanding of mathematics is not well developed, they are "less likely to recognize the mathematical sense in a student's representation or solution, leading to an inappropriate assessment of the student's capabilities" (Rand Mathematics Study Panel, 2003, p. 22).

## **Science Professional Development**

Effective professional development in science shares many of the same concerns of mathematics professional development. Like mathematics, many research-based practices in science professional development emphasize a need for strengthening teachers' content and pedagogical content knowledge of science (Carpenter, Blanton, Cobb, Loeffel, Franke, Kaput, & McClain, 2004; Loucks-Horsley, Stiles, & Hewson, 1996; Mundry & Loucks-Horley, 1999; National Research Council, 1996; Weiss, 1997). Science education reform has been guided by the development of

the National Science Education Standards (National Research Council, 1996). Weiss (1997) points out that the standards emphasize how science education should do the following:

- Promote high expectations for all students;
- Focus on in-depth learning of a limited number of powerful concepts, emphasizing understanding, reasoning, and problem-solving rather than memorization of facts, terminology, and algorithms;
- Integrate scientific inquiry with knowledge of science concepts and principles;
- Engage students in meaningful activities that enable them to construct and apply their knowledge of key science concepts;
- Reflect sound principles from research on how students learn; use cooperative learning and techniques for asking questions that promote interaction and deeper understanding;
- Feature appropriate, ongoing use of calculators, computers, and other technologies;
- Empower students by enabling them to do science, and increase their confidence in their ability to do so;
- Develop in students the scientific literacy necessary to make informed decisions and to function as full participants in society; and
- Assess learning as an integral part of instruction.

Included in the National Science Education Standards are a set of Professional Development Standards, which are focused on four areas:

- The learning of science content through inquiry;
- The integration of knowledge about science with knowledge about learning, pedagogy, and students;
- The development of the understanding and ability for lifelong learning; and
- The coherence and integration of professional development programs. (National Research Council, 1996)

Loucks-Horsley, Stiles, and Hewson (1996) add that the best professional development for science educators:

- Is driven by a clear, well-defined image of effective classroom learning and teaching;

- Provides teachers with opportunities to develop knowledge and skills and broaden their teaching approaches so they can create better learning opportunities for students;
- Uses instructional methods to promote learning for adults which mirror the methods to be used with students;
- Builds or strengthens the learning community of science teachers;
- Prepares and supports teachers to serve in leadership roles if they are inclined to do so;
- Consciously provide links to other parts of the educational system; and
- Includes continuous assessment.

The National Research Council (1996) suggests that reforming science education requires substantive changes in how science is taught, which requires equally substantive change in professional development practices at all levels. Indeed, in her report on a national survey of 6,000 teachers in the United States about the status of science and mathematics education, Weiss (1997) found that science and mathematics teachers were generally supportive of the science and mathematics instruction outlined in the NCTM and NRC standards. Yet, the instructional practices that teachers reported using tended not to be the ones they themselves said were most effective (e.g., collaborative, small group, student-centered, inquiry-based instruction, etc.). She concluded that:

*It is essential that reform efforts recognize that while the NCTM and NRC standards call for high expectations and quality instruction for all students, schools are not alike in their capacity to implement these recommendations. Policymakers must take steps to ensure that adequate resources including well prepared teachers, appropriate facilities, and high quality instructional materials are available to all schools. Otherwise, schools without the resources to effectively implement new, higher standards will be left even further behind.*

## **Online Professional Development**

As previously noted, NSDC has been a leader in identifying standards for high quality, effective professional development. In “E-Learning for Educators,” NSDC holds online learning to the same standards as other more traditional forms of professional development. NSDC (2001) makes the following claims:

*Because staff development available through electronic resources serves the same function as face-to-face staff development, the context necessary to support adult learning, the processes*

*by which they learn, and the content they need to increase student achievement are the same. E-learning has the potential to expand and enrich learning opportunities for educators employing alternative learning processes not available in the face-to-face arena. However, in order to be as effective as face-to-face staff development in deepening understanding and improving performance of both educators and their students, e-learning for educators will need to meet the same high standards as those for face-to-face professional learning (p. 4).*

In addition to emphasizing the importance of high standards for online professional development, NSDC also suggests that additional considerations must be made, such as the costs of maintaining the infrastructure and support necessary for teachers to effectively use the technology associated with online learning. In addition, NSDC suggests that:

*It is imperative that measures of the effectiveness of e-learning for educators reach beyond the number of participants, completion rates, or preference for e-learning over face-to-face staff development to application of learning and results for students (p. 11).*

In a more substantive review of research on online learning environments, Sunal, Sunal, Odell, and Sundberg (2003) found that “online learning is neither better nor worse than face-to-face classroom instruction” (p. 16). From their review of the literature they also concluded that “at the present time, the lack of adequately designed research does not allow us to rate online instruction as better, or even as the same, as traditional forms of classroom instruction” (p. 17). Nevertheless, the studies reviewed provide useful information for further examination of online learning environments and some tentative guides to effective practice. Based on these findings, the authors developed a checklist for online interactive learning including four categories: 1) student behavior; 2) faculty-student interactions; 3) technology support; and 4) learning environment. Examples of effective practices related to these four categories include:

- Student behaviors: encouragement of student use of a variety of communication techniques, such as discussion boards, journals, and e-mail, as a means to enhance interactive learning.
- Faculty-student interaction: personalizing communications with students and providing continuous, frequent supportive feedback throughout the online course.
- Technology support: insuring a low level of technical difficulty in accessing the Web site or communicating with others.
- Learning environment: social interaction through group collaboration.

Graham, Cagiltay, Lim, Craner, and Duffy (2001) also developed a set of best practice principles, or “lessons learned,” from an evaluation of four online university courses. The seven principles, suggested for developers of online learning, included the following lessons:

1. Instructors should provide clear guidelines for interaction with students to maximize interactions while maintaining communications to a manageable load;
2. Well-designed discussion assignments facilitate meaningful cooperation among students;
3. Students should present course projects to promote active learning;
4. Instructors need to provide two types of feedback: information feedback and acknowledgement feedback;
5. Online courses need deadlines to encourage students to spend time on tasks and help students with busy schedules avoid procrastination;
6. Challenging tasks, sample cases, and praise for quality work communicate high expectations; and
7. Allowing students to choose project topics incorporates diverse views into online courses.

The authors note that these principles were based on a limited scope of work and were not based on a more “rigorous research project.” However, these seven principles reflect similar ones set forth in the Sunal et al. review of research, indicating the convergence of our understanding of best practice for online learning environments.

The conclusion drawn from the review of literature on online learning indicates that there are generally no unique principles of professional development that apply only to online learning opportunities. Indeed, what constitutes good professional development is the same for online learning as it is for face-to-face learning opportunities. Nevertheless, some specific practices may enhance the success of online learning and special considerations should be made to ensure that the technological resources and infrastructure are in place to support it.

### **Cost-Effectiveness of Professional Development**

Despite the numerous studies identifying the components of effective professional development programs and the impact of those programs, there is a limited amount of research available on the cost effectiveness of professional development. Several reasons can be cited to explain this lack of information. Professional development costs are often mixed across funding sources and not



grouped by initiative. For example, federal law allows for up to 10 percent of Title I funds to be allocated for professional development. In addition to Title I funds, many state grants are also available to fund teacher professional development. School districts often track these budget items by program rather than by the type of training conducted. As a result, determining the actual cost of specific professional development programs is difficult.

Standards-based educational reform (e.g., the federal No Child Left Behind Act of 2001) has increased the need for quality professional development for teachers. As the research previously described indicates, intensive, high quality professional development can play an important part in raising student performance and improving schools. However, research on professional development expenditures suggest a wide range of school district spending levels ranging from 1 percent of operating budgets to more than 8 percent. As reported in the *Journal of Education Finance*, none of the existing studies systematically capture the targets, purpose, and organization of professional development activities.<sup>4</sup> Without this understanding, it is very difficult to evaluate the effectiveness of school district investments in professional development, or create a strategy that directs resources to the most important priorities.

Several studies have been undertaken to develop a more consistent and comprehensive system for tracking professional development expenditures (Chambers, 1999; Killeen, et al., 2002; Miles and Hornbeck, 2000; Odden, et al., 2002; Rice, 2001). For example, the Consortium for Policy Research in Education (CPRE) collaborated with Jennifer King Rice to identify the following eight core elements of professional development spending:

1. Teacher time;
2. Training and coaching;
3. Administration;
4. Materials, equipment, and facilities;
5. Travel and transportation;
6. Tuition and conference fees;
7. Future salary obligations; and
8. Research and development.

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<sup>4</sup> “Inside the Black Box of School District Spending on Professional Development: Lessons from Five Urban Districts,” *Journal of Education Finance* (Miles, Odden, Fermanich, and Archibald, Summer 2004).

However, most studies consider only the direct cost of training and coaching and ignore the costs of designing, administering, and supervising these efforts.

To date, research has not focused on the cost-effectiveness of particular training programs, but rather on overall annual school district professional development expenditures, which can range between \$2,000 and \$6,000 per teacher. In fact, there has been very little evaluation conducted on targeted teacher training initiatives in most states. As a result, many states and school districts have no idea of what they actually spend on professional development programs because state accounting systems make it difficult to aggregate professional development expenditures, and few school districts attempt to track them.<sup>5</sup>

Targeted training initiatives, such as teacher academies, are investments in a smaller cadre of teachers, compared to the regular in-service training programs conducted periodically by school districts. However, under these targeted training programs, it is assumed that teachers who attend the training will bring the newly learned strategies back to the district and share those strategies with teachers that did not attend the training. In this way, these targeted training initiatives derive their cost effectiveness by generating a “ripple effect” that spreads the concepts to more teachers than actually participated in the training. To the extent that the benefits of the training extend beyond the primary participants, the per teacher cost is appreciably lower than the per participant cost. According to the research, investments in professional development that are rolled out in narrow concentrations rather than through broad distribution channels are more defensible if they can meet at least one of the following three criteria:

1. The expenditures can be credibly tied to a ripple effect so that the per teacher cost is demonstrably lower than the per participant cost;
2. One can claim that the direct individual benefit of the academy is far more certain than the benefit linked to less defined training sessions; and/or
3. The targeted training program contributes in demonstrable ways to increased organizational capacity in ways that transcend the impact of those individuals who participate directly in the program.<sup>6</sup>

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<sup>5</sup> CPRE Policy Brief: *Helping Teachers Teach Well: Transforming Professional Development*, June 1995.

<sup>6</sup> *Systemic Reform: Perspectives in Personalizing Education*, September 1994.

There is a difference in the cost of an in-house district training program conducted during in-service training sessions throughout the school year and targeted training initiatives, such as special teacher academies (Miller, Lord, Durnay, 1994). The most straightforward method of comparing costs is to divide the direct monetary expenditures by the number of actual training participants to arrive at a per participant cost. However, it should be noted that the results of this calculation will be dependent on the researcher's ability to identify and include all associated costs of training. In a 1993 study conducted in California (*Systemic Reform: Perspectives in Personalizing Education*, September 1994), it was determined that the per participant cost of special training programs may exceed \$2,000.<sup>7</sup>

One important aspect when determining the cost-effectiveness of any professional development program is the potential impact on teacher turnover. Teacher turnover has been shown to be a significant cost to school districts in Texas. It is estimated that one-third of beginning teachers leave the profession within their first three years. In a November 2000 study prepared for the Texas State Board for Educator Certification (SBEC) as a part of the Texas Beginning Educator Support System (TxBESS) initiative, it was estimated that the state loses between \$329 million and \$1.2 billion each year due to teacher turnover, translating to a range of \$335 to \$5,166 per teacher. Included in the cost of teacher turnover are the cost of separation, replacement or hiring costs, training costs, and the learning curve loss. High rates of teacher turnover may have a significant impact on school health and climate, complicating the ability of schools to plan and implement new programs, conduct professional development, and provide support systems for school faculty.<sup>8</sup> Low rates of staff turnover may increase the capacity of schools to plan over time, implement new programs, and strengthen collaboration and teamwork among staff members.

## **Evaluation of Professional Development on Classroom Practices and Student Outcomes**

The research and clinical understanding of what constitutes high quality, effective professional development has been defined and widely accepted for some time. However, as Elmore (2002),

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<sup>7</sup> For example, the California Mentor Program allocates \$6,000 per teacher to each teacher selected as a mentor. Two-thirds of the allocation goes directly to the teacher as a stipend; the remaining third is allocated to the district in support of the mentor's work.

<sup>8</sup> Guin, K., *Chronic Teacher Turnover in Urban Elementary Schools*, Education Policy Analysis Archives, August 2004

Hawley and Valli (1999), and others have acknowledged, the majority of professional development opportunities that teachers experience still do not adhere to the standards or principles of high quality professional development. Elmore (2002) suggests that the gap between what we know and what really happens “is not so much about knowing what good professional development looks like; it’s about knowing how to get it rooted in the institutional structure of schools” (p. 11). In light of this disconnect or gap in our knowledge and practice, evaluation can serve an important function in bridging the two by examining what is in practice and comparing this practice to the standards. In addition, evaluation can help identify the strengths and weaknesses of current practice and help develop the chain of evidence to determine how learning opportunities for teachers lead to improved student learning.

Experts on professional development suggest that evaluations of professional development should be addressed at multiple levels (Guskey, 2000; Killion, 1998; Mizell, 2003). For example, Guskey’s (1998, 2000) model for evaluating professional development includes the following five levels:

1. Participants’ reactions to the professional development opportunity;
2. Participants’ learning as a result of the opportunity;
3. Organizational support and preparedness to help teachers implement what they learned;
4. Participants’ use of new knowledge and skills; and
5. Student learning outcomes.

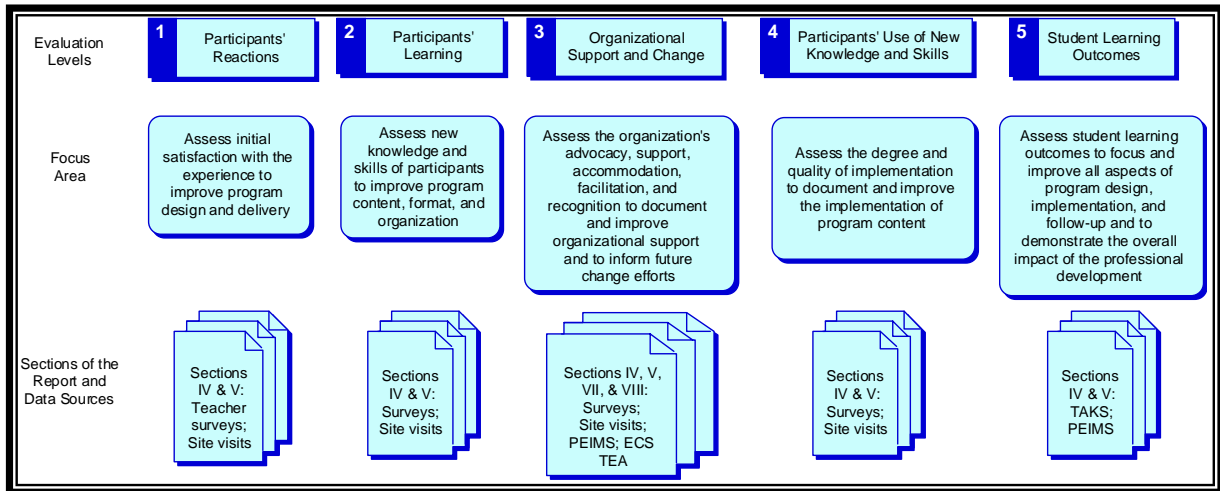
This approach to evaluation essentially provides a framework for connecting the dots between teachers’ professional development experiences and the impact on students. However, within this framework, the process of gathering evaluation information at these different levels moves from rather simple to more complex types of questions and correspondingly requires more time and resources to gather the information. As a result, many professional development efforts are not effectively evaluated, which can in turn result in the continuation of ineffective practices or the elimination of effective ones.

An important part of the Guskey approach to evaluating professional development is to become very clear about the professional development goals for teacher and student outcomes. Obtaining information about district or campus professional development programs aides in designing or confirming logical connections between desired outcomes and teacher professional development

opportunities (Champion, 2002, 2003). Clear goals for professional development have demonstrated improvements in teaching practices when connected to other ongoing school improvement endeavors (Parsad, Lewis, & Farris, 2001). Further, when staff members work together to achieve school goals, improvements in student learning, more effective teacher practices, and the setting of high standards for both teachers and student have been attained (Hassel, 1999).

In this evaluation of the Teacher Reading and Mathematics Academies and the Science Teacher Quality Grants, the Guskey approach is useful for determining the degree to which the academies and science grants adhered to standards or principles of best practice and their overall success in improving student achievement. To a large extent this evaluation assesses the success and impact of the academies and science grants at the five levels, which are described in the findings sections of this report. This is best illustrated by Exhibit 1.

**Exhibit 1**  
**Framework for Evaluating the Impact of the Teacher Reading and Mathematics Academies and the Science Teacher Quality Grants Using Guskey’s Model for Evaluating Professional Development**

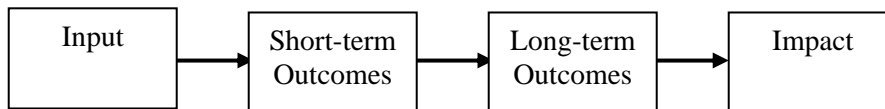


Source: Guskey (1998, 2000) and SEDL, 2004.

### III. EVALUATION METHODOLOGY AND DATA SOURCES

A challenge when evaluating the effectiveness of targeted professional development programs, such as the Teacher Reading Academy (TRA), Teacher Mathematics Academy (TMA) and Online Teacher Reading Academy (OTRA), is to avoid using an overly simplistic approach to evaluation—one that fails to explicitly describe the underlying theory and operations of the staff development and to delineate the linkages between the staff development experiences and resources, their interactions, and the expected student outcomes (Guskey, 2000). Student learning or achievement results from many factors and takes place in complex systems such as schools and districts, thus introducing extraneous variables in addition to teacher training that may contribute to these outcomes. A thorough evaluation will reveal the logic of the transformation process that starts with inputs like teacher training and materials, moves to short term outcomes like changes in teacher knowledge and skills, on to changes in teacher practice and finally resulting in improved student outcomes (Killion, 2002).

A model of this process is depicted below:



Since the reading, mathematics, and science teacher training activities evaluated in this report include multiple aspects of the above model, a multifaceted research design is necessary to ensure that the evaluation of these professional development initiatives is both comprehensive and valid.

In order to adequately address each of the evaluation questions for this study, the evaluation team utilized a combination of qualitative, quantitative, and expert review methodologies, including:

- Direct observations, follow up teacher interviews, administrator interviews, and focus group interviews with academy participants and non-participants to observe the degree to which academy participants implemented what they learned in the training activities and to assess the implementation and application of the academies' objectives across campuses;
- Surveys of both academy participants and administrators to gauge perceptions regarding the perceived effectiveness of the teacher training activities and whether the training resulted in changes in classroom practices;

- Expert reviews of academy training materials to determine whether the TRA, TMA, OTRA, and science training materials reflect “best practices” in teacher professional development using national standards and recent research on teacher professional development;
- Analysis of PEIMS data, TAKS results, data collected by the Education Service Centers (ESCs), and school district survey data to examine the impact of the reading, mathematics, and science teacher training activities on student achievement and teacher and student retention; and
- Analysis of financial data to assess the cost effectiveness of the TRA, TMA, OTRA and Science Teacher Quality Grants programs.

The following sections provide a brief overview of each of these research methodologies.

### **On-Site Visits: Observations and Interviews with Academy Participants and Administrators**

In an attempt to determine the degree to which teachers implemented what they learned in the training activities and to assess the implementation and application of the academies’ objectives across campuses, the evaluation team conducted several on-site visits with schools that had participated in either the TRA or TMA programs. The evaluation team first obtained a list of school districts that had participated in the TRA and TMA trainings from the ESCs and then selected a sample of school districts that participated in both academies and reflected the diversity of the state in terms of geography, ethnicity, and economic disadvantage. The entire evaluation team reviewed the sample and discussed districts for site visits. The list of suggested districts was submitted to TEA for review. TEA required that no districts participating in Reading First be included. TEA sent letters to district superintendents explaining the project and requesting district participation and contact persons to coordinate site visits. The evaluation team then directly contacted superintendent offices (see Exhibit 2 for characteristics of participating districts). The designated district contact, district staff, and/or administrators selected specific schools for site visits. Principals and/or administrative staff at these selected schools identified teachers to participate in the evaluation.

**Exhibit 2**  
**Characteristics of School Districts That Participated in On-Site Visits**

District	Region	Rating*	Student Enrollment	Economically Disadvantaged	African American	Hispanic	White	Other
Abilene	14	R	17,420	54.3%	12.5%	31.0%	54.9%	1.6%
Edgewood	20	AA	13,153	96.0%	1.6%	97.1%	1.1%	0.1%
Edinburg	1	AA	23,985	85.3%	0.2%	96.8%	2.7%	0.3%
Fort Bend	4	R	59,217	23.7%	29.2%	19.3%	33.6%	18.0%
Hallsville	7	R	3,761	31.1%	7.0%	4.3%	88.0%	0.6%
Lewisville	11	AA	42,922	13.6%	7.8%	14.9%	70.7%	6.6%
Lufkin	7	R	8,216	59.6%	31.8%	26.4%	40.7%	1.1%
Socorro	19	AA	29,919	71.5%	1.3%	92.4%	5.7%	0.6%
Wichita Falls	9	R	14,951	49.3%	17.7%	20.9%	58.2%	3.2%

Source: Academic Excellence Indicator System (AEIS), 2002-03 School Year Data.

<http://www.tea.state.tx.us/perfreport/aeis/2003/district.srch.html>.

Note: \*R = Recognized, AA = Academically Acceptable

A primary interest of this report was to detect changes in teacher behaviors and approaches within the classroom after attending the academies. Direct observation by the evaluation team coupled with follow-up interviews provided an opportunity to identify changes in classroom practices and teaching techniques. However, it is important to note that single one-hour classroom observations, such as those used in this evaluation, do not necessarily provide comprehensive depictions of teachers' practices. To address this concern, the evaluation team conducted follow-up structured interviews with teachers and administrators to gather additional information regarding classroom practices and perceptions regarding the quality of training materials. These interviews were useful in providing a context for the classroom observations.

The classroom observation and follow up interview protocols, developed by the evaluation team, focused on the use of academy-supported objectives for content and pedagogy. In an attempt to ensure the validity of the information gathered during the on-site visits and follow up interviews, these protocols were piloted across six school districts and members of the evaluation team received training in the use of these observation and interview protocols prior to the on-site visits. The evaluation team completed a total of nine, three-day visits to schools between August and September 2004 (primarily to Grade 5 mathematics and Grade 3 reading classrooms). Exhibit 3 provides information regarding the characteristics of the teachers who participated in these classroom observations.

Following each classroom observation, evaluation team members interviewed teachers about the observed lesson as well as their experience attending the academies, if applicable. Evaluators also



interviewed campus principals about their awareness of the academies' objectives and their perceived impact of the academy training campus- and district-wide. A total of 54 teacher and 21 administrator interviews (approximately six teacher interviews and two administrator interviews per school) were conducted by the evaluation team.

**Exhibit 3**  
**Characteristics of Teachers Who Participated in Classroom Observations**

By Academy Type and Attendance	Average Years Experience	Average Class Size
Math Participant (n = 21)	16.9	22.0
Math Non-participant (n = 5)	13.2	24.4
Reading Participant (n = 21)	12.4	17.4
Reading Non-participant (n = 7)	14.7	15.6

*Source: Analysis of teacher participant data collected by evaluation team, 2004.*

Additionally, the evaluation team conducted a total of nine structured focus group interviews, one at each site. Ninety-seven teachers participated in the focus groups, averaging eleven per site. Focus group interviews included a wider group of teachers than those selected for direct observation, some of whom had not attended the academies. These focus groups spanned multiple grade levels in order to assess the implementation and application of the academies' objectives across campuses. For information regarding the characteristics of the teachers who participated in the focus groups, see Exhibit 4.

District contacts, designated by the superintendent, were responsible for inviting teachers to participate in the focus groups. The evaluation team requested that each focus group consist of six to ten teachers from Grades K-6 who teach reading and/or mathematics, including teachers who had attended the reading or mathematics academies and some of whom had not, and that some of the teachers be ones who were not scheduled to be observed and interviewed during the site visit. Each focus group was scheduled for 1 1/2 hours in length, usually after school. The evaluation team posed questions to the participants and those who wished to respond to a particular question did. Participants were encouraged to build on one another's responses. The purpose of the focus group interview was to allow people time to reflect and recall experiences as well as amend any initial accounts that upon hearing others' responses may have led to other ideas.

**Exhibit 4**  
**Characteristics of Teachers Who Participated in Focus Groups**

By Academy Attendance	Average Years Experience
Participant (n = 60 )	15.37
Non-participant (n = 27 )	11.81

*Source: Analysis of teacher participant data collected by evaluation team, 2004.*

## Surveys of Academy Participants and School Administrators

### Teacher and Administrator Surveys

Given that a limited number of school districts were visited for site observations and focus groups, a broader base of teachers and administrators was surveyed by the evaluation team in an effort to gauge their perceptions regarding the perceived effectiveness of the Reading (TRA), Mathematics (TMA), and the Online Teacher Reading Academies (OTRA). Four separate survey instruments were developed: a reading teacher survey, a mathematics teacher survey, an online reading academy participant survey, and an administrator survey. These surveys were designed to assess teachers' and administrators' perceptions regarding the extent to which the TRA, TMA, and OTRA teaching strategies were being implemented into classroom practice. All of the teacher survey respondents (including academy participants and non-participants) were asked to provide background information (e.g., teaching experience, highest level of education attainment, etc.) and to indicate how frequently they use certain instructional strategies when teaching reading or mathematics in their classes. In addition, teachers who had participated in the TRA, TMA, and OTRA trainings and administrators who referred teachers to the trainings were asked to evaluate the effectiveness of the trainings. Finally, the surveys assessed perceptions regarding several issues addressed in the scope of the study including the accessibility of the training, the role of stipends, potential alternatives to stipends, effectiveness of identification of struggling learners, effectiveness of grouping strategies, ease of implementation, effectiveness of the diagnostic assessments, and the adaptation of academy instructional techniques. The members of the evaluation team, TEA staff, and external content advisors reviewed the survey instruments to check for item clarity. As a measure of validity, a sample of teachers and administrators pilot tested each instrument and critiqued the items.

### Reading and Mathematics Teacher Survey Sample

Approximately 4,026 surveys were distributed to reading and mathematics teachers between September 1 and September 22, 2004. In order to provide the best coverage among the various geographic regions, years of training, grade levels, and reading and mathematics, the evaluation

team utilized a stratified random probability survey sample. The first sample stratum consisted of four groupings of the 20 ESC regions of the state. The second stratum was a compound of grade level and year of training. For example, for reading, Kindergarten teachers were the target for 1999, Grade 1 for 2000, and so forth. Earlier grade level training was also included in subsequent years (see Appendix D for a full description of the survey sampling design). For comparison purposes, the survey sample included teachers who did and did not attend TRA or TMA trainings. A summary of the teacher sample is included in Exhibit 5.

**Exhibit 5**  
**Distribution of Reading and Mathematics Teacher Sample**

ESC Cluster	Reading		Mathematics	
	Trained	Not Trained	Trained	Not Trained
1,2,3,19,20	431	210	177	113
4,5,6,7,8	586	286	241	154
9,10,11,12,13	685	334	282	180
14,15,16,17,18	160	78	66	42
<b>TOTALS</b>	<b>1,862</b>	<b>908</b>	<b>766</b>	<b>489</b>

Source: *Teacher and Administrator Survey, 2004.*

### Administrator Survey Sample

The teacher sample was grouped, when possible, by district and last listed campus (2004) with a total of 2,591 campuses receiving packages of surveys that included one administrator survey and between one and six teacher surveys in reading and/or mathematics. The administrator survey was targeted to the campus principals for every school campus receiving a set of surveys. Hard copies of surveys with a letter explaining the context and purpose of the surveys were mailed to the campus principals. The principals were asked to complete the administrator survey and distribute the teacher surveys to the teachers identified on the cover letters. A total of 2,591 campus principals made up the administrator sample.

### OTRA Teacher Participant Sample

A list of the teachers who participated in the OTRA training was obtained from the University of Texas' Vaughn Gross Center for Reading and Language Arts. Those who participated only for demonstration, those who did not have contact information, and the teachers who were selected for TRA survey were then removed, resulting in a total population of 2,294 OTRA participants. Of the 2,294 possible OTRA participants, 411 were randomly selected for the survey to achieve a 95 percent level of confidence. OTRA surveys were mailed to each of the selected OTRA participants directly.

### Paper and Online Survey Options and Response Rates

In the end, a total of 7,028 surveys were mailed to reading teachers, mathematics teachers, online training participants, and administrators. Each of the survey recipients was given the option to return the paper survey using pre-paid envelope or to complete the survey online using a unique identification number. The identification number allowed the evaluation team to track the response rates for every survey (see Exhibit 6) and identify non-respondents. Of the total 7,028 survey sample, 2,555 completed surveys either on paper or online. The teacher surveys included several items on teachers' background information, including the number of years of teaching experience, education level, ethnicity, and grade levels taught. A summary of the respondents' background information is presented in Appendix D.

**Exhibit 6**  
**Disposition of Survey Sample and Survey Response Rates**

Survey	Number of Surveys Sent	Number of Surveys Returned Unknown*	Number of Surveys Returned Mail	Number of Surveys Returned Online	Total Surveys Returned*	Response Rate
Reading	2,769	118	847	185	1,032	37%
Mathematics	1,257	82	238	76	314	25%
Online Participant	411	13	53	17	70	17%
Administrator	2,591	44	967	172	1,139	44%
<b>TOTALS</b>	<b>7,028</b>	<b>257</b>	<b>2,105</b>	<b>450</b>	<b>2,555</b>	<b>36%</b>

Source: Teacher and Administrator Survey, 2004.

Note: \* Total Surveys Returned does not include "Surveys Returned Unknown" (i.e., academy training status was unknown).

### Expert Review of Teacher Academy Training Materials

Nationally recognized experts in teacher professional development were selected to serve on a panel to review the TRA, TMA, and OTRA training materials and activities and compare them to "best practices" in teacher professional development using national standards and recent research on teacher professional development. The evaluation team conducted a nation-wide search for experts in the fields of teacher professional development with specific expertise in face-to-face and online delivery of trainings as well as expertise in reading and mathematics content for K-12 teacher trainings. Criteria for identifying the experts included the following:

- Demonstrated experience in researching best practices in teacher education;
- Recognition in the field of teacher education;

- A record of publications related to best practices in teacher professional development; and
- Extensive knowledge of research in the field of teacher professional development.

As a result of this search, four panel members were selected to review the reading and mathematics content for the academies, the general approach to face-to-face instruction, and issues related to online delivery of professional development. The expert panel included:

- Dr. Scott Paris, University of Michigan, Reading Content Expert;
- Dr. Jere Confrey, Washington University in Saint Louis, Mathematics Content Expert;
- Dr. Stephanie Hirsh, National Staff Development Council, Professional Development Delivery Expert; and
- Dr. Judi Harris, College of William and Mary, Online Professional Development Delivery Expert

(See Appendix E for a copy of the complete expert reviews and biographies of the expert reviewers).

Each reviewer was provided hard copies of academy trainer guides and participant materials that described the objectives and content of the trainings as well as the methods employed for delivering the trainings. The reviewers were also provided with general guidelines for conducting the reviews and submitting their evaluation reports. Dr. Stephanie Hirsh reviewed the TRA and TMA training materials focusing on the delivery mechanisms of the trainings. In addition, the TRA was reviewed by Dr. Scott Paris focusing on the reading content and the TMA was reviewed by Dr. Jere Confrey focusing on the mathematics content. Finally, Dr. Judy Harris, an expert in instructional technology was provided with CDs that contained OTRA materials along with a username and password to log in to the internet utilities. All of the experts were given materials and guides for multiple grade levels but were directed to focus on Grade 3 for reading and Grade 5 for mathematics using the other grades' materials as a supplement. These grade levels were selected as a concentration in order to strategically manage the amount of time the experts' devoted to their reviews and to focus their reviews on grade levels that would correspond the most with the site-visit and student achievement analyses.

The reviewers were asked to compare the content from each academy with best practices in teacher professional development and to list references for their review. As a guideline for best practices, the evaluation team asked the experts to consider the following seven questions:

1. Were the academies grounded in research and clinical knowledge of teaching and learning in the field of reading?
2. Were the academies grounded in national and state reading content and teaching standards?
3. Did the academies offer opportunities for teachers to become deeply immersed in content and pedagogical content knowledge?
4. Did the academies focus on challenging learning goals?
5. Did the academies encourage depth of understanding, allowing students to “grow with it” according to their level of prior expertise in the subject area?
6. Did the academies provide teachers with strategies for monitoring and assessing student progress and using those data to adapt instruction?
7. Did the academies provide teachers with grade specific opportunities to build students’ knowledge appropriately from grade level to grade level?

The experts took approximately two to four weeks to assess the materials and submit their reviews. Expert reviews ranged from 7-14 pages in length. The evaluation team then summarized these reviews and returned them to the panel members for verification before including the content in this report.

### **Analysis of Academy Participation and Impact on Student Performance and Teacher Retention**

An important measure of the effectiveness of a professional development program is its ability to improve certain outcomes such as student achievement or teacher retention. As discussed in the previous chapter, the link between teacher training and student achievement is often not a direct one, but rather mediated by a variety of factors, including the quality of professional development, administrator and school support structures, teachers’ knowledge of subject matter and pedagogy, and family background. This evaluation attempted to address the causal linkage of teacher training and student and teacher outcomes by addressing the following research questions:

1. Did the TAKS passing rates of students, who were taught by teachers trained in the reading and mathematics academies, increase more than expected?
2. Were teachers who received training from the academies more likely to stay employed with the school district, compared to teachers who did not receive academy training?
3. Were students who were taught by teachers trained in the reading and mathematics academies more likely to be promoted to the next grade level than students whose teachers did not receive academy training?

### **Conceptual Questions**

In addition to the research questions listed above, several other conceptual questions were addressed to determine the linkages or relationships between the training academies (and professional development in general) and student outcomes. These conceptual questions, in part, helped guide the analyses conducted for this study.

#### *Can teacher training impact student performance?*

Current educational policy is based on a belief that effective teacher training positively impacts student performance. Public school teachers need to demonstrate knowledge of particular subject areas and an understanding of instructional practices and approaches that best convey information to students (pedagogy). Given this, the transfer of teacher knowledge and skill to students in the classroom should most likely result in improved student performance.

#### *Can brief teacher training sessions impact student performance?*

For this study, a “brief training” session is defined as a three or four-day session. The answer to this question depends on many factors, including:

- The relationship of what was learned in the training to the actual instructional program;
- The quality of the training;
- Whether the skills and knowledge provided at the training must be applied/practiced regularly in order to maintain competency;
- Whether the skills and knowledge learned leads to a marked change in instructional approach; and
- Whether there is a strong relationship between the skills learned by the teacher in the training academies and the assessment objectives for students.

For many schools, multiple teachers attended academy training at each grade level and in some cases attended academies for more than one grade level and more than one subject area. This flexibility and multiplication of training efforts effectively increases the density of training at certain schools (i.e., the ability to subject more teachers at various grade levels and in various subject areas to training efforts). The term *density* of training will be explored later as one of the independent variables included when investigating the linkage between teacher training and student achievement.

*Can teacher training decrease student achievement?*

In some cases, the answer may be yes. If the objectives of the training program do not match with assessment objectives, it is possible that the instructional behaviors or content areas promoted in the training are inconsistent with content areas that will be tested. In addition, for some teachers who lack a strong background in a particular subject area, provision of training information in that subject area may serve to confuse the teacher regarding either content or pedagogy.

*Can sharing of information among teachers affect the impact of teacher training on student achievement?*

This sharing of training information can be described as a *diffusion of knowledge* among teachers on a school campus or in a district. From an evaluation perspective, it is ideal that a teacher who is trained not share skills learned during the training with other teachers. However, when teachers who are trained return to their schools and, in turn, train other teachers, it becomes difficult to determine the actual number of “trained” teachers. Within the constraints of the available data, there is little that can be done to control for sharing of knowledge and skill among teachers on a school campus or in a district.

## **Data Sources**

Many of the questions of this study involve data analyses of teacher retention and the impact of training on student performance. To conduct these analyses, the evaluation team utilized information from five separate databases:

- Public Education Information Management System (PEIMS) data collected and maintained by TEA;
- Academic Excellence Indicator System (AEIS) and TEA’s Division of Student Assessment student performance data (e.g., TAAS and TAKS results);



- AEIS campus and district demographics data;
- Data regarding academy participation collected by the ESCs; and
- 2004 summer school results reported by school districts.

Two additional databases were provided by the University of Texas at Austin, which contained some information on the teachers who received academy training online or obtained academy training materials via CD-ROM. However, these two databases were restricted in their utility because there was limited information related to which teachers participated in the academy training and the extent to which training actually occurred. For example, even if the recipients of CD-ROMs were known, it is not known if the program and lessons were ever used.

The PEIMS data obtained by the evaluation team contained teacher identifiers (e.g., name, SSN, etc.) as well as information regarding teacher age, grade level, school district tenure, work experience, level of education, gender, and ethnicity for 1999 through 2003. The AEIS data compiled by TEA includes information on student performance for individual schools, districts, regions and statewide based on the state assessment test (e.g., previously the Texas Assessment of Academic Skills or TAAS and now the Texas Assessment of Knowledge and Skills or TAKS). The evaluation team also obtained data regarding campus and district characteristics such as district size, tax rate, property wealth, student demographics, and region from the AEIS data. Teacher participation data were obtained from the ESCs; however, data were provided in a variety of formats including electronic data files, paper copies, and word-processing documents. The evaluation team used a variety of techniques to obtain useful electronic data sets, and when the ESCs were able to provide teacher SSNs, direct linkages to the PEIMS database were established. However, since not all data provided by the ESCs contained Social Security Numbers (SSNs), the number of participating teachers identified is likely understated. Thus, the impact of the academies will be conservatively estimated.

### **Methodology for Determining the Impact on Student Achievement**

A direct link or relationship between teacher training and outcomes such as teacher retention or student achievement is difficult to establish in part because of several factors, both internal and external to the training program (e.g., teacher, student and school characteristics). The evaluation team utilized academy participation information reported by the ESCs and existing TAAS and TAKS data contained in PEIMS and reported in AEIS to assess the impact of academy training

on student achievement. Because there is no data linkage between teacher and individual student information available in PEIMS, an indirect measure was developed to determine the extent to which teachers in a school participated in academy training. This indirect measure, which reflects the amount of trained teachers available to the school campus during the entire time period of this study, is labeled the Academy Trained Density (ATD) (See Appendix C for more information on the development and limitations associated with this indirect measure).

The evaluation team first compiled a series of descriptive statistics identifying the schools with a higher ATD and then comparing the TAAS and TAKS student scores for schools with a higher ATD to schools with a lower ATD. These descriptive statistics helped to establish the groundwork for the more complicated statistical analyses, which attempt to isolate the effect of ATD on student achievement by controlling for other factors (i.e., the percentage of students that are economically disadvantaged, the average district property wealth per student, the percentage of minority students, teacher work experience, etc.). The evaluation team then constructed a series of linear and multivariate regression models to examine the relationship between teacher training and student performance using the factors listed above, TAAS and TAKS scores and a variable indicating the ATD for each school.

### **Methodology for Determining the Impact on Teacher Retention**

Professional development is only one of many factors (e.g., student success; instructional approach; accountability and testing; administrative support; pay and benefits; student discipline; paperwork; work load issues and class size; and personal and family issues) that may impact a teacher's decision to stay in the teaching profession. Even though there is a clear way to quantitatively measure teacher retention (i.e., did the teacher remain in the public school system?), it is difficult to quantify the degree to which each of these factors influences an individual teacher's decision to stay or leave the teaching profession.

Additionally, all teachers generally receive some type of additional on-going professional development each year (i.e., through general in-service trainings or through other targeted training initiatives other than the academies) and this on-going professional development may cover some or all of the same areas covered in the teacher training academies. Further complicating matters, interviews with teachers who participated in academy training indicated that some teachers were confused about the source of the training that they received. While they

remembered the content of the teacher training, some were not sure if the training was offered through the academies or through another district or ESC training opportunity.

As a result, the impact of the academy training programs cannot be linked directly to teacher retention, given the existence of other intervening factors and the confusion about the source of the training. However, comparing a group of teachers who attended academy training and teachers that did not attend academy training to outcomes such as teacher retention, student success or changes in instructional approach, allows basic relationships between teacher training and outcomes to be ascertained. In order to understand the basic relationships between teacher training and teacher retention, the evaluation team compiled academy participation information reported by the ESCs as well as teacher data contained in PEIMS to calculate the percentage of trained teachers who remained in the public school system. The evaluation team also used linear regression models to predict the likelihood of a teacher who received academy training remaining in the public school system and to predict the likelihood of a student associated with a teacher who received academy training being promoted to the next grade level. However, given the complexity of intervening factors, it is assumed that any measured relationship between teacher training and outcomes such as teacher retention and student retention is likely to be modest.

### **Analysis of Financial Data: Evaluation of the Cost -Effectiveness of the Reading and Mathematics Academies and the Science Teacher Quality Grants**

In order to collect financial information regarding the cost effectiveness of the academies, the evaluation team conducted site visits at nine of the 20 ESCs, including: Region 1 (Edinburg), Region 4 (Houston), Region 7 (Kilgore), Region 9 (Wichita Falls), Region 10 (Richardson), Region 13 (Austin), Region 14 (Abilene), Region 19 (El Paso), and Region 20 (San Antonio). The TRA initiative was administered by TEA staff housed at Region 13.

During the site visits, evaluation team members interviewed the business managers to gain an understanding of how the grant dollars were expended, while program staff provided information on how the training was delivered and rolled out in their region. Each ESC provided detailed general ledger information to the evaluation team for each academy. The data were analyzed and an average cost per participant was calculated.

The science portion of this study was reviewed differently from the reading and math academies since much of the implementation associated with the Science Teacher Quality Grant program has yet to occur. The Science Teacher Quality Type A & B grants are a component of a cooperative between the Texas Education Agency (TEA) and the Texas Higher Education Coordinating Board (THECB) to provide training to Texas science teachers. The evaluation team met with THECB staff to gather information about the program and how it will be financed. It is important to note that the Science Teacher Quality Grant program is in the early stages of implementation and the only cost information provided by the THECB was budget information. Since the training has yet to be conducted, a per participant cost could not be calculated.

The following report sections include a detailed evaluation of the reading and mathematics academies as well as the Science Teacher Quality Grant program.

#### **IV. EVALUATION OF THE TEACHER READING ACADEMY**

Legislatively-mandated teacher training programs for reading began in 1999 with the Teacher Reading Academies (TRA). In its first year of operation, 6,613 teachers were trained. The number of teachers training increased to 16,220 in 2000; 16,974 in 2001; and 21,351 in 2002.<sup>9</sup> In 2003, another 4,698 were trained at TRAs. To date, a total of 65,856 teachers have been trained through TRAs.

The purpose of this section is to assess the effectiveness of the TRA through the following evaluation questions:

- A. How do the TRAs compare with best practices?
- B. How do TRAs impact classroom practices?
- C. What impact have TRAs had on student achievement?
- D. How cost effective was the TRA and are there opportunities to improve the cost effectiveness of this program?

The major conclusions of this evaluation include:

- Based on statistical analysis, on-site observations, and survey results, the Teacher Reading Academies (TRA) were consistently effective;
- Schools with a higher percentage of teachers who attended the TRA had higher TAKS scores than schools with lower teacher TRA participation rates and lower percentages of students who were retained and not promoted to the next grade level;
- The TRA showed positive statistical relationships between teacher participation and lower teacher turnover, particularly for African-American teachers;
- The TRA program was cost-effective, compared with similar professional development programs in other states and industry benchmarks;
- National reading education and professional development experts provided favorable reviews of the content of the TRA training materials, but identified areas where the TRA content could be substantially improved;

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<sup>9</sup> 1999 and 2000 counts are likely lower than the actual number of teachers trained. See Supporting Materials in Appendix C for a discussion of ESC-supplied data and estimates of actual number of teachers receiving training.

- There was insufficient participation and cost data to fully evaluate the Online Teacher Reading Academy (OTRA);
- On-site visits and classroom observations found that teachers consistently used the TRA-promoted teaching strategies and diagnostic tools in their daily practice when these tools and strategies supported what the teachers were already doing prior to TRA training;
- When interviewed, teachers also indicated that they preferred face-to-face training, as compared to online training, and that they wanted more follow-up and program support during the school year; and
- Survey responses from teachers who participated in the TRA and school administrators indicated that the teaching strategies and subject matter covered in the TRA were valuable and helped to increase student achievement in reading; however, administrators were not sufficiently informed about the TRA and its benefits.

## **A. Comparison with Best Practices**

In this section, the evaluation team examines how the professional development offered by the Teacher Reading Academy (TRA) compares with “best practices” in teacher professional development. To what extent do the TRA and OTRA professional development trainings reflect what recent research and clinical knowledge of teaching and learning have come to view as high quality professional development? How do the teachers who participated in the TRA and OTRA trainings view the professional development experiences? The degree to which the TRA and OTRA compare to best practices was assessed in four ways: (a) a review by nationally-recognized experts, (b) a survey sent to participants of the face-to-face and online reading academies, (c) a survey sent to administrators of the teachers surveyed, and (d) site visits to a sample of schools which included observations and focus group interview with teachers and school administrators. Within each of these data sources, the evaluation team examined the quality of the TRA and OTRA trainings. The findings from these data sources are presented below.

### **Expert Reviews of the Teacher Reading Academy (TRA) and the Online Teacher Reading Academy (OTRA)**

Nationally-recognized experts in teacher professional development reviewed the TRA and OTRA training materials and activities and compared them to “best practices” using recent research on

teacher education and national standards on teacher professional development. Dr. Scott Paris reviewed the TRA training materials with a focus on the reading content. Dr. Stephanie Hirsh reviewed the TRA training materials concentrating on the delivery mechanisms of the training. Finally, Dr. Judi Harris, an expert in instructional technology, reviewed the OTRA training with a particular focus on evaluating the effectiveness of the online medium.

Dr. Paris and Dr. Hirsh received the Kindergarten, Grade 1, Grade 2, and Grade 3 trainer guides and participant materials. Dr. Harris received Kindergarten, Grade 1, Grade 2, and Grade 3 CDs that contained online academy instruction along with a username and password to log in to the internet utilities. All of the experts were directed to focus their reviews on the Grade 3 materials using the other grade level materials as a supplement. The experts selected and referred to a variety of studies while conducting their reviews. Each of their reports contains a careful review of the TRA and OTRA materials and resources, detailed suggestions for improving the TRA and OTRA trainings, as well as a full list of references (see Appendix E for their complete reports).

### **Teacher Reading Academy: Content Review**

In his review, Dr. Scott Paris of the University of Michigan relied on a body of research that included the National Reading Panel (2000) report as well as research summaries such as those on early reading development (Snow, et. al, 1998 and Adams, 1990). He also acknowledged the work of K. E. Stanovich (2000) in *Progress in understanding reading: Scientific foundations and new frontiers*. Finally, Dr. Paris relied upon and referred to his own experiences working in CIERA, the Center for Improvement of Early Reading Achievement and his own research publications such as his chapter in the *Handbook of Reading Research* (1991).

Dr. Paris began his TRA review by noting that, “the content of [the TRA] information is grounded very well in current research on reading” and that he will “recommend the TRA information to colleagues teaching pre-service elementary education students.” Dr. Paris observed and noted that the TRA training materials reference and use important reading research such as Foorman, et. al, (1998), Fletcher, et. al., (1998), Hasbrouck, et. al., (2004), and Hasbrouck, et. al., (1992) as well as the report of the National Reading Panel, *Preventing Reading Difficulties* (2000) and the National Association for the Education of Young Children (NAEYC) position paper on developmentally appropriate practices in early childhood programs (1996). He observed that teachers attending the TRA are provided with summaries of key research on reading development, instruction, and assessment that are clear, easy to understand, and presented in a

manner that allow teachers to implement the suggestions in their own curricula and with their own teaching styles.

### Strengths of TRA Training

Dr. Paris identified several notable strengths of the TRA trainings connected with key research on reading. To begin with, Dr. Paris reported that the TRA is consistent with the best practices identified by Barbara Taylor and her colleagues (Taylor, 2002; Taylor, Pearson, Clark, & Walpole, 2000; and Taylor, Pressley, & Pearson, 2002) and comparable to frameworks for reading and language arts developed and used in other states such as the Michigan Language Arts Framework, the Massachusetts Curriculum Framework, and Minnesota's Reading First programs.

Another notable strength of the TRA identified by Dr. Paris is that the trainings utilize the research on the developmental accomplishments of children by grade level, such as those summarized in *Preventing Reading Difficulties* by Catherine Snow, et al., (1998) and *Beginning to read: Thinking and learning about print* by M. J. Adams (1990). Dr. Paris reported that:

*The organization of information at each grade level compartmentalizes the skill information so that teachers can understand the complexity of each one. Word Study and Fluency, for example, are sometimes treated superficially in some professional workshops and reduced to simple activities such as word walls and repeated reading, but that is not the case for the TRA. The TRA delves into each skill in depth so teachers identify what children need to know, how to instruct each skill, and what to do with children who struggle mastering the skills. The pedagogical knowledge about fundamental techniques such as guided reading, scaffolded instruction, explicit instruction, modeling, and differentiated instruction are explained clearly. Many of these instructional approaches are incorporated into activities during the workshops so that teachers can experience them first-hand. I think the information about each reading skill and each pedagogical technique is a succinct and scholarly summary of the key evidence of what is learned and what works in classrooms.*

Furthermore, Dr. Paris observed that the TRA materials across grade levels have a good scope and sequence. He noted that each grade level provides developmentally appropriate content and information, consistent labels, consistent use of terminology, similar graphic organizers, and good repeated descriptions of pedagogical techniques. He reportedly found no contradictions of information, goals, or methods across K-3 training materials. Finally, Dr. Paris wrote:



*I think that a teacher could benefit from attending a TRA workshop every year for a different grade level, and it would consolidate and reinforce the same broad knowledge about reading skills and instructional techniques.*

### Weaknesses of TRA Training

During his review of TRA materials, Dr. Paris detected and noted several places where there was limited use of research in the TRA trainings. First, Dr. Paris indicated that the treatment of assessments for students and teachers was not as strong as other elements of the training, noting that teachers are not told how to use assessment data to identify and address students' problems. He explained that:

*The assessments included in the TRA are standard and adequate, but they are not as helpful as they might be. For example, fluency assessments depend too much on reading speed and do not provide enough information to analyze miscue patterns or prosody<sup>10</sup>. Teachers are not told how to use assessment data to identify and address students' problems. Informal reading inventories could be used for these assessments and retellings and comprehension questions could be added. This is a problem in grade 3 because the Texas Primary Reading Inventory (TPRI) is only a K-2 instrument and third grade teachers need better assessments of reading strategies and comprehension. They could be given more information, for example, about using informal reading inventories and other assessments to diagnose students' strengths and weaknesses.*

*Even the TPRI is inadequate in my view because it does a poor job of assessing comprehension. The passages are short, there are only 5 questions for each of the nine passages, and the questions are relatively easy. In my research, students who are average readers reach ceiling levels on the TPRI questions at every grade. Because the TPRI provides much more detailed evidence about decoding skills, phonological awareness, and word recognition, the diagnostic use of the TPRI and the implications for instruction are strongest for these basic skills. I think the TPRI would be better if comprehension and vocabulary were assessed as thoroughly as the other skills.*

Second, Dr. Paris suggested that the TRA may convey low expectations and goals for students' reading abilities noting, for example:

*In kindergarten, the focus is on exposure to letters, words, and sounds more than interacting with text. In first grade, instruction is aimed at pre-reading skills more than encountering environmental print or joint storybook reading. There is also very little concern for comprehension beyond occasional retelling. The focus on letters and phonemes seems more like kindergarten instruction than first grade to me.*

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<sup>10</sup> "Prosody" refers to the "stress patterns" with which students read and is an indication as to whether they understand what they are reading as they read it aloud.

*In third grade, there seems to be more emphasis on skills such as fluency than comprehension and responding to text. Fluency norms are provided from Hasbrouck and Tindal with the suggestion that they may be too high. The focus on reading rate seems unduly narrow and ignores miscue analyses and comprehension. In general, the focus in third grade is too much on word recognition rather than reading for authentic purposes. Likewise, writing instruction in third grade is more focused on technical than conceptual aspects of composition. Decoding text and writing sentences seem to be the goals of third grade instruction and they do not seem challenging to me.*

Finally, Dr. Paris reported that while the content of the TRA training is generally very good, he was concerned about the absence of a formal mechanism for assessing whether teachers learn from the trainings and whether they implement the teaching techniques they learned in the TRA. He explained that:

*I think periodic assessments of what teachers are learning and how well they can implement the teaching techniques would strengthen their learning. The content of information is “deep” but whether the received curriculum is as deep as the intended curriculum is not clear to me. I have observed too many teachers misunderstand or ignore good information in professional development activities to trust that they will have a depth of understanding from attending workshops or reading the TRA information alone. It is ironic that the accountability advocated for students to learn is missing from the professional development for teachers. Perhaps districts can provide some follow-up workshops or peer in-services to maintain the knowledge provided in the compact workshops.*

### **Delivery of the Teacher Reading Academies**

Dr. Stephanie Hirsh from the National Staff Development Council (NSDC) reviewed the TRA with a concentration on the delivery design and methods. In her review, Dr. Hirsh primarily used the NSDC standards for high quality staff development (2001) as a framework and guide for her review but also referred to other NSDC publications such as *Designing Powerful Professional Development* (2002) and *Powerful Designs for Professional Learning* (2004). The NSDC standards used in Dr. Hirsh’s review are grouped into three categories which include:

#### Context Standards

- *Learning Communities:* Staff development that organizes adults into learning communities whose goals are aligned with those of the school and district.
- *Leadership:* Staff development that requires skillful school and district leaders who guide continuous instructional improvement.

- *Resources:* Staff development that requires resources to support adult learning and collaboration.

### Process Standards

- *Data-Driven:* Staff development that uses disaggregated student data to determine adult learning priorities, monitor progress, and help sustain continuous improvement.
- *Evaluation:* Staff development that use multiple sources of information to guide improvement and demonstrate its impact.
- *Research-based:* Staff development that prepares educators to apply research to decision making.
- *Design:* Staff development that use learning strategies appropriate to the intended goal.
- *Learning:* Staff development that applies knowledge about human learning and change.
- *Collaboration:* Staff development that provides educators with the knowledge and skills to collaborate.

### Content Standards

- *Equity:* Staff development that prepares educators to understand and appreciate all students, create safe, orderly and supportive learning environments, and hold high expectations for their academic achievement.
- *Quality Teaching:* Staff development that deepens educators' content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately.
- *Family Involvement:* Staff development that provides educators with knowledge and skills to involve families and other stakeholders appropriately.

In her report on the TRA, Dr. Hirsh identified elements of nine of the twelve NSDC standards in the academy designs. According to Dr. Hirsh, the strongest features of the TRA are its alignment with aspects of the standards on design, learning, equity, and teaching quality. Examples of these strengths are discussed below for each standard.

### Strengths of TRA Training

*Design: Staff development that use learning strategies appropriate to the intended goal.*

The NSDC design standard emphasizes several aspects of professional development necessary to enable adults to acquire new knowledge and skills and transfer that knowledge to classroom practice (NSDC, 2001, p. 22). Good designs include a variety of activities and learning strategies to support the goals of the training. Dr. Hirsh observed that the TRA design combines a variety of learning strategies. For example, in the TRA, participants complete a concept map as a group, practice using dry erase boards, complete a story map, analyze student writing, and view videos that demonstrate the teaching strategies described.

*Learning: Staff development that applies knowledge about human learning and change.*

The NSDC learning standard emphasizes the need for learning methods used in the professional development to mirror as closely as possible the methods teachers are expected to use with their students (NSDC, 2001, p.24). Dr. Hirsh noted that participants of the TRA have numerous opportunities to experience the lesson frameworks they are expected to use in their classrooms. For example, Dr. Hirsh observed that in the TRA training materials a video shows teachers how to teach the strategy for chunking multi-syllabic words and teachers discuss how to help students apply scaffolded practice. In addition, Dr. Hirsh observed that during the session on comprehension, a content web strategy is introduced and participants practice completing a web using one of the subject areas in the Teacher's Edition.

*Equity: Staff development that prepares educators to understand and appreciate all students, create safe, orderly and supportive learning environments, and hold high expectations for their academic achievement.*

The NSDC equity standard emphasizes the need for staff development to equip teachers with ways of providing various types of instruction based on individual difference (NSDC, 2001, p. 30). Dr. Hirsh noted that the TRA goals clearly align with this standard. In her review of the TRA, she noted that the TRA introduction includes a video illustrating the ethnic cultural diversity found in Texas classrooms and how to understand and meet the needs of English language learners. She also observed that the teacher's role in helping dyslexic students become better readers is illustrated via a video and references to *The Dyslexia Handbook*. Another video is shown that depicts the characteristics and needs of the advanced or gifted learners. Furthermore, participants are involved in activities that look at teaching the same concept to

English and Spanish learners where teachers work with a partner; compare the Spanish and English versions of using cognates and list words with the same Latin or Greek root.

*Quality Teaching: Staff development that deepens educators' content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately.*

The NSDC quality teaching standard emphasizes the need for staff development to integrate content with appropriate instructional strategies (NSDC, 2001, p.32). In her review, Dr. Hirsh reported the TRA presents a variety of teaching strategies that engage the participants in activities aligned with the subject matter. For example, she observed that teachers who participate in the TRA learn about the Quick Phonics Screener as a monitoring tool, practice calculating reading levels, and write answers on a group chart.

#### Weaknesses of TRA Training

Throughout her review of the TRA, Dr. Hirsh shared some concerns which mostly stem from the limitations of a four-day workshop design. She noted that “[t]he limitations of a four-day academy model are evident when one examines the alignment of the academy with the NSDC Standards for Staff Development. Certain standards cannot be addressed within this design.” According to Dr. Hirsh, the weakest features of the TRA were its lack of alignment with the standards on learning communities, leadership, and family involvement.

Directly referencing the NSDC standards, Dr. Hirsh reported that, “[t]he most powerful forms of staff development occur in ongoing teams that meet on a regular basis, preferably several times a week, for the purpose of learning, joint lesson planning, and problem solving.” She further explained that:

*[t]he Learning Community structure is essential to ensuring that teachers have the ongoing support necessary to successfully achieve the goals of the Academy. While TRA can ask that teachers work collaboratively during the academy, it does not appear designed to support the learning community format necessary in the school to support school-wide implementation of the practices addressed.*

In terms of building the leadership to support the teachers' implementation of what they learn, Dr. Hirsh noted that:

*[w]ithout participation in the Academy or another institute designed for school leaders, it is less likely that principals will be able to provide the necessary support and follow up to ensure successful implementation. Convening principals and teachers together develops a shared language for teaching and learning, clear expectations, and instills the accountability necessary for results.*

Finally, Dr. Hirsh reported that creating a context supportive of professional development requires advocacy at every level. Dr. Hirsh observed that the TRA does not address partnerships between teachers, parents, and the community. She explained that:

*Education is a partnership between the school, home, and the community. To maximize student achievement, teachers must be knowledgeable about various ways in which families and community members can be involved meaningfully in aspects of the school. TRA can take advantage of this research by providing teachers with strategies for engendering support at home.*

### **Delivery of the Online Teacher Reading Academy (OTRA)**

Dr. Judi Harris of the College of William & Mary reviewed the OTRA concentrating on the effectiveness of the design and delivery of the online medium. Dr. Harris referred to a variety of research in her review including the *Seven Principals of Effective Teaching* by Graham, Cagiltay, Lim, Craner, & Duffy (2001), the research on engaging online learners such as Conrad & Donaldson (2004), and referred to the National Staff Development Councils' (NSDC) standards for online staff development (2001). For the majority of her review however, Dr. Harris primarily used the Checklist for Online Interactive Learning (COIL) created by Sunal, Sunal, Odell, and Sundberg (2003) as a research-based evaluative instrument of courses and modules used in online learning environments.

Dr. Harris began her OTRA review by describing the COIL instrument as extensively research-based despite the fact that the research field on online learning environments is relatively new (since 1997) and that a "consensus view" of the characteristics and design principles that define effective, high quality online professional development is still emerging. She noted that:

*In a recent meta-analysis of 155 empirical research studies of online learning (published since 1997) that focused upon student and instructor attitudes and perceptions, comparisons with traditional face-to-face learning, and instructional design, Sunal, Sunal, Odell, and Sundberg (2003) found that overall, "online learning is neither better nor worse than face-to-face classroom instruction" (p. 16). Yet though the authors acknowledged that research about online learning is too nascent at the present time to be conclusive, taken together, the examined studies do have strong potential to "inform us in regard*

*to variables and best practices that may form the basis of future research” (p. 16).*

The COIL instrument used for this review is divided into four sections: student behaviors (eight items), faculty-student interaction (16 items), technology support (two items), and learning environment (25 items). Since Dr. Harris was limited to reviewing the OTRA materials without observing student and teacher behaviors and interactions, she chose to focus her evaluation on the last two areas of technology support and learning environments. These practices emphasize that good online learning environments do the following:

#### Technology Support

- Insure a low level of technological difficulties in accessing Web site and communication; and
- Provide adequate, friendly, easy, continuous technical support.

#### Learning Environment

- Use structured activities to provide an effective framework for online learning;
- Create social interaction through group collaboration to facilitate high achievement;
- Uses streaming audio for reading online;
- Present course content in a manner that hierarchically structures the sequence of information;
- Organize Web site to enable students to interact with the content, other students, and instructor;
- Create a welcoming, safe, nurturing online environment;
- Present problem-solving situations in a realistic context;
- Provide opportunities for students to question the instructor to insure accuracy of understanding;
- Create opportunities for students to communicate with each other to share understanding of course content;
- Provide opportunities to collaboratively construct knowledge based on multiple perspectives, discussion and reflection;
- Provide opportunities for students to articulate and revise their thinking to insure accuracy of knowledge construction; and
- Use computer conferencing to develop overall critical thinking skills.

In her review, Dr. Harris compared the OTRA to the COIL practices. According to Dr. Harris, the strongest features of the OTRA were its alignment with aspects of technology support. Dr. Harris found little alignment between the OTRA and the COIL learning environment practices. Examples of what she identified as strengths and weaknesses are discussed below.

### Strengths of OTRA Training

Dr. Harris began her review by describing the technological features of the OTRA as “user-friendly” and “exemplary.” She wrote:

*The ‘user friendliness’ of the Online Teacher Reading Academy (OTRA) materials is nothing short of exemplary. The clarity and ease of use of the interface, the thorough and accessible documentation (presented in both text and video forms), and the well-conceptualized ‘details’ of software design (e.g., showing how many minutes remain on a video that’s playing and automatically pausing a video when the user selects the ‘Menu’ feature) should ensure a minimum of difficulty and a maximum of comfort for users at all levels of computer facility.*

Dr. Harris reported that the OTRA makes good use of high-quality audio and video that are not band-width intensive and described the continual building of searchable Frequently Asked Questions with accompanying responses as “impressive without being too complex for less experienced users.”

Dr. Harris further reported that the sections and individual lessons in OTRA were clearly and predictably sequenced and hierarchically structured. She wrote, “[t]he common elements that appear in each section make the structure quite apparent, and therefore the sequence should be easy for teachers to follow.” Dr. Harris found the aesthetics of the interface and the items displayed within it “pleasing, welcoming, and cohesive” and noted that, “[r]eadily available assistance, the anonymous nature of reflections and questions shared, and the high degree of user control over the pace and sequence of learning within the OTRA should reportedly help learners to feel “safe.””

### Weaknesses of OTRA Training

Dr. Harris found several disconnects between the COIL practices and the delivery of the OTRA in terms of the potential learning environment. First, Dr. Harris indicated that the weakest feature of the OTRA environment is that participants have few opportunities to interact and collaborate.



She noted that an important aspect of online learning is for teachers to have opportunities to communicate with each other, to share understanding of course content where they can articulate and revise their thinking, and to collaboratively construct knowledge based on multiple perspectives, discussion, and reflection. Dr. Harris observed that opportunities for the teachers to articulate and revise their thinking “are largely missing from the OTRA materials” and noted that the absence of a cohesive learning community prevents participants from engaging in active and higher-level learning. For example, she noted that:

*Though participants can see randomly-selected responses to some activities written by other Academy participants, these are viewable in fewer than 30 percent of the activities offered, and – more importantly – there is no real group collaboration possible in the way in which the materials are now designed. Without opportunities for the building of an online professional community, learning from the OTRAs may be shallow, inflexible, and not productively reflective and reflexive (Collison, Elbaum, Haavind & Tinker, 2000; Conrad & Donaldson, 2004; Gillani, 2003; Palloff & Pratt, 1999 & 2001).*

Second, Dr. Harris found that participants’ interaction with instructors and content is limited and mostly “unidirectional.” She explained that:

*Interaction with academy instructors in a one-turn question-and-answer format is provided, but this seems to be presented more as a way to get help than to enter into professional dialogue. Interaction with content appears to be mostly unidirectional; content is communicated mostly in an online version of a frontal instructor lecture, adding the considerable advantages of random access and possibilities for review, pause-and-resume. The ways in which most of the activities are written, however, do not promote deeper-level interaction with and application of content presented.*

In addition, Dr. Harris noted a need for more activities that engage participants in relevant problem-solving situations so that participants of the academy can apply the information in meaningful ways. She explained that:

*The activities that require viewing a classroom-based video and using one or more handouts to analyze and/or respond to what is observed (e.g., the “Quick Phonics Screener” activity, in which the teacher-learner scores the responses of the student in the video, then checks her scores afterwards and compares her suggested instructional strategies with others’ ideas) do present relevant problem-solving situations in a realistic context. Unfortunately, there are relatively few of these kinds of activities included in the OTRAs, and many more ‘activities’ that require learners only to read material in a downloaded handout. Without structured, engaging ways to apply that information on higher levels, we*

*cannot be sure that OTRA learners are truly mastering the concepts and ideas that the materials present.*

In her conclusion, Dr. Harris reported that because the OTRA is not designed to encourage teachers' active and higher-level learning as strongly and consistently as it could, the OTRA appears to provide, "only minimally adequate professional development in reading instruction for teachers of student in grades K through 3." She explained that:

*The lack of opportunity for students to interact with each other and one or more instructors as a cohesive learning community is the aspect of the OTRA materials that is of primary concern. Without opportunities – either online or on-site – for teachers to reflect, discuss, apply, and offer and receive constructive criticism as part of a professional community, the best that can be achieved with these materials is learning at the Bloom's knowledge and comprehension levels. Opportunities for authentic application, synthesis, and evaluation of the important ideas and techniques presented in the OTRAs should be added as soon as possible.*

The table in Exhibit 7 provides an overall summary of the expert reviews for the TRA and the OTRA.

**Exhibit 7  
TRA Expert Review Summary**

	<b>TRA Strengths</b>	<b>TRA Weaknesses</b>
<p><b>Reading Expert:</b> Dr. Scott Paris, University of Michigan</p>	<ul style="list-style-type: none"> <li>• Grounded in research and consistent with best practices identified in the literature.</li> <li>• Provides clear, concise summaries of research for teachers that can be easily implemented.</li> <li>• Uses research on developmental accomplishments of children by grade level.</li> <li>• Provides a good scope and sequence of materials across grade levels.</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate treatment of assessments for students and teachers.</li> <li>• Low expectations and goals for students' reading abilities in some areas.</li> <li>• No formal mechanism for assessing what teachers learned from the training and whether they implemented what they learned.</li> </ul>
<p><b>Professional Development Expert:</b> Dr. Stephanie Hirsh, National Staff Development Council</p>	<ul style="list-style-type: none"> <li>• Elements of nine of the twelve NSDC standards identified in the academy designs.</li> <li>• Combines a variety of learning strategies.</li> <li>• Provides numerous opportunities for participants to experience lesson frameworks they are expected to use with students.</li> <li>• Opportunities to understand and support equitable learning (e.g., for culturally diverse students, English language learners, dyslexic students).</li> <li>• Presents a variety of teaching strategies that engage the participants in activities aligned with the content</li> </ul>	<ul style="list-style-type: none"> <li>• The four-day academy model limited in its potential impact.</li> <li>• Without planned follow-up and support, research suggests that the state can expect little in the way of improved teacher practice and shared learning.</li> <li>• Lack of alignment with the standards on learning communities, leadership, and family involvement.</li> <li>• No expectations or suggestions for creating a learning community in the schools to support implementation.</li> <li>• Lack of principal participation in TRA makes it less likely that they will be able to provide support and follow up to ensure implementation.</li> <li>• No expectations or suggestions for partnerships between teachers, parents, and the community.</li> </ul>
<p><b>Online Expert:</b> Dr. Judi Harris, College of William &amp; Mary</p>	<ul style="list-style-type: none"> <li>• User-friendly and exemplary technological features of OTRA.</li> <li>• Sections and individual lessons in OTRA clearly and predictably sequenced and hierarchically structured.</li> <li>• Aesthetics of the interface and the items displayed within it are pleasing, welcoming, and cohesive.</li> </ul>	<ul style="list-style-type: none"> <li>• Few opportunities to interact and collaborate.</li> <li>• Interaction with instructors and content is limited and mostly unidirectional.</li> <li>• Limited opportunities for authentic application, synthesis, and evaluation of important ideas and techniques.</li> </ul>

Source: *Expert Reviews of TRA Training Materials, 2004.*

## Survey Results

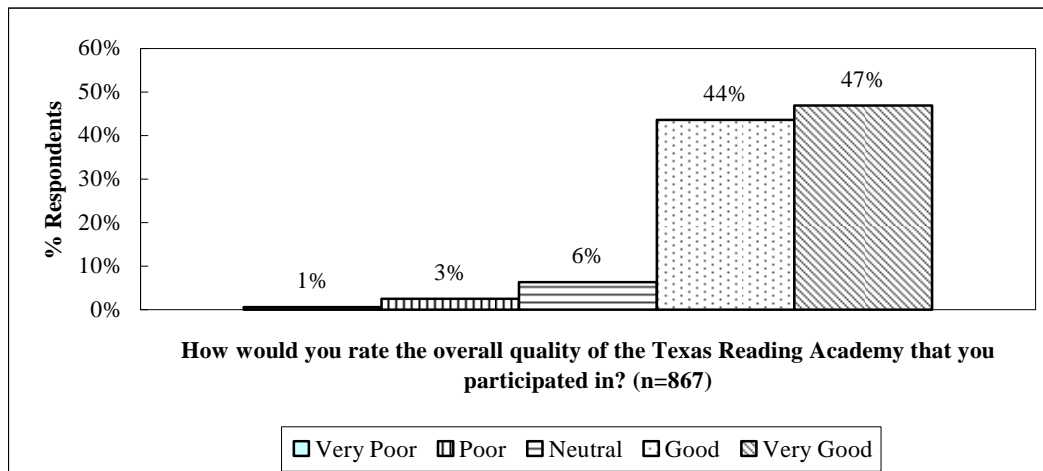
### Teacher/Administrator Perceptions of TRA Quality

To better understand how the TRA and OTRA compare with “best practices” in professional development, the evaluation team surveyed teachers who participated in the trainings and administrators who recommended or required teachers to attend the trainings to solicit their perceptions regarding the overall quality of the academies, how it compared to similar trainings they have participated in, and their level of familiarity with the content of the academy prior to attending. A total of 1,032 teachers completed the TRA survey and 70 completed the OTRA survey with a response rate of 37 and 17 percent respectively. Approximately 1,139 campus administrators completed and returned the Administrator survey with a response rate of 44 percent.

### Perceptions of Training Quality

In the survey of teachers regarding TRA and OTRA quality, academy participants were asked to respond to several items related to the quality of the reading academies. As Exhibit 8 illustrates, the vast majority of teachers (91 percent) rated the overall quality of the TRAs as “good” (44 percent) or “very good” (47 percent). Just 4 percent of the teachers felt that the quality of the TRA training was “poor” (3 percent) or “very poor” (1 percent).

**Exhibit 8**  
**Teacher Perceptions of TRA Overall Quality**

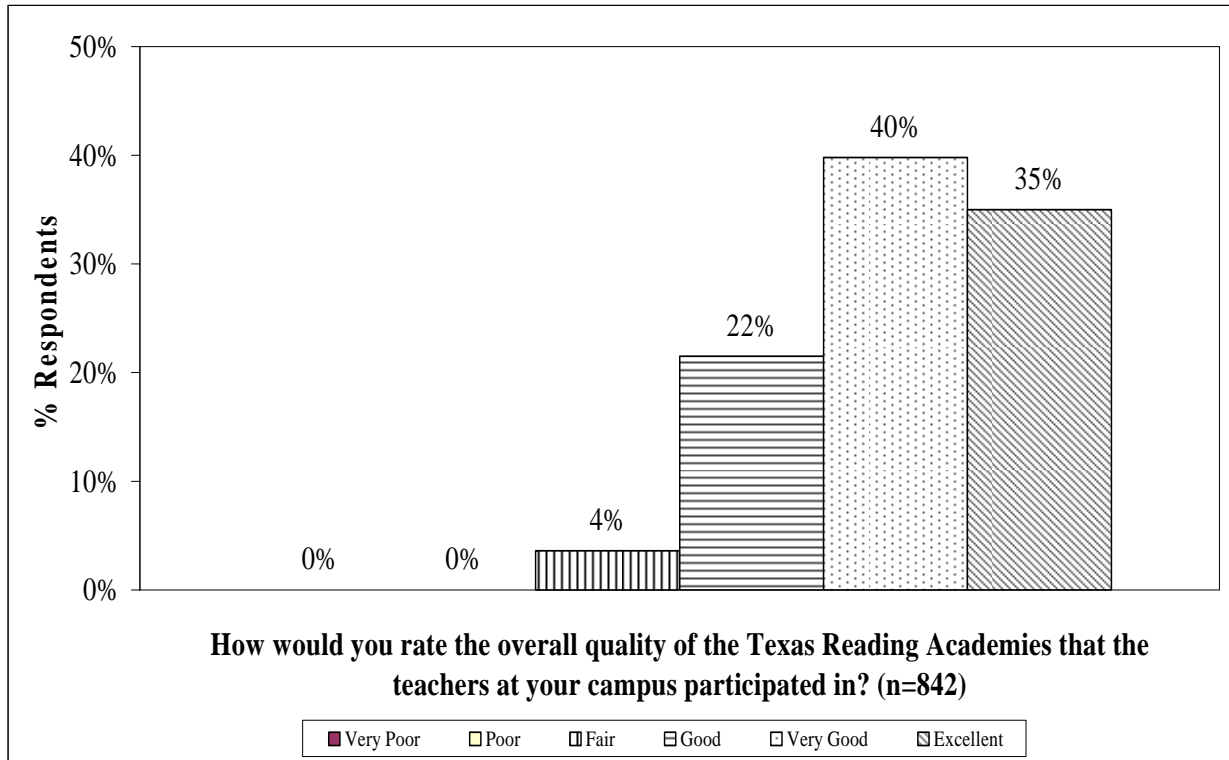


Source: Survey of Teachers Regarding TRA Training, 2004.

Using a six-point scale, ranging from “very poor” to “excellent,” school administrators were asked to rate the overall quality of the TRA training in which the teachers on their campuses

participated. As illustrated in Exhibit 9, approximately three out of four (75 percent) survey respondents rated the quality of the academy training as “very good” (40 percent) or “excellent” (35 percent). Only 4 percent of the administrators rated the quality of TRA training as “fair” and less than 1 percent rated the TRAs as “poor.”<sup>11</sup>

**Exhibit 9**  
**School Administrator Perspectives Regarding the Overall Quality of TRA Training**



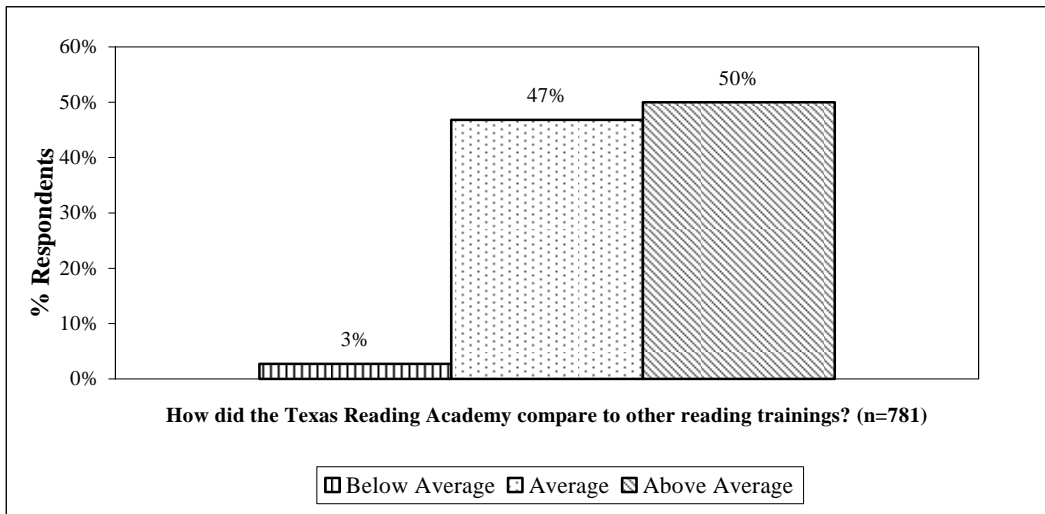
Source: Survey of School Administrators Regarding TRA Training, 2004.

Note: Less than 1 percent of respondents rated the quality of the TRA as “poor” or “very poor.”

When asked to rate how the TRA training compared with other reading training attended by teachers, half of the teachers rated the TRA training as “above average;” while 47 percent of the survey respondents felt that the TRA training was “average” and 3 percent indicated that it was “below average” (Exhibit 10).

<sup>11</sup> None of the school administrators felt that the quality of the TRA training was “very poor.”

**Exhibit 10**  
**Teacher Perspective: Comparison of TRA with Other Reading Training Quality**



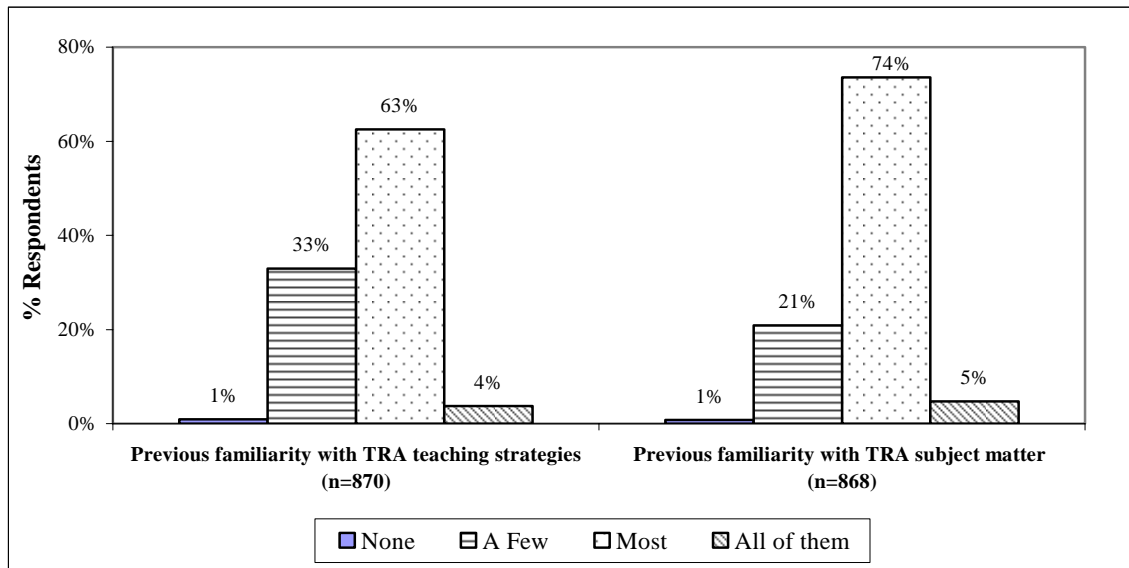
Source: Survey of Teachers Regarding TRA Training, 2004.

Another measure of the quality of the TRA training is based upon teachers’ perceptions of whether the TRAs provided new information. Exhibit 11 illustrates the degree to which respondents reported their level of familiarity with the teaching strategies and subject matter presented in the TRAs.

Nearly two-thirds (63 percent) of the teachers completing the survey indicated that they were familiar with “most” of the TRA teaching strategies, and 4 percent reportedly knew “all” of the teaching strategies taught at the reading academy. Another 33 percent of the teachers reported that they were familiar with “some” of the instructional strategies taught at the TRAs (see Exhibit 11).

Similarly, most respondents (74 percent) indicated that they knew “most” or “all” of the subject matter as well. Approximately, one-fifth (21 percent) of the teachers reported that they knew “a few” of the TRA content, and just 1 percent did not know any of the subject matter.

**Exhibit 11**  
**Teacher Perspective: Previous Familiarity with TRA Teaching Strategies & Subject Matter**



Source: Survey of Teachers Regarding TRA Training, 2004.

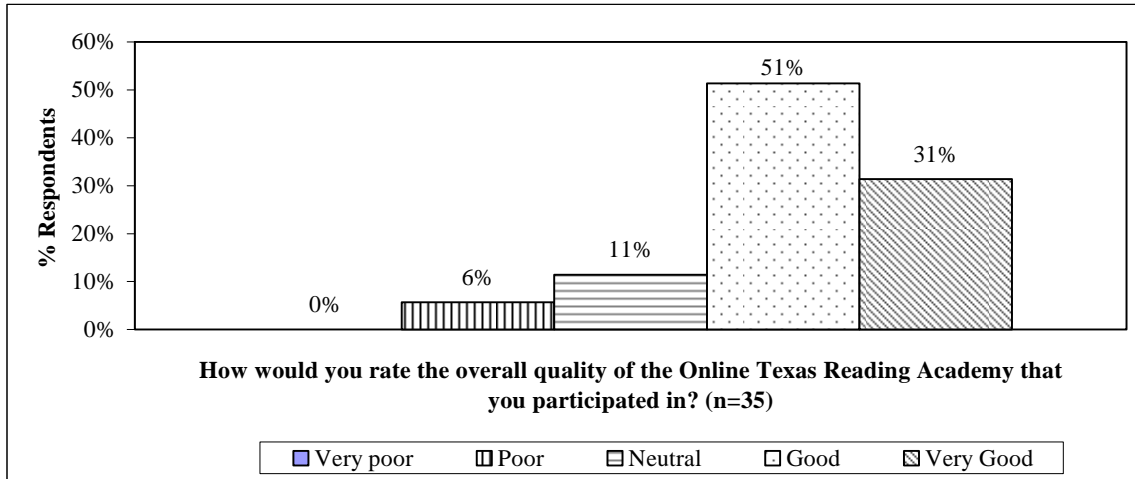
**Online Teacher Reading Academy (OTRA) Teacher Perceptions of Training Quality**

Teachers who participated in the OTRA training were asked to respond to several items about the quality of the online reading academies.<sup>12</sup> First, teachers were asked to rate the overall quality of the OTRA in which they participated and to compare their experience in the OTRA to their experiences in other reading training. The responses to these items are summarized in Exhibits 12 and 13.

Responses illustrated in Exhibit 12 show that most respondents rated the overall quality of the OTRA quite favorably. Approximately half of the teachers attending the TRA training felt that the quality was “good,” and another 31 percent of the training attendees rated the quality of the TRA as “very good.” Eleven percent of the survey respondents were neutral regarding the quality of TRA training, and only 6 percent of the teachers viewed the OTRA training as “poor.”

<sup>12</sup> The results of the OTRA surveys should be viewed with some caution due the low response rate, and small number of survey respondents (N=35).

**Exhibit 12**  
**Teacher Perceptions of OTRA Overall Quality**



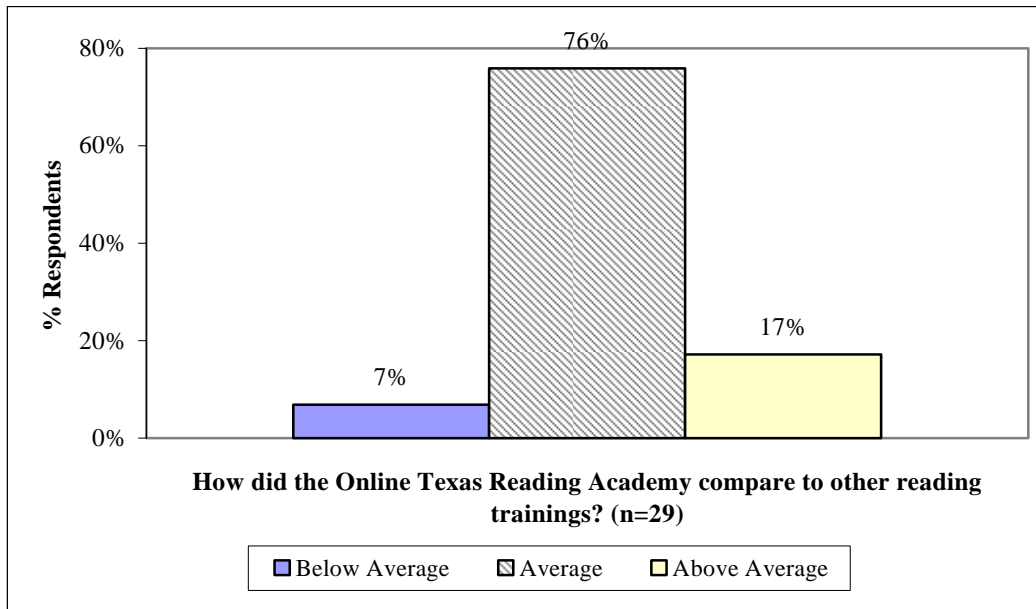
Source: Survey of Teachers Regarding OTRA Training, 2004.

As Exhibit 13 illustrates, the majority of the teachers surveyed (76 percent) felt that the OTRA training was “average” when compared to other reading-related training they had attended.

In general the OTRA training was rated considerably lower than the face-to-face TRA training that was conducted over the 1999 to 2003 period. Less than half (47 percent) of the TRA attendees rated the training as “average” when compared to other reading-related training (versus 76 percent rating the OTRA as average). Likewise, 50 percent of the teachers rated the TRA training as “above average” when compared to other similar trainings; while just 17 percent rated the OTRA training as “above average.”



**Exhibit 13**  
**Teacher Perspective: Comparison of OTRA with Other Reading Training Quality**

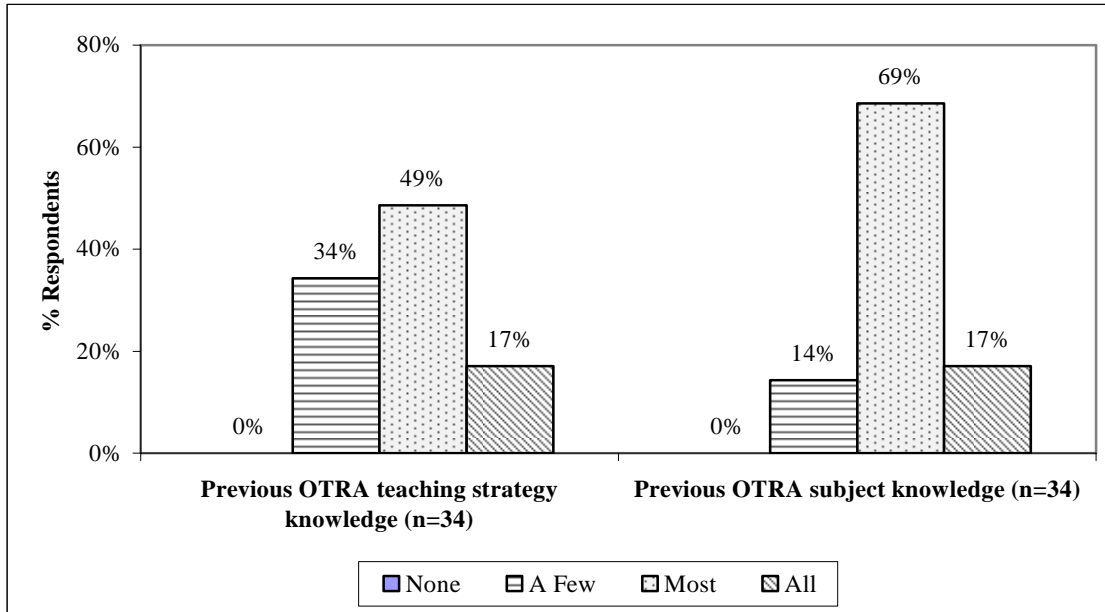


Source: Survey of Teachers Regarding OTRA Training, 2004.

Another measure of the quality of the OTRA was teachers’ perceptions of whether the TRAs provided new information. Exhibit 14 illustrates the degree to which respondents reported their level of familiarity with the teaching strategies and subject matter presented in the TRAs. The majority of the surveyed teachers indicated that they were familiar with “a few” (34 percent) or “most” (49 percent) of the teaching strategies included in the OTRA training.

Exhibit 14 also illustrates the degree to which respondents were already familiar with the subject matter presented in the online academies. Sixty-nine percent of the survey respondents indicated that they were familiar with “most” of the OTRA subject matter, and another 17 percent reported that they were familiar with “all” of the OTRA content.

**Exhibit 14**  
**Teacher Perspective:**  
**Previous Familiarity with OTRA Teaching Strategies & Subject Matter**



Source: Survey of Teachers Regarding OTRA Training, 2004.

**Teacher Perceptions of the Role of Stipends and other Factors that Influence TRA Participation**

Another important component of the evaluation of the TRA and OTRA was to understand the factors that contributed to teachers’ and administrators’ decisions to participate in the academy trainings. Teacher stipends to attend the reading academies constitute a substantial portion of the overall cost of the TRAs. For this reason, it was important to solicit information about the role stipends play for participants. In addition, other factors may also contribute to teachers’ decisions to participate in the TRAs, such as logistics and the reputation of the TRAs among teachers.

First, participants were asked whether or not they received a stipend for their participation in the TRAs. Exhibit 15 shows the percentage of participants who received stipends by grade level. Almost all participants reported receiving stipends. Only 29 of the 857 teachers who responded to this survey item did not receive a stipend.

**Exhibit 15**  
**TRA Trained Teachers Who Received a Stipend**

<b>Received a Stipend</b>	<b>Yes</b>	<b>(%)</b>	<b>No</b>	<b>(%)</b>	<b>Total</b>	<b>(%)</b>
Kindergarten	230	28	7	24	237	28
Grade 1	203	25	4	14	207	24
Grade 2	204	25	6	21	210	25
Grade 3	173	21	8	28	181	21
Grade 4	18	02	4	14	22	03
<b>Total</b>	<b>828</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>857</b>	<b>100.0</b>

Source: Survey of Teachers Regarding TRA Training, 2004.

TRA participants were also asked how influential various factors were in their decision to attend the academy. These survey items broadly addressed several types of influences, including monetary (stipend), logistical (time of year or location), and professional issues (district or state professional development requirements). Exhibit 16 presents the responses regarding factors that influenced the teachers to attend the reading academies.

**Exhibit 16**  
**Teacher Perspectives: Factors that Influenced them to Participate in the TRA**

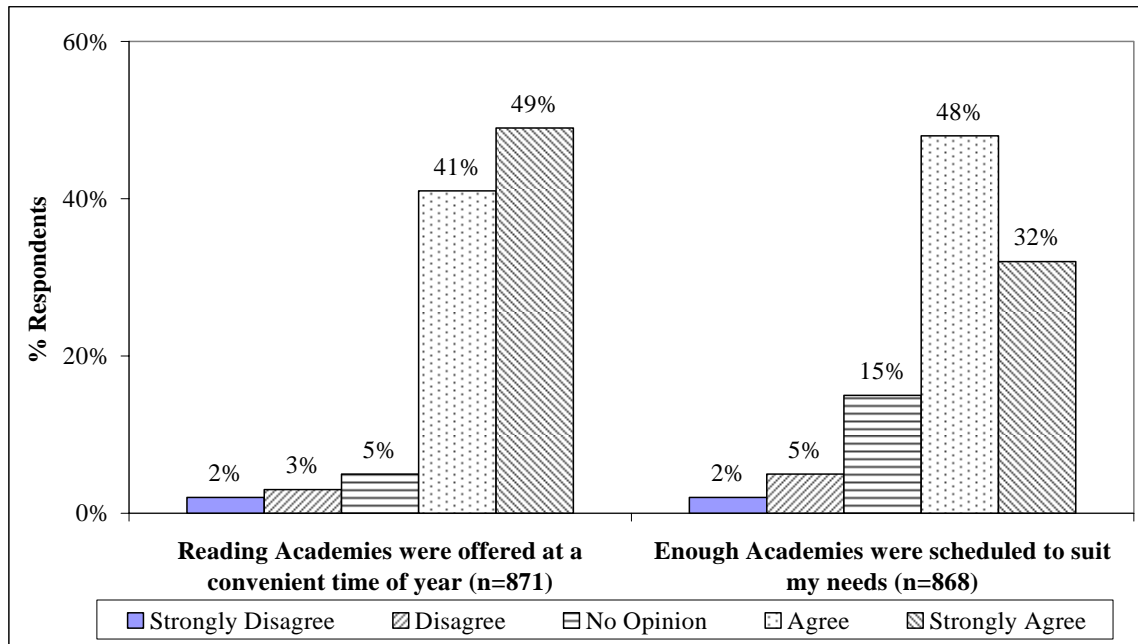
<b>Factors</b>	<b>No Influence</b>	<b>A Little Influence</b>	<b>Neutral</b>	<b>Somewhat Influenced</b>	<b>Strongly Influenced</b>
Sponsor or trainer (n=871)	35%	4%	40%	14%	7%
Length of the training (n=868)	21%	9%	39%	24%	8%
Recommendations from other teachers (n=874)	32%	5%	33%	20%	10%
Location of the training (n=871)	15%	5%	23%	28%	29%
Time of the year (n=872)	16%	6%	20%	28%	30%
Content of the training (n=871)	5%	3%	13%	42%	37%
Availability of stipend (n=870)	10%	8%	12%	27%	44%
State or district prof. development reqs (n=876)	9%	3%	14%	23%	52%
Principal or other administrator (n=872)	4%	5%	8%	20%	63%

Source: Survey of Teachers Regarding TRA Training, 2004.

The majority of respondents indicated that the most influential factors that “strongly” motivated them to participate in the TRA were their principal or district administrator (63 percent), state or district professional development requirements (52 percent), the availability of the stipend (44 percent), followed by the content of the training (37 percent). Respondents were mixed in terms of the influence of the location and the time of year in which the TRAs were offered. The factors that were rated least influential for influencing respondents’ decision to attend the academy were the recommendations from other teachers, the length of the training, and the sponsor of the training.

Participants were also asked whether the TRAs were offered at a convenient time of year and whether enough TRAs were offered to suit teachers’ needs. Responses to these items are presented in Exhibit 17.

**Exhibit 17**  
**Teacher Perceptions of TRA Accessibility**



Source: Survey of Teachers Regarding TRA Training, 2004.

The large majority of respondents agreed or strongly agreed that the TRAs were offered at a convenient time of the year (90 percent) and enough TRAs were offered to suit their needs (80 percent).

The combined findings related to factors that influenced teachers to attend the TRAs suggest that teachers are more likely to attend the TRA because they are encouraged or required to attend by school administrators and because they receive a stipend for attending, rather than other influences, such as the reputation of the training or convenient time or location. Nevertheless, academy offerings do appear to have been convenient for the majority of respondents and the stipends do indeed play a considerable role in teachers' decisions to participate.

These findings may also indicate that districts play the most significant role in whether teachers participate, even more so than stipends.

### **Administrator Perceptions of the Role of Stipends and other Factors that Influence TRA Participation**

For those administrators who recommended or required their teachers to participate in the TRA training, the survey asked them to report the extent to which a set of factors influenced their decisions to select the TRA training as a professional development option for teachers in their schools. These survey items broadly addressed several types of influences, including monetary incentives (stipend), logistics (time of year or location), and professional issues (district or state professional development requirements). The factors were rated on a five-point scale (i.e., no influence, a little influence, neutral, somewhat influenced, strongly influenced). School administrators' responses to these items are presented in Exhibit 18.

**Exhibit 18**  
**Influences on School Administrators' Decisions to Select**  
**TRA as a Professional Development Option for Teachers**

Factors	No Influence	A Little Influence	Neutral	Somewhat Influenced	Strongly Influenced
Length of training (n=877)	12%	6%	36%	32%	13%
Sponsor or trainer (n=875)	16%	6%	36%	27%	16%
Recommendations from others (n=876)	15%	6%	26%	36%	18%
State or district requirements (n=878)	11%	6%	22%	32%	29%
Time of year (n=878)	7%	5%	19%	36%	32%
Location of training (n=878)	9%	4%	23%	33%	32%
Availability of stipend (n=876)	11%	6%	11%	29%	44%
Content of training (n=876)	3%	1%	4%	26%	66%

*Source: Survey of School Administrators Regarding TRA Training, 2004.*

The most influential factor for administrators' decisions to select the academy as a professional development option was the content of the training, with two-thirds of respondents rating this factor as strongly influential. The second most influential factor was the availability of stipends, with 44 percent of school administrators rating it as strongly influential. Approximately one-third of school district administrators indicated that the location of the training (32 percent) and the time of the year for the training (32 percent) strongly influenced their decision to send their teachers to the TRAs.

The administrators corroborated the teachers' perspectives regarding what they considered to be the least influential factors in their decision to select the TRAs as a professional development option for their teachers. Among the least influential factors rated by administrators were the recommendations from other teachers, the length of the training, and the sponsor of the training.

### **Teacher Perceptions of the Role of Stipends and other Factors that Influenced OTRA Participation**

Online reading participants were also asked whether or not they received a stipend for their participation in the TRAs. Exhibit 19 shows the percentage of participants who received stipends.

Only 7 of the 34 teachers who responded to this survey item reportedly received a stipend for participating in the online training.

**Exhibit 19**  
**OTRA Trained Teachers Who Received a Stipend**

Received a Stipend	Yes	(%)	No	(%)	Total	(%)
	7	21	27	79	34	100

*Source: Survey of Teachers Regarding OTRA Training, 2004.*

OTRA participants were also asked how influential various factors were in their decision to attend the academy. These survey items broadly addressed several types of influences, including monetary (stipend), logistics (the nature of the online medium), and professional issues (district or state professional development requirements). Exhibit 20 presents the responses of OTRA participants regarding what influenced them to participate in the OTRA.

**Exhibit 20**  
**Teacher Perspectives: Factors that Influenced them to Participate in OTRA**

Factors	No Influence	A Little Influence	Neutral	Somewhat Influenced	Strongly Influenced
Sponsor or trainer (n=35)	34%	11%	34%	6%	14%
Availability of stipend (n=35)	63%	3%	14%	3%	17%
Recommendations from other teachers (n=35)	43%	3%	20%	14%	20%
Principal or other administrator (n=35)	26%	6%	11%	23%	34%
Convenience of a flexible schedule (n=35)	20%	9%	11%	26%	34%
Accessibility through distance learning (n=35)	14%	3%	14%	31%	37%
Self-paced nature of training (n=35)	17%	6%	14%	26%	37%
State or district requirements (n=35)	31%	3%	11%	9%	46%
Content of the training (n=35)	9%	6%	14%	20%	51%

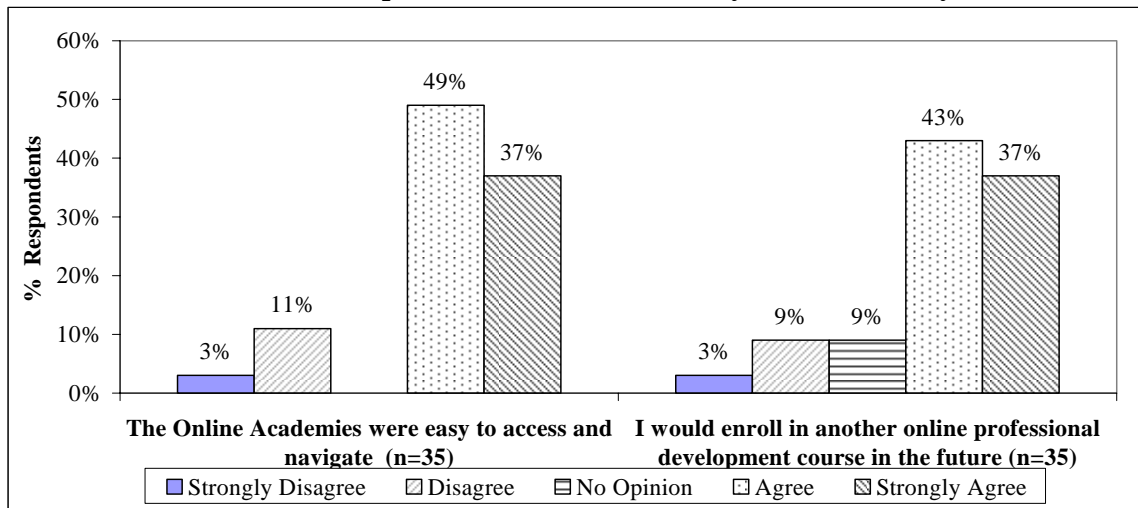
*Source: Survey of Teachers Regarding OTRA Training, 2004.*

The majority of the OTRA respondents indicated that the factor that strongly influenced them to participate in the OTRA was the content of the training (66 percent). This was followed by state or district professional development requirements (46 percent), the self-paced nature of the online

medium (37 percent), and the accessibility of distance learning (37 percent). Many of the respondents also recognized the flexibility of the online schedule (34 percent) and their principal or district administrator (34 percent) as motivating factors. Respondents were mixed in terms of the influence of recommendations from other teachers and the least influential factors for OTRA participation was the availability of the stipend and the sponsor of the training.

OTRA participants were also asked whether the OTRA was easy to access and navigate and whether they would enroll in another online professional development course in the future. Responses to these items are presented in Exhibit 21. The large majority of respondents agreed or strongly agreed that the OTRA was accessible (86 percent) and that they would enroll in another online academy (80 percent).

**Exhibit 21**  
**Teacher Perceptions of OTRA Accessibility and Desirability**



Source: Survey of Teachers Regarding OTRA Training, 2004.

The combined findings related to motivations for attending and accessibility suggest that teachers were most influenced to participate in the OTRA because of the content of the training, the convenience of the online delivery, and because they were encouraged to participate by their principal or district administrator or other state or district requirements. The respondents were less influenced by other factors such as the reputation of the training, recommendations from other teachers, and the availability of a stipend.



## Open-ended Comments

TRA and OTRA teachers were asked to suggest alternatives to financial stipends that would increase participation in the TRA. Several teachers insisted that the financial remuneration through the stipends was the best way to encourage participation and urged that the stipends be continued or even increased (19 percent). Additionally, teachers suggested other methods of paying teachers for their time including compensation time, choice time, providing substitutes during the school year, or counting TRA for professional development hours as an alternative to stipends (18 percent). Others suggested that instructional materials, resources, or supplies be given to teachers at the end of the academy (14 percent). Respondents also suggested that the TRA provide additional options for location or time of the year that the academy is offered (8 percent) or that teachers simply be required or mandated by the state or district to attend TRA (5 percent). Examples of teachers' comments regarding alternatives to financial stipends include:

- Since the Reading Academies were mainly offered in the summer. I feel the teachers should be paid a stipend. I do not think teachers will attend for free and I feel they should not be required to attend any summer training for free.
- Teachers should be treated as professionals and paid for our time. We are not volunteers.
- Compensation/exchange time for another scheduled inservice day would probably increase participation.
- I feel that if a financial stipend could not be offered that possibly you could offer teachers that option to take a compensation day during the school year. It would cost much less to reimburse the school districts for a substitute than the \$600.00 offered.
- It would be helpful to have more hands-on, make it/take it portions. Supplies are always helpful.
- Distribution of more classroom materials needed to implement some of the strategies. such as consumables for the students.
- I feel that the only other alternative would be to offer the Reading Academy during the school year and allow teachers that need to go to attend without losing *any* days ....
- I thought that everyone had to do it regardless. Why should we have to pay professionals to do something that is mandated by the state? Save the money and just make everyone go.
- Put the word out on what good things are coming out of the Academy, Teachers are good about saying what is good and what is not.

Additionally, administrators were asked to provide alternatives to financial stipends that would increase participation in the TRAs. Several administrators who responded to the survey insisted that the financial remuneration through the stipends is the best way to encourage participation and to demonstrate that teachers are valued and treated as professionals (30 percent). They urged that the stipends be continued and even increased. Additionally, administrators suggested other methods for compensating teachers for their time including release time, compensation time, choice time, providing substitutes during the school year, counting the TRAs for professional development hours as an alternative to stipends (16 percent). Others suggested that instructional materials, resources, or supplies be given to teachers at the end of an academy (14 percent). Respondents also suggested that teachers receive college credit for their participation as an alternative to the stipends (6 percent). Examples of administrator comments regarding alternatives to stipends that would increase teacher participation in the TRAs included:

- Stipends caused teachers to feel like professionals - valued for expertise and time compensated.
- I really don't think there are any other alternatives to stipends that would increase teacher participation in the TRAs. Most teachers work long hours during the school year and expecting them to give up part of their vacation without receiving any monetary compensation is unfair.
- Provide the instructor compensation days - the state would repay the district the cost of a certified substitute.
- If teachers were supplied resources to implement the strategies they would be highly motivated to participate in the training.
- Classroom materials to implement or support instructional strategies presented in Academies.
- College credit, Professional development credit
- Perhaps college credit - 3 hours for a 40-hr course.

## **Interviews and Focus Groups**

### **Teacher/Administrator Perceptions of TRA Quality**

This section of the report relies upon information gathered by the evaluation team during their 3-day site visits at selected campuses conducted during the summer of 2004 and the fall semester of

the 2004-05 school year. These interviews and focus groups are meant to provide further depth to the survey data and TEA administrative data analyzed in this report.

### **Participation in and Access to Training**

Participation in and access to the TRA training varied across districts. In many districts, participation was required for all reading teachers working in the grade level the academy offered training in that year. In other locations, only new teachers were required to attend. In some districts, participation depended on the grade level taught. Teacher or principal interest determined participation in other areas. Stipend availability drove participation at some sites. Principals and teachers did not report a consistent pattern or criteria for how academy participants were chosen. Generally, teachers reported that schools made a unified effort to have all reading teachers trained.

Of those teachers attending the TRA training, 88 percent reported receiving stipends. Teachers indicated that the stipend did not make a strong difference in whether they attended, generally, because they were requested to go. However, the overwhelming majority of participants indicated that the stipends were a “nice incentive” that “motivated” them to attend. Teachers stated that receiving stipends indicated that the district and state understood and respected that their time was valuable. Additionally, offering the stipend indicated to the participants that the state “recognized the importance of the training.”

### **Content and Delivery of Training**

Teachers responded positively to the content, materials, and delivery of the TRA training. They found the use of current teachers and former school teachers as actual presenters to be helpful because it gave “validity” to what the presenters demonstrated as well as keeping the training practical and “real-world oriented.” Participants found the group setting to be collaborative and affirming. They also felt that the model of sending several teachers from the same campus together was extremely effective. Teachers indicated that by attending in campus groups, they were able to continue processing information and sharing ideas about the training after it ended. Additionally, teachers from small districts who reported receiving less staff development in general found they “were like sponges absorbing the new knowledge.” Principals agreed that teachers returned from the TRA training “excited.” They reported the academy motivated participants to want to become trainers.

Teachers found the content of the materials, as well as the packaging of the materials, to be useful and well designed for classroom application. Participants noted the content matched what they were expected to teach in their classrooms and followed the TEKS. It was easy to understand and did not require restructuring what was already in place. They also recognized and valued the strong research base supporting both the TRA's chosen content and pedagogy. Teachers found the quality of the materials to be "exceptional." The TRA offered hands-on resources with demonstrations of how to use the material in the classroom setting. Specifically, participants overwhelmingly endorsed the notebooks as well organized, teacher friendly, and easy to incorporate into daily lessons. They also thought the videos were a good resource. Finally, many teachers voiced liking the "make-and-take sessions" because they were able to leave with a usable product.

Some participants made suggestions for increasing the quality and effectiveness of the content and delivery of the TRA training. These included providing the training over an extended period of time; this would provide teachers time to process what they had learned, experiment with implementation, and then reflect on its application. Others suggested that securing district support was essential for the training to be effective, "If your district doesn't support the training and offer follow-up, the teachers are less likely to use it." Principals also saw district level support as necessary for maintaining the momentum that the TRAs generated. Some participants thought it would be helpful to tailor the TRAs for different levels of teaching experience. For example, one new teacher was overwhelmed by the amount of information and felt an academy designed specifically for new teachers would have been more beneficial. Finally, teachers of English Language Learners (ELLs) requested more focus on Spanish materials and strategies for bilingual students.

Additionally, interviews with teachers and principals indicated that principals had limited awareness of the TRAs. Most principals knew the basic tenets of the TRAs but had little knowledge of how information was shared across campuses or within districts. Few had attended academy awareness training. However, many of the principals who were on campus during the time of the academy training were no longer at the same campus. Therefore, it is understandable that newer principals had less information about the TRAs. Exhibit 22 summarizes the teacher perceptions of the strengths and weaknesses of the TRA from the on-site interviews and focus groups.

**Exhibit 22**  
**Summary of Teachers’ Perceptions of TRA Training and Delivery**

TRA Training and Delivery Strengths	TRA Training and Delivery Weaknesses
<ul style="list-style-type: none"> <li>• Presenters were knowledgeable and tailored training for different contexts.</li> <li>• Modeling lessons during trainings helped teachers with implementation.</li> <li>• Teachers found content and pedagogy were research-based.</li> <li>• Teachers noted resource notebooks were well organized and included numerous materials used in classrooms.</li> <li>• Teachers appreciated receiving compensation for their time.</li> </ul>	<ul style="list-style-type: none"> <li>• Academies lacked ELL focused materials and strategies.</li> <li>• Training lacked follow up support.</li> <li>• Participation in and access to academy training varied across districts resulting in different levels of dissemination.</li> <li>• Principals lacked awareness of TRA content and strategies.</li> </ul>

*Source: Analysis of teacher participant interview data collected by evaluation team, 2004.*

**B. Impact on Classroom Practices**

This section evaluates the impact of the TRA on classroom practices To what extent was the knowledge that teachers gained through the TRA and OTRA professional development experiences translated to classroom practices? The degree to which the TRA strategies were implemented and their impact on classroom practices were assessed in three ways: (a) a survey sent to participants of the face-to-face and online reading academies, (b) a survey sent to administrators of the teachers surveyed, and (c) site visits to a sample of schools which included observations and focus group interview with teachers and school administrators. Within each of these data sources, the evaluation team examined levels of teaching experience and reading instruction, implementation of the TRA strategies, and the perceived and observed impact these strategies have had on teaching practice and student achievement. The findings from these data sources are presented below.

**Survey Results**

**Teacher Perceptions Regarding TRA Implementation**

To better understand how the TRA and OTRA affected classroom practices, the evaluation team surveyed reading teachers and their administrators regarding the extent to which TRA and OTRA teaching strategies were being implemented in the classroom. A total of 1032 teachers completed the TRA survey and 73 completed the OTRA survey with response rates of 37 and 18 percent

respectively. Approximately 1,139 campus administrators completed and returned the Administrator survey with a response rate of 44 percent.

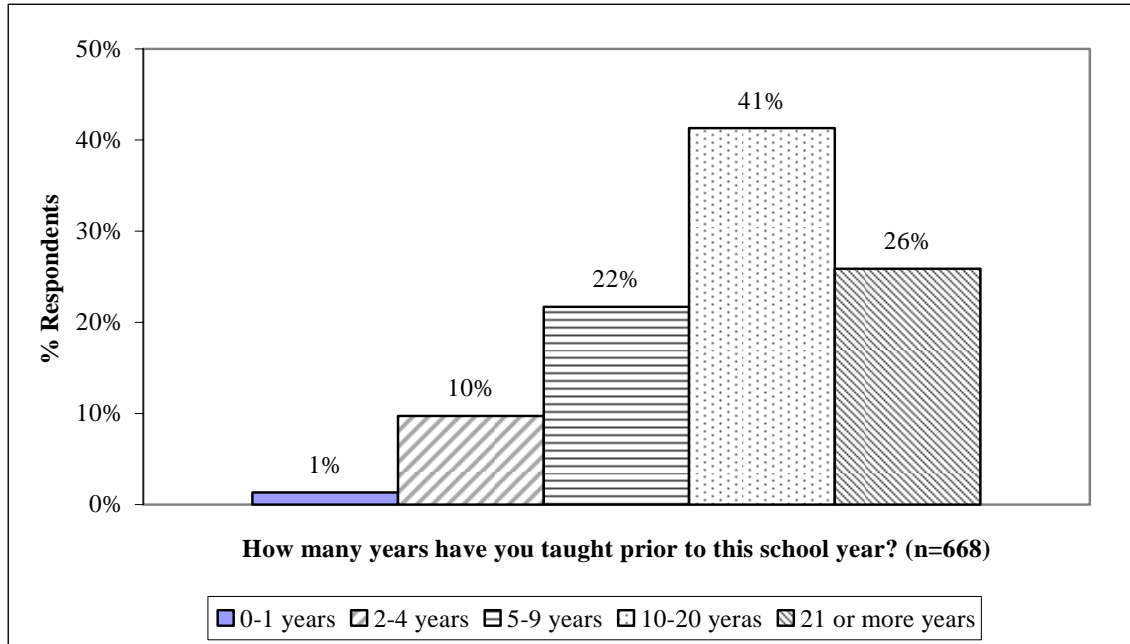
### **TRA Teachers' Reading Instruction Experience**

Teachers were asked about their current experience with reading instruction in terms of their years in the teaching profession, the highest level of education they had attained, the grade level taught, and the number of hours devoted to reading instruction each week. The purpose of these survey items was to establish the degree to which teachers are experienced and the level of their engagement in teaching reading as a way to better understand the context within which implementation is assessed. Exhibits 23-26 show the years of teaching experience among the respondents, the percentage that has earned a Bachelor's or Master degree, the percentage of respondents who reported teaching at each grade, and the average number of hours they devote to reading instruction each week.

The evaluation plan was designed to include an analysis of survey teachers who had not attended TRA training, so their classroom experiences could be compared to teachers who did attend the training; however due to a low response rate among non-TRA trained teachers, this analysis is not included in the report.

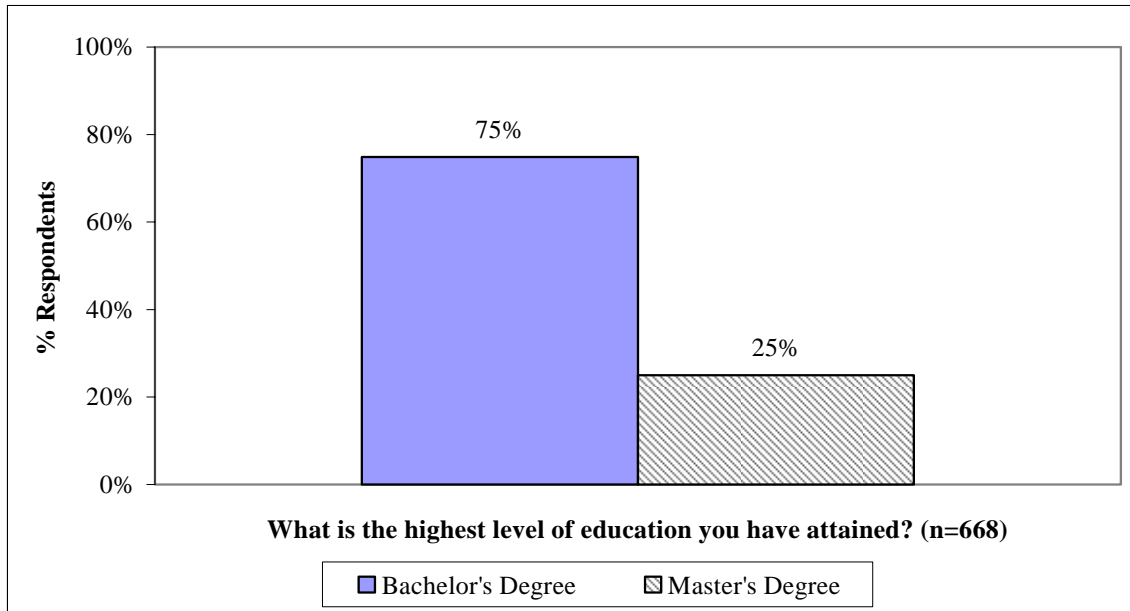
As seen in Exhibits 23-25, the majority of respondents have taught for at least 10 years or more prior to the 2004-2005 school year and one out of four have Master's degrees. In addition, the survey respondents trained through the TRAs are evenly distributed across grade levels; however, there is a slight decline in representation from kindergarten to Grade 3 teachers.

**Exhibit 23**  
**Years of Prior Teaching Experience of Teachers who attended the TRA**



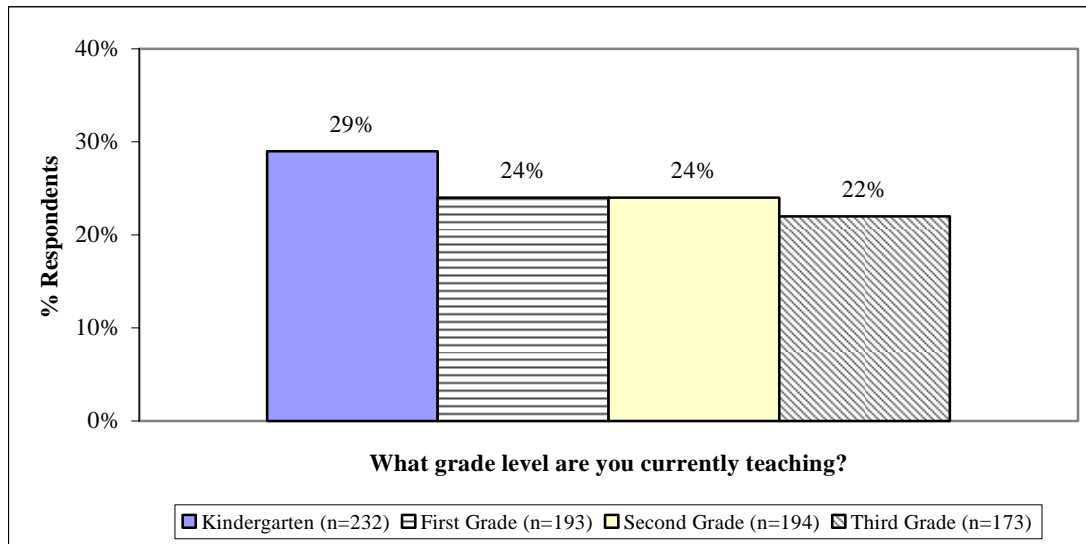
Source: Survey of Teachers Regarding TRA Training, 2004.

**Exhibit 24**  
**Highest Level of Education of Teachers who attended the TRA**



Source: Survey of Teachers Regarding TRA Training, 2004.

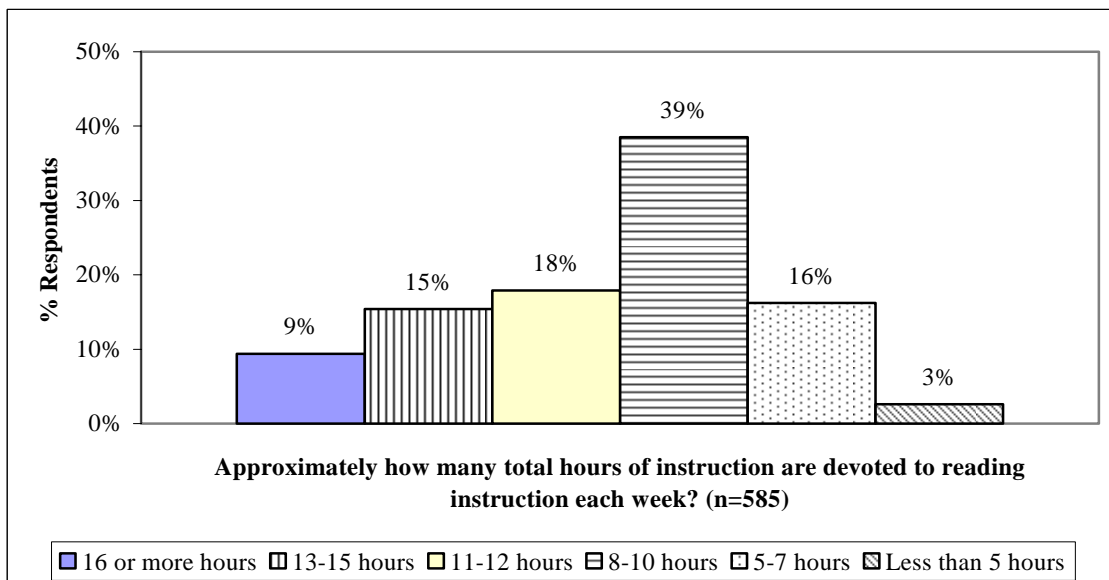
**Exhibit 25**  
**Current Grade Level of Teachers who attended the TRA**



Source: Survey of Teachers Regarding TRA Training, 2004.

Exhibit 26 shows the respondents' reporting of the approximate hours of instruction devoted to reading each week. The responses represent a fairly normal distribution with a greater number of trained and non-trained teachers devoting 8-10 hours on reading instruction per week and fewer devoting less than 5 hours or more than 15 hours of weekly reading instruction.

**Exhibit 26**  
**Hours Devoted to Reading Instruction Each Week by Teachers who Attended the TRA**



Source: Survey of Teachers Regarding TRA Training, 2004.



**Implementation of TRA Strategies**

The TRA survey contained a list of 17 to 20 skills and strategies for reading instruction divided into four grade levels for Kindergarten, Grade 1, Grade 2, and Grade 3 teaching. These strategies aligned with the teaching strategies taught in the scope and sequence of the TRA K-3 academies. Although the strategies differed for each grade level, a set of common items was included across each grade skill-set to determine the extent to which TRA-trained teachers were using strategies important to the scope of this study. Teachers were asked to identify the grade level they were currently teaching and respond to the appropriate grade level set of strategies.

Teachers were asked to rate their frequency of strategy use on a 5-point scale where 1=never, 2=rarely, 3=sometimes, 4=often, and 5=all or almost all reading lessons. Exhibit 27 presents the teachers’ mean responses to the common set of implementation survey items that were assessed across the different K-3 grade levels.

**Exhibit 27  
Mean Implementation of TRA Teaching Strategies Grades K-3**

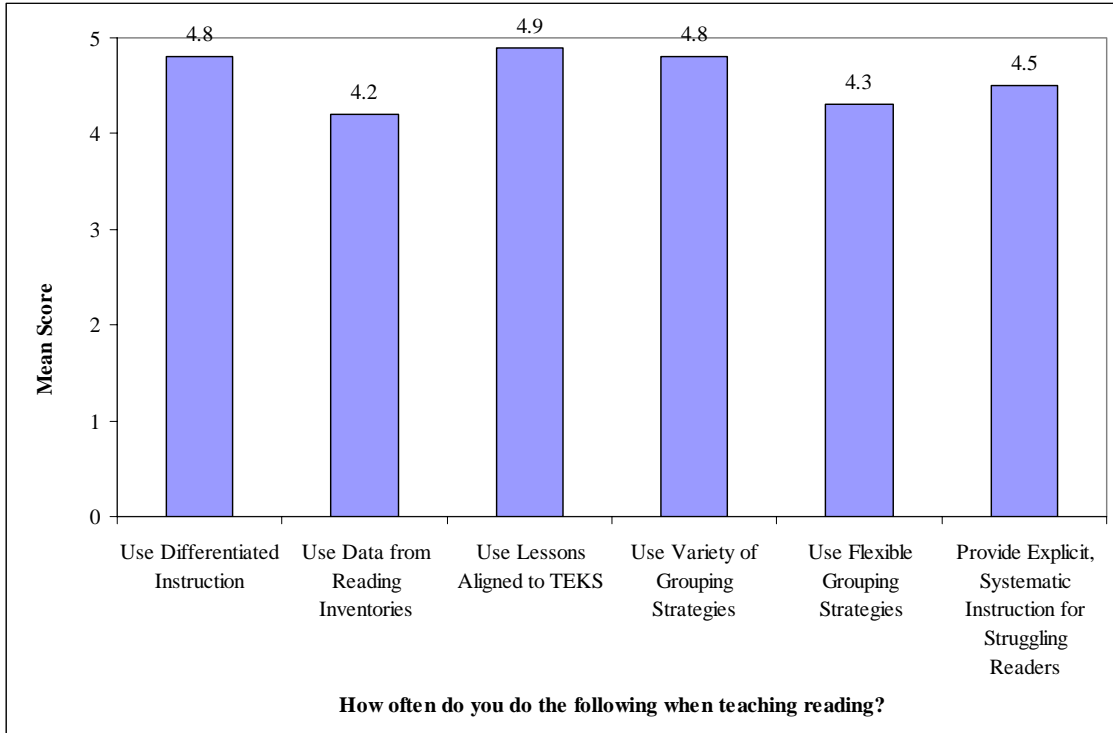
Grade	K			1			2			3		
	M	SD	n	M	SD	N	M	SD	n	M	SD	n
Differentiated Instruction	4.8	0.4	181	4.6	0.6	221	4.3	0.7	219	4.2	0.8	210
Reading Inventories	4.2	0.9	179	4.2	0.9	220	4.2	0.9	220	3.8	1	207
Lessons Aligned with TEKS	4.9	0.4	181	4.9	0.4	221	4.8	0.5	220	4.9	0.4	209
Groupings	4.8	0.5	181	4.8	0.5	220	4.7	0.5	221	4.5	0.7	210
Flexible Groupings	4.3	0.9	181	4.3	0.9	219	4.2	0.8	220	4.1	1	208
Instruction for Struggling Learners	4.5	0.6	177	4.6	0.6	220	4.5	0.7	220	4.3	0.7	209

Source: Survey of Teachers Regarding TRA Training, 2004.

Notes: M – Means, SD – Standard Deviation, n – sample size. Scale ranges from 1=“never” to 5=“use in all the lessons.”

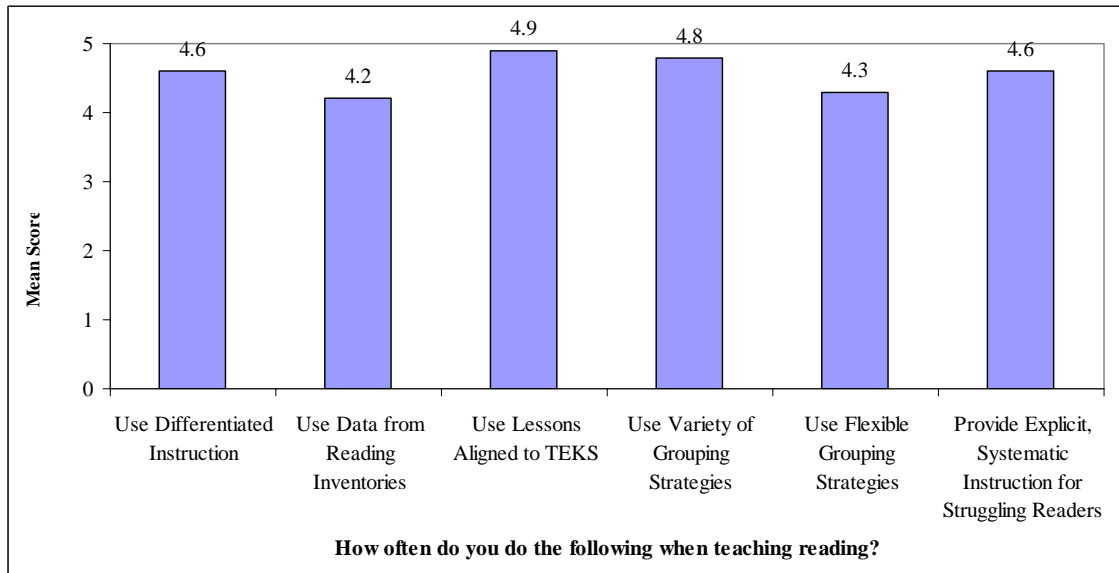
Overall, teachers rated their level of strategy use quite high, with the large majority of respondents reportedly using the strategies often or all the time. In Exhibits 28-31, the respondents, regardless of grade level, report very similar levels of use of certain strategies. For example, teachers across all grades levels, Kindergarten to Grade 3, report a high frequency of using lessons aligned with TEKS and a high frequency of grouping strategies. Furthermore, respondents in all grade levels report a slightly lower frequency of using data from reading inventories and flexible grouping strategies.

**Exhibit 28**  
**Mean Implementation of Teaching Strategies**  
**for TRA-Trained Kindergarten Teachers**



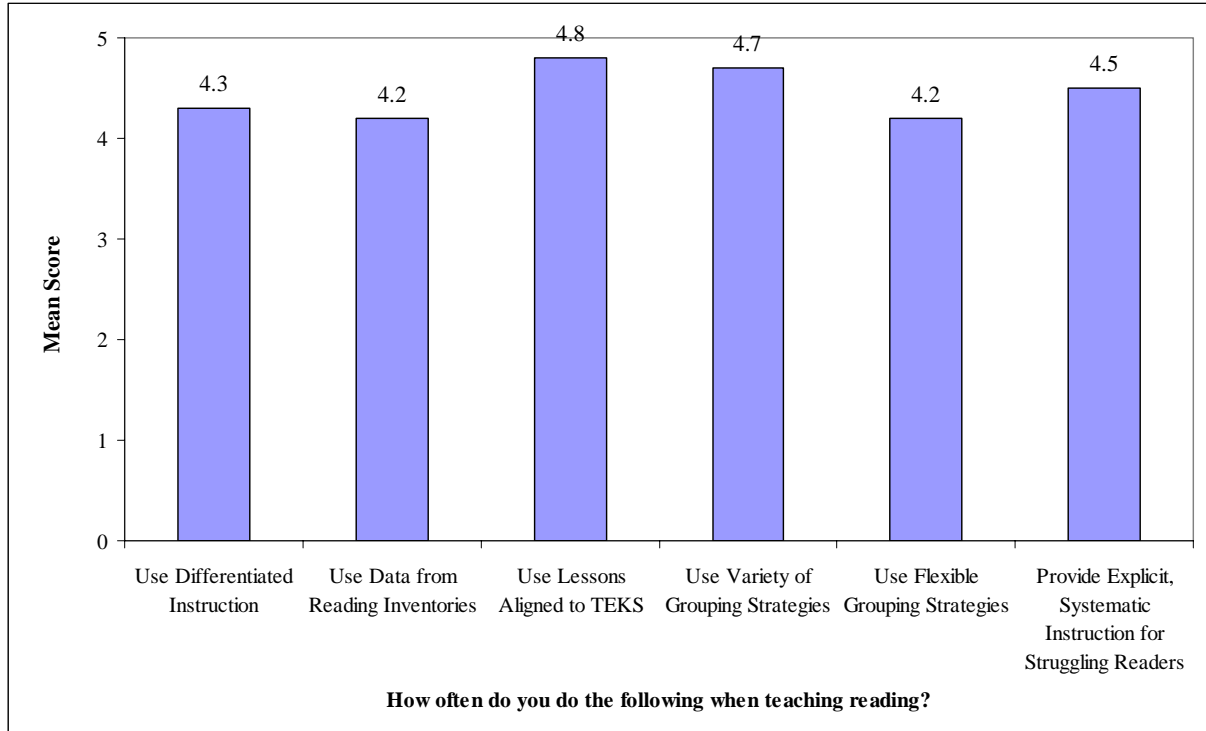
Source: Survey of Teachers Regarding TRA Training, 2004.

**Exhibit 29**  
**Mean Implementation of Teaching Strategies**  
**TRA-Trained Grade 1 Teachers**



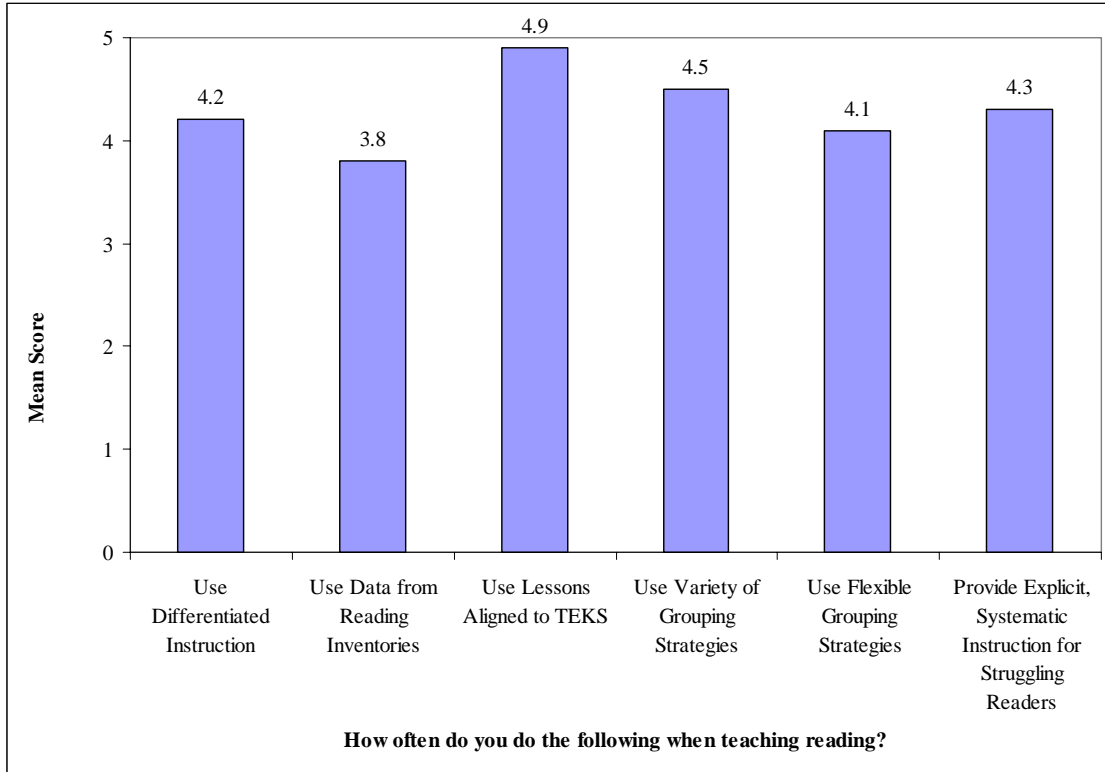
Source: Survey of Teachers Regarding TRA Training, 2004.

**Exhibit 30**  
**Mean Implementation of Teaching Strategies**  
**TRA-Trained Grade 2 Teachers**



Source: Survey of Teachers Regarding TRA Training, 2004.

**Exhibit 31**  
**Mean Implementation of Teaching Strategies**  
**TRA Trained Grade 3 Teachers**



Source: Survey of Teachers Regarding TRA Training, 2004.

TRA participants were also asked to provide information about the effectiveness and possible outcomes of the TRA training. Responses to these items are presented in Exhibit 32.

Exhibit 32 illustrates that the TRA participants who responded to this survey generally “agree” or “strongly agree” that the TRA strategies were easy to implement (93 percent), and they resulted in changes to instruction in the district (60 percent). Furthermore, the respondents “agreed” or “strongly agreed” that the training helped teachers to identify struggling learners (73 percent), the grouping strategies helped teachers to accelerate struggling learners (75 percent), and the diagnostic tool helped teachers use differentiated instruction (74 percent) and identify students’ strengths and weaknesses (76 percent). Finally, respondents “agreed” or “strongly agreed” that they have shared TRA strategies with other teachers or school staff (74 percent). These combined findings suggest that survey respondents perceive that the TRA training has had considerable effects on participants and their schools.

**Exhibit 32**  
**Trained Teacher Perceptions of TRA Effectiveness and Outcomes**

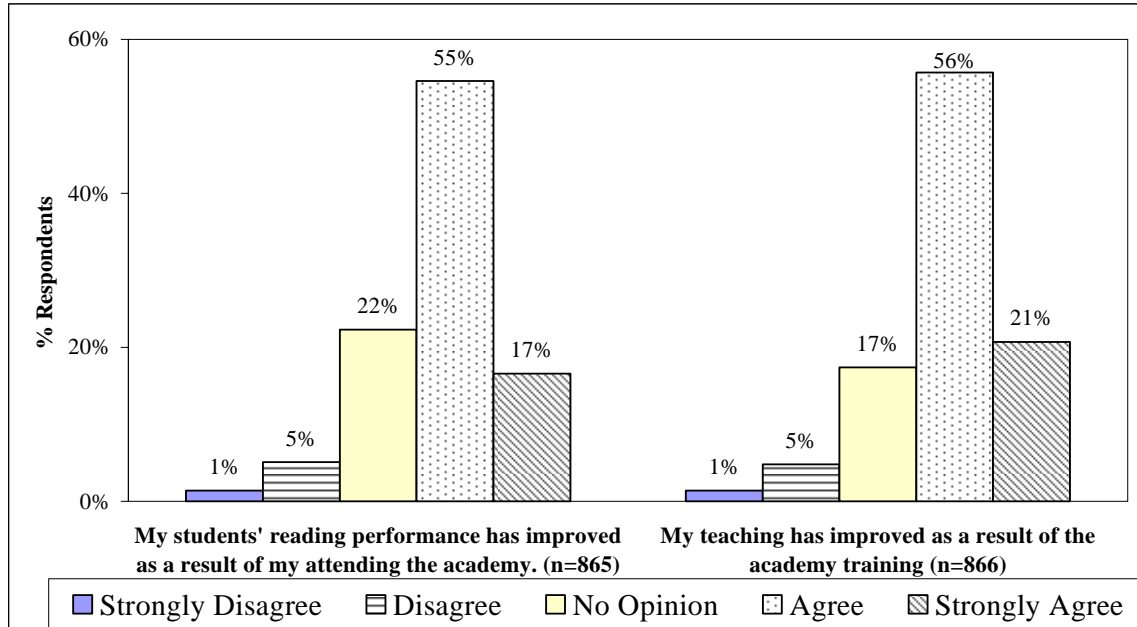
<b>Factors</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>No Opinion</b>	<b>Agree</b>	<b>Strongly Agree</b>
I have shared what I have learned with others (N=865)	1%	7%	18%	59%	15%
The diagnostic tool helped me use differentiated instruction (N=868)	1%	5%	21%	57%	17%
TRA resulted in instructional change in my district (N=865)	1%	6%	34%	43%	17%
Grouping strategies helped accelerate struggling learners (N=869)	1%	4%	20%	58%	17%
TRA training helped me identify struggling learners (N=867)	1%	7%	19%	54%	19%
The diagnostic tool helped me identify students' strengths and weaknesses (N=867)	1%	4%	19%	57%	19%
The TRA strategies were easy to implement (N=868)	0%	1%	5%	56%	37%

*Source: Survey of Teachers Regarding TRA Training, 2004.*

### **Perceptions of Impact of TRA Training on Teaching Practice and Student Achievement**

An important piece of these findings was addressed by survey items which asked participants whether the training had improved their teaching practice and resulted in improved student achievement. As seen in Exhibit 33, almost three quarters (72 percent) of the surveyed teachers “agreed” or “strongly agreed” that the TRA training resulted in improved reading achievement, and 77 percent of survey respondent “agreed” or “strongly agreed” that their teaching practice improved as a result of attending the training.

**Exhibit 33**  
**Trained Teacher Perceptions of TRA Student and Teacher Outcomes**



Source: Survey of Teachers Regarding TRA Training, 2004.

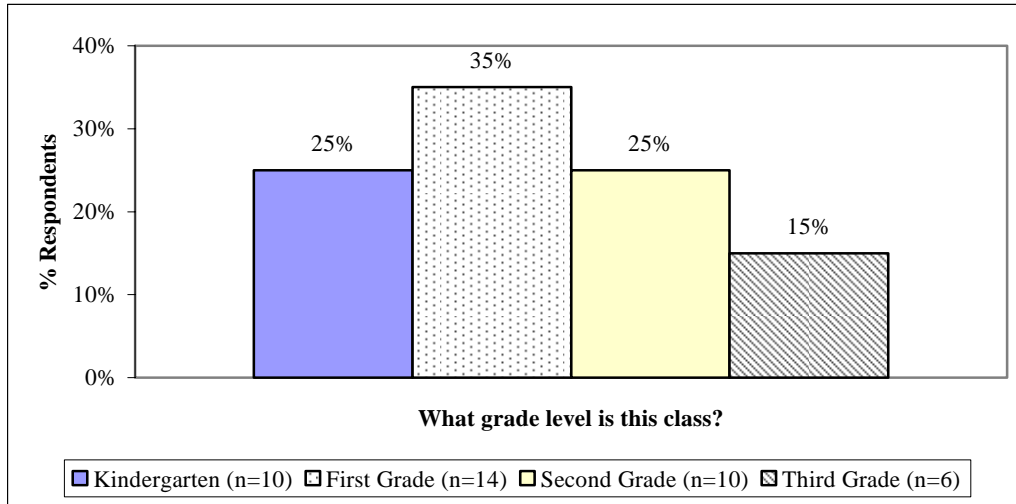
**Online Teacher Reading Academies (OTRA): Perceptions of Implementation**

Equally important to the scope of this study was to understand how teachers who participated in the online versions of the TRA were implementing what they learned in their classrooms and to note any differences between teachers who attended the traditional, face-to-face TRA trainings and teachers who participated in the OTRA. The OTRA survey was identical to the TRA survey except for questions related to the nature of the online medium. A total of 73 surveys from participants of the OTRA were returned with a response rate of 17 percent.

**OTRA Reading Instruction Experience**

Teachers who participated in the OTRA were asked about their current experience with reading instruction in terms of their years in the teaching profession, the highest level of education they had attained, the grade level taught, and the number of hours devoted to reading instruction each week. The purpose of these survey items was to establish the degree to which teachers are experienced and the level of their engagement in teaching reading as a way to better understand the context within which implementation is assessed. Exhibits 34-37 show the years of teaching experience among the respondents, the percentage that have earned a Bachelor's or Master's degree, the percentage of respondents who reported teaching at each grade, and the average number of hours they devote to reading instruction each week.

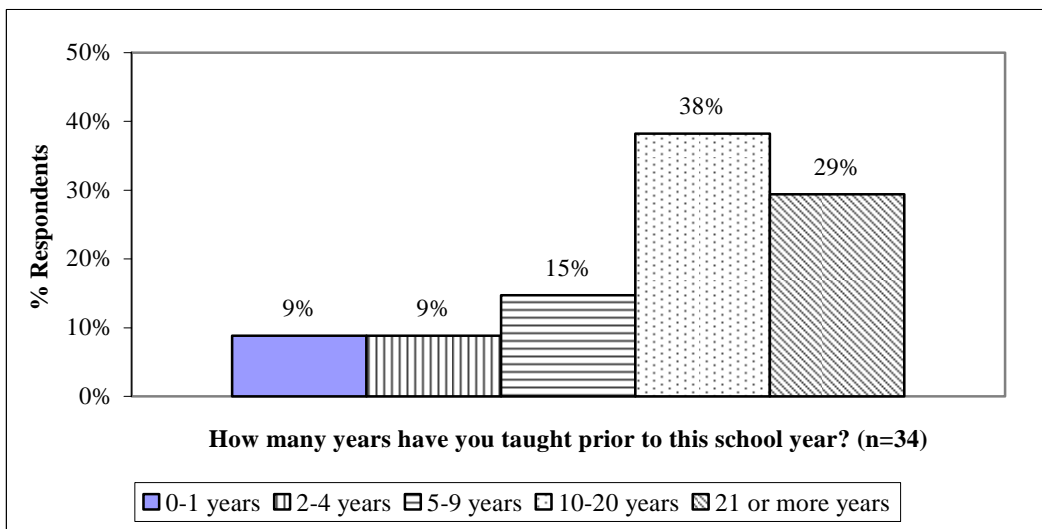
**Exhibit 34**  
**OTRA Teachers' Current Grade Level**



Source: Survey of Teachers Regarding OTRA Training, 2004.

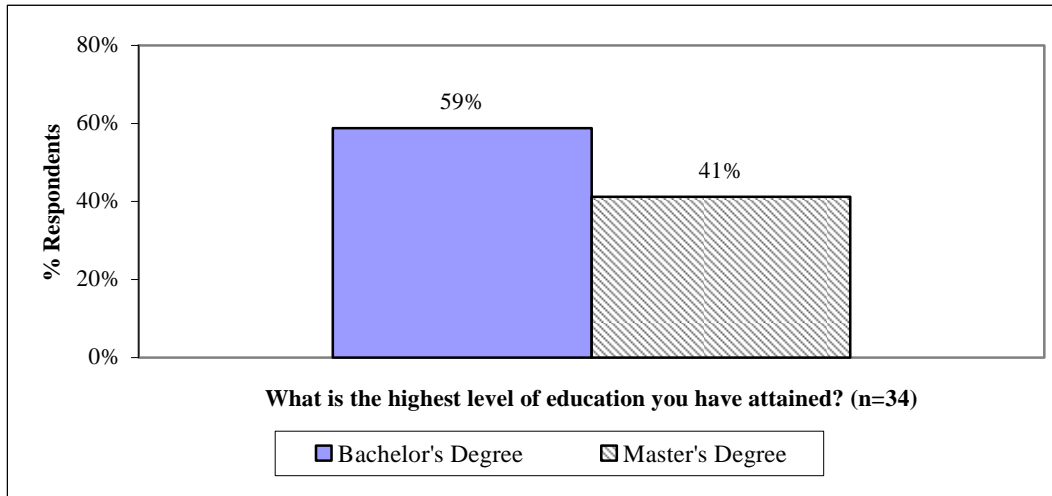
As seen in Exhibits 34-36 the survey respondents trained through the OTRAs are fairly evenly distributed across grade levels however there is a slightly larger representation of Grade 1 teachers and a slight under-representation from Grade 3 teachers. Similar to the TRA participants, the majority of OTRA teachers (67 percent) have taught for at least 10 years or more prior to the 2004-2005 school year. However a noticeable difference is that a much larger percent of OTRA participants (41 percent) have Master's degrees.

**Exhibit 35**  
**OTRA Teachers' Years of Prior Teaching Experience**



Source: Survey of Teachers Regarding OTRA Training, 2004.

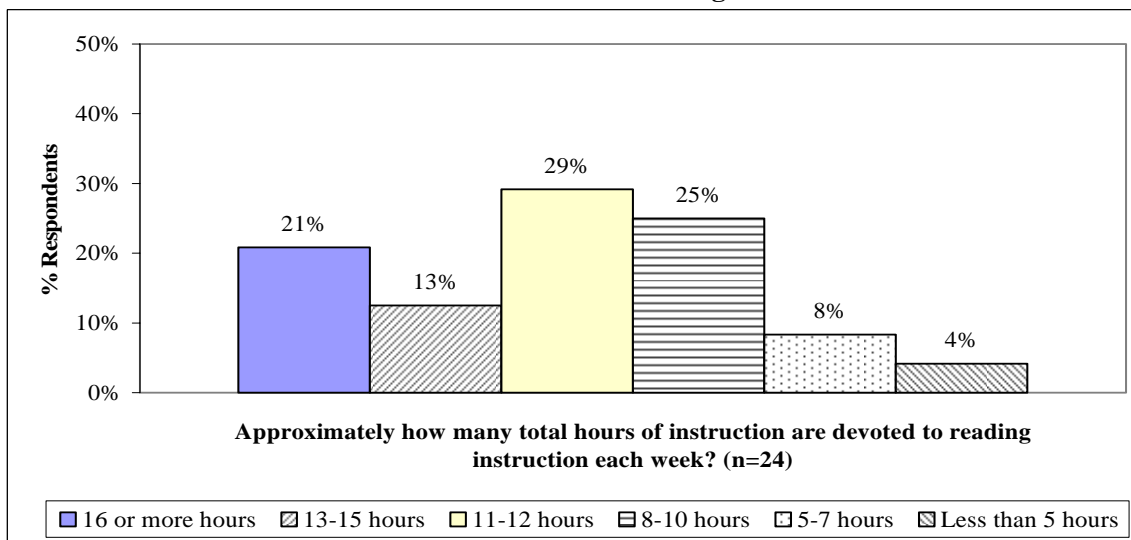
**Exhibit 36**  
**OTRA Teachers' Highest Level of Education**



Source: Survey of Teachers Regarding OTRA Training, 2004.

Exhibit 37 shows the OTRA respondents' reporting of the approximate hours of instruction devoted to reading each week. The majority of OTRA respondents (54 percent) reportedly devote between 8 to 12 hours a week to reading instruction. This is followed by a group of teachers who devote 16 or more hours a week to reading instruction. These responses differed between participants of the OTRA and TRA with OTRA teachers reportedly spending more time reading than participants of the face-to-face academies.

**Exhibit 37**  
**OTRA Teachers and Hours Devoted to Reading Instruction Each Week**



Source: Survey of Teachers Regarding OTRA Training, 2004.



Implementation of OTRA Strategies

OTRA participants were also asked to provide information about the effectiveness and possible outcomes of the OTRA trainings. Responses to these items are presented in Exhibit 38.

**Exhibit 38**  
**Trained Teacher Perceptions of OTRA Effectiveness and Outcomes**

<b>Factors</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>No Opinion</b>	<b>Agree</b>	<b>Strongly Agree</b>
The OTRA strategies were easy to implement	0%	0%	14%	49%	37%
I have shared what I learned through the OTRA with others	3%	0%	26%	43%	29%
OTRA training helped me identify struggling learners	0%	6%	31%	37%	26%
The reading diagnostic tool helped me identify students' strengths and weaknesses	0%	6%	34%	34%	26%
The reading diagnostic tool helped me use differentiated instruction	0%	6%	31%	40%	23%
OTRA resulted in instructional change in my district	6%	9%	49%	26%	11%
Grouping strategies helped accelerate struggling learners	6%	20%	51%	23%	0%

*Source: Survey of Teachers Regarding OTRA Training, 2004.*

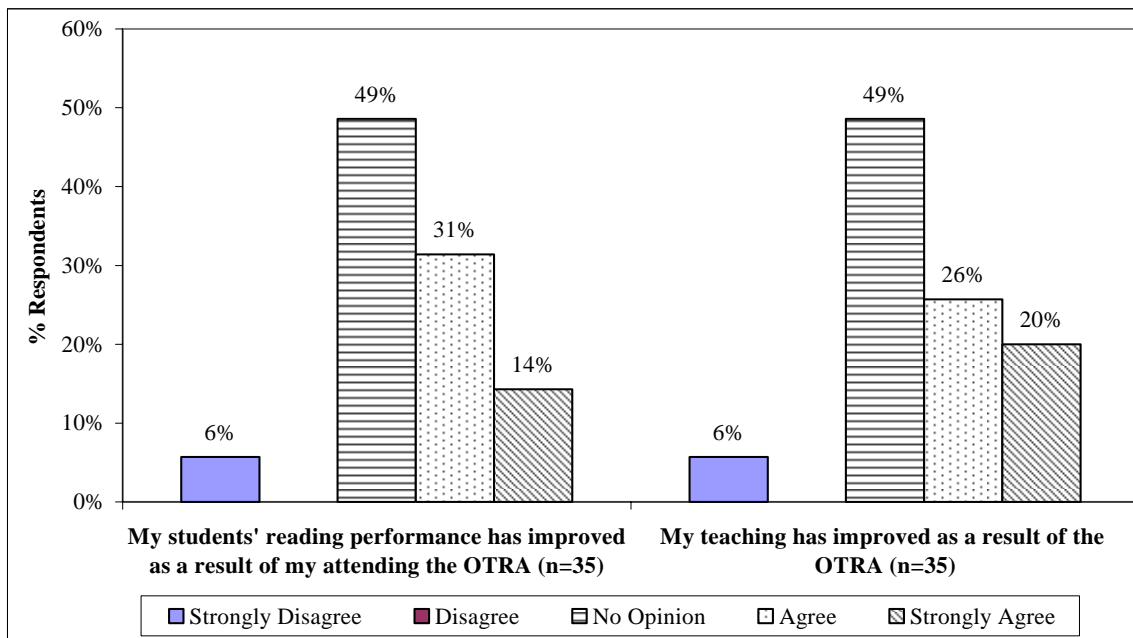
Exhibit 38 indicates that similar to respondents who attended the face-to-face TRA, a large majority of OTRA participants “agree” or “strongly agree” that the OTRA strategies were easy to implement (86 percent) and that they have shared what they have learned from the OTRA with others. Also, for the most part OTRA respondents “agree” or “strongly agree” that the training helped them to identify struggling learners (63 percent), that the diagnostic tool helped them to identify students’ strengths and weaknesses (60 percent), and that the diagnostic tool helped them to use differentiated instruction (63 percent). Responses varied more regarding whether the OTRA resulted in district instructional changes and whether grouping strategies taught in the OTRA helped them to accelerate struggling learners.

The teachers who participated in the online academy reported somewhat similar experiences as the participants of the face-to-face academies; but a noteworthy difference is that the OTRA respondents tended to rate their level of agreement lower on all of the possible outcomes.

Teacher Perceptions of Impact of OTRA Training on Teaching Practice and Student Achievement

When asked whether the OTRA training had improved their teaching practice and resulted in improved student achievement, 45 percent of respondents “agreed” or “strongly agreed” that the training had indeed resulted in improved reading achievement and another 46 percent of respondents “agreed” or “strongly agreed” that their teaching practice improved as a result of attending the training. Approximately half of the OTRA respondents shared no opinion on these items and 6 percent indicated they strongly disagreed on both items. While the sample size for the OTRA survey is small, it is important to note that these results for the OTRA training are not nearly as strong as the teacher perspectives on the face-to-face TRA training. A smaller percentage of the OTRA survey respondents agreed that their teaching had improved or that student achievement had improved as a result of the online academy participation (Exhibit 39).

**Exhibit 39**  
**Trained Teacher Perceptions of OTRA Student and Teacher Outcomes**



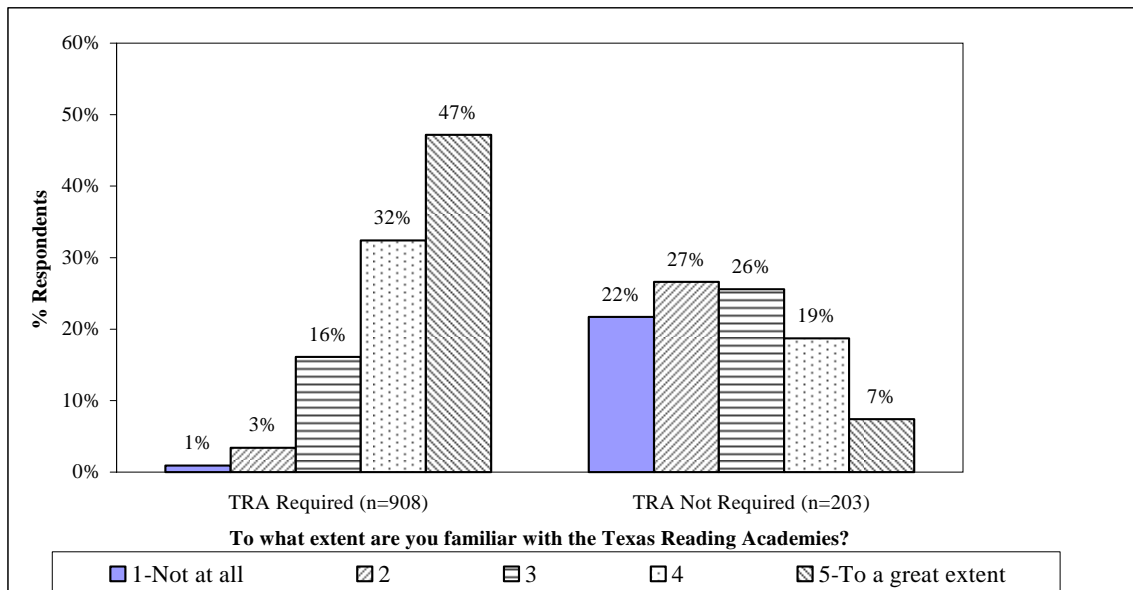
Source: Survey of Teachers Regarding OTRA Training, 2004.

**School Administrator Perceptions of TRA Implementation**

To further examine how classroom practices may have changed as a result of the TRA, the evaluation team surveyed school administrators regarding their perceptions of reading practices in their schools and the possible impact the TRA may have had on reading instruction and student achievement. Approximately 1,139 campus administrators completed and returned the administrator survey with a response rate of 44 percent.

In the administrator survey, respondents were asked to report the extent to which they were familiar with TRA on a five-point scale that ranged from 1 “not at all” to 5 “to a great extent.” Responses were compared for those administrators who required or recommended that teachers participate with those who did not. As illustrated in Exhibit 40, there is large difference between these administrator groups. As might be expected, school administrators who recommended or required their teachers to attend the TRA trainings reported greater familiarity with the TRAs than administrators who have not sent teachers to the trainings. Although the levels of familiarity vary for all administrator respondents, nearly half of those who have not required the training for their teachers are to some extent familiar with them.

**Exhibit 40**  
**School Administrators’ Familiarity with TRAs**



Source: Survey of School Administrators Regarding TRA Training, 2004.

The school administrators were then asked to report the percentage of the Kindergarten through Grade 3 reading teachers at their schools that participated in TRA, on a ten-point scale that

ranged from 0 percent to 100 percent. Exhibit 41 presents the responses to this item. Nearly two-thirds (64 percent) of school administrators who recommended TRA to teachers reported that 90 percent to 100 percent of their reading teachers participated in TRA, while only 19 percent of the administrators who did not recommend TRA reported that 90 percent to 100 percent of their teachers participated in TRA. Half (50 percent) of school administrators who did not recommend TRA reported that 0 percent to 20 percent of their teachers participated in TRA. Therefore, participation in TRA training seemed to have been greatly influenced by the requirements or recommendation from the school administrators.

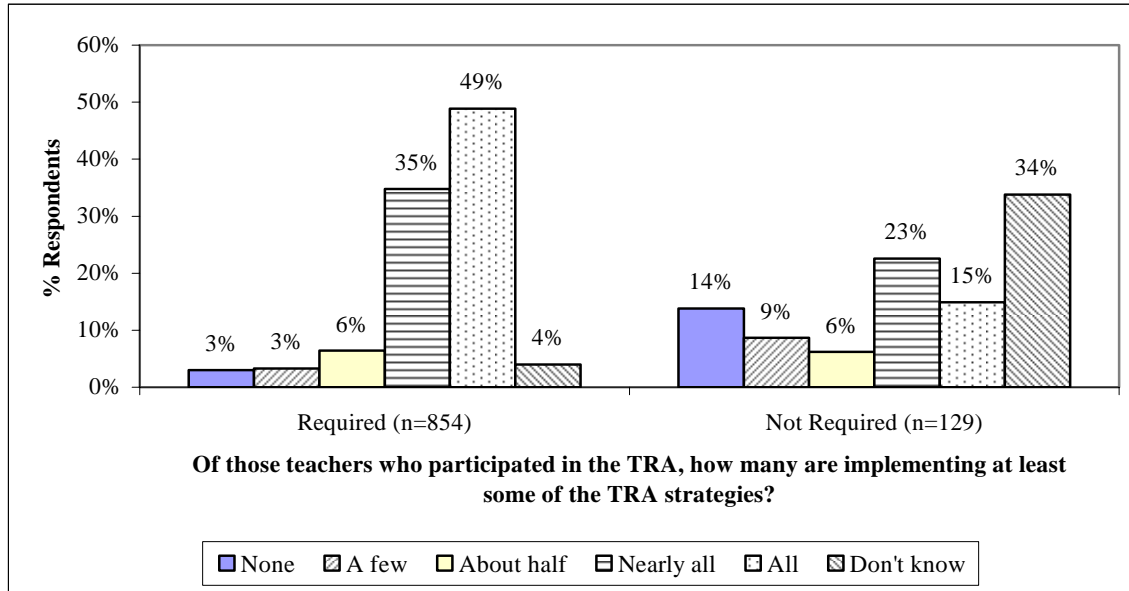
**Exhibit 41**  
**School Administrators' Reports of Teacher Participation in TRAs**

<i>Approximately what percentage of the teachers from your campus participated in the Teacher Reading Academy?</i>		
<b>Percent of Teachers Who Participated</b>	<b>Administrator Required or Recommended</b>	<b>Administrator Did Not Require or Recommend</b>
0-20%	9%	50%
30-50%	7%	17%
60-80%	21%	13%
90-100%	64%	19%
	n=893	n=175

*Source: Survey of School Administrators Regarding TRA Training, 2004.*

The school administrators were also asked to report the degree to which the teachers who attended TRA were implementing the strategies they learned at the training. Administrators were asked to rate the level of implementation on a six-point scale where 1= none, 2= a few, 3= about half, 4= nearly all, 5= all, and 6= don't know. In particular, administrators were asked to report how many teachers were implementing at least some of the TRA strategies and how many were implementing most of the TRA strategies. Exhibits 42 and 43 present administrators' responses to these items.

**Exhibit 42**  
**Administrator’s Perceptions of Teachers Implementing**  
**At Least Some of the TRA Strategies**

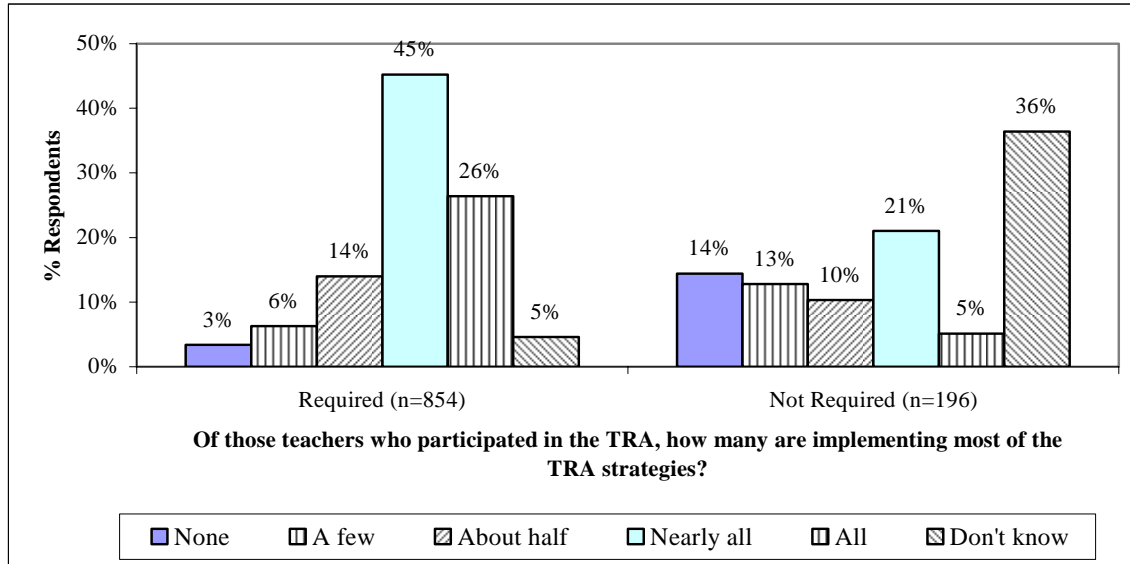


Source: Survey of School Administrators Regarding TRA Training, 2004.

School administrators’ responses to two survey items: 1) how many teachers are implementing *at least some* of the TRA strategies; and 2) how many teachers are implementing *most* of the TRA strategies, suggest that, according to the administrators, strategy implementation levels are fairly high. The vast majority (87 percent) of administrators who required or recommended teachers to participate in the TRAs reported that “all” or “nearly all” of their TRA-trained teachers are implementing *at least some* of the TRA strategies compared to just 41 percent of the teachers working for school administrators who did not require or recommend TRA attendance.

Likewise, three-quarters (75 percent) of school administrators who recommended/required that teachers participate in the training indicated that “all” or “nearly all” of teachers are implementing *most* of the TRA strategies. As might be expected, smaller percentages of administrators (41 percent) who did not recommend or require teachers to participate in the TRAs report that “all” or “nearly all” of their TRA-trained teachers are implementing *most* of the TRA strategies. In fact, just over a third responded that they did not know the answer to these two items.

**Exhibit 43**  
**School Administrator’s Perceptions of Teachers Implementing**  
**Most of the TRA Strategies**



Source: Survey of School Administrators Regarding TRA Training, 2004.

These findings strongly imply that commitment to training at the school and district administration level tends to have better post-training implementation results among elementary school teachers.

The school administrators were also asked to provide their opinions about the ways in which the TRAs have influenced teachers and general reading practices in the district. Exhibit 44 illustrates that administrators overwhelmingly “agreed” or “strongly agreed” that the academy strategies were easy for teachers to implement (93 percent), were offered at a convenient time of year (91 percent), improved reading instruction (85 percent), and improved students’ reading (81 percent). Regarding more specific TRA outcomes, administrator respondents also largely “agreed” or “strongly agreed” that the academy training helped teachers to identify struggling learners (90 percent), the diagnostic tools helped teachers use differentiated instruction (82 percent) and identify students’ strengths and weaknesses (88 percent), and the grouping strategies helped teachers to accelerate struggling learners (84 percent). The majority of respondents also “agreed” or “strongly agreed” that the academy resulted in instructional changes in their district (75 percent). A slightly lower percentage of administrators agreed that they have shared the academy strategies with others (61 percent).

**Exhibit 44**  
**School Administrators' Perceptions of TRA Outcomes**

<b>Factors</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>No Opinion</b>	<b>Agree</b>	<b>Strongly Agree</b>
I have shared academy strategies with others	2%	7%	31%	47%	14%
The reading diagnostic tools helped teachers use differentiated instruction	0%	4%	14%	61%	21%
The Reading Academies resulted in instructional changes in the district	0%	4%	21%	53%	22%
The grouping strategies helped teachers accelerate struggling learners	0%	2%	14%	61%	23%
Student reading performance improved as a result of the academy	0%	2%	17%	57%	24%
Enough academies scheduled to suit teachers needs	1%	13%	7%	54%	26%
The reading diagnostic tools helped teachers identify students' strengths and weaknesses	0%	1%	11%	61%	27%
Teaching in reading improved from the academy training	0%	2%	13%	57%	28%
Academy training helped teachers identify struggling learners	0%	2%	8%	59%	31%
Academy strategies were easy to implement	0%	1%	7%	61%	32%
The academies were offered at a convenient time of year	0%	2%	7%	52%	39%

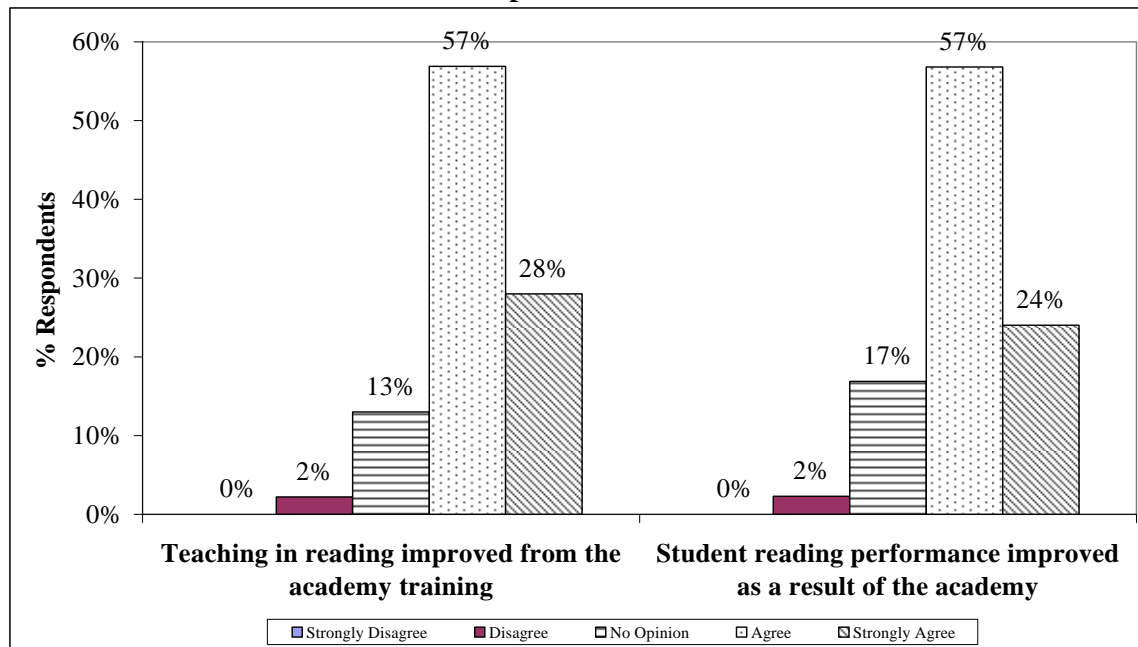
*Source: Survey of School Administrators Regarding TRA Training, 2004.*

#### Administrator Perceptions of Impact of TRA Training on Teaching Practice and Student Achievement

When asked whether the TRA training had improved teaching practice and resulted in improved student achievement, a large percent of administrators who responded to the survey (81 percent) “agreed” or “strongly agreed” that that the training had indeed resulted in improved reading achievement and another 85 percent of school administrators “agreed” or “strongly agreed” that teaching practice in reading improved as a result of the teachers attending the training. A smaller

percentage of the administrator respondents shared no opinion or disagreed that these outcomes resulted from the TRAs.

**Exhibit 45**  
**School Administrators' Perceptions of Teacher and Student Outcomes**



Source: Survey of School Administrators Regarding TRA Training, 2004.

### Open-Ended Responses –Teacher Perceptions of TRA Outcomes

On the survey of teachers regarding the TRAs and OTRAs, teachers were asked to respond to several open-ended items about the usefulness of the information learned through the TRA and OTRA training to their classroom practice. First, teachers were asked to indicate what components of the TRA training most enabled them to assist struggling readers. Teachers indicated that the following approaches learned through the TRA training were helpful:

- instructional strategies that promoted the Five Components of Reading (22 percent);
- grouping strategies (16 percent);
- diagnostic tools and methods for identifying students who struggle with reading and addressing their needs (15 percent); and
- specific reading instructional techniques (e.g., using graphic organizers, alphabetic principle, think sheets, etc.) (13 percent).



Teachers reported that additional components of the TRA were useful resources for their instruction, such as the materials and handouts that were distributed during the TRA (4 percent). Sample comments of the components of TRA that most enabled teachers to help struggling learners included:

- What helped me most were ideas and strategies to use with struggling readers in the areas of comprehension, accuracy and fluency, vocabulary, word study and phonological awareness.
- The before reading, during and after activities have helped me be a better reading teacher. The vocabulary development, the phonics. I just learned very good strategies in the reading academy.
- The section titled group learning helped me when grouping students for various purposes.
- The variety of strategies explained thoroughly. Diagnostic materials - TPRI, DRA, running records.
- The use of graphic organizers, especially those allowing the students to express themselves pictorially.
- The large binder was a great help because everything in it was research-based and readily accessible whenever I needed reading instruction assistance or justification

Next, survey respondents were asked what factors at their campus supported their efforts to implement what they learned at the TRAs. Teachers most commonly cited the support they received from their principals (29 percent). The comments from survey respondents indicated that school administrators had general policies in place that fostered teacher innovation and growth in reading instruction. Teachers also valued the support they received from grade level peers or other teachers who had attended the academy (17 percent) as well as follow-up support offered by the district through ongoing training and consulting with district staff (12 percent).

Administrators at the district- or school-level provided teachers with resources and supplies they needed for instruction (12 percent). Principals provided teachers the autonomy to plan their time for additional instruction or collaboration with their colleagues. Teachers were allowed to arrange their class, schedule, students, or adapt curriculum as they thought best to achieve their instructional purposes (7 percent). Examples of teachers' comments regarding factors that supported their efforts to implement TRA at their campus included:

- My campus leader supports me in any and everything I do that will help the student. He is very supportive and wanted me to use the TRA strategies in any way possible.
- My principal allowed me to go to an on-site visit and watch the instructor during instructional hours to see it in action!! That was helpful!
- Our district supplied us with the budget money we needed to purchase items to incorporate academy strategies into our curriculum.
- Freedom to design my classroom to do small group instruction effectively.
- We were able to use materials and ideas we learned in the Reading Academy in our own classrooms.
- My grade level of teachers all planned our activities together and based much of them off of what we learned at the academy.

Survey respondents also reported factors that hindered their efforts to effectively implement TRA principles at their campuses. While a large percentage of teachers (41 percent) indicated that nothing hindered their efforts to implement what they learned from TRA on their campuses, some found it difficult to implement TRA due to a lack of time or other priorities that demanded their time (18 percent). Respondents also wrote that they lacked resources, equipment, or finances to fully implement TRA-learned strategies with their students (10 percent). A smaller percentage of teachers reported that their districts or schools were implementing other reading programs or had a focus on helping students with standardized test preparation (6 percent). Sample comments included:

- There were no factors that hindered my efforts to effectively implement what I learned at the Texas Reading Academy.
- I do not feel that my campus did anything to hinder implementation of activities.
- Lack of time, too many programs thrown at us.
- Continually trying new and different approaches without allowing enough time to really work at one new approach before implementing another approach.
- We did not have the books, special manipulations, supplies that the Reading Academy trainer showed us. A great deal of the material was not standard issued - but teacher bought with personal funds. Other kits were teacher made and too much time taken.
- Difficult to use all ideas from Texas Reading Academy because of need to cover all TEKS and then use Basal Reader and then prepare for Grade 3 TAKS test.

- We use the Success For All Reading program and we do not implement anything that is not in that program. Even when we have great ideas that have been proven to work we are discouraged to implement them.

### **Open-ended Comments: Administrator Perceptions of TRA Training**

School administrators were also asked to indicate what components of the TRAs supported their teachers' efforts to implement new teaching principles or strategies. Respondents to this open-ended item most commonly cited the follow-up support provided by the district after training, such as additional staff development, coaching, modeling, and other support from district personnel with expertise to reinforce and enhance TRAs (19 percent). The following are examples of such comments:

- Our district provided on-going support and staff development for our teachers throughout the school year.
- Extension of the Academies was provided by our district.
- Follow-up training has been provided to the teachers. The major components of the Reading Academies have been discussed.
- Reading Specialists on every campus helped encourage teachers to implement what they learned.
- Literacy Specialist position created for each campus.

Administrators who responded to this open-ended item cited the provision of resources including materials, time, and additional personnel as another factor that supported implementation (14 percent). Examples of such resources included funding for literacy libraries and other instructional materials, substitutes or support staff to lower class sizes and cover classes during training, and time allotted for observing teachers implementing the academy strategies. Other respondents explained how existing school and district initiatives were consistent with the academy strategies and therefore supported the implementation in the classrooms (8 percent).

Another factor that administrator survey respondents described was the collaboration among teachers within schools (e.g., common planning time for planning and discussing TRA strategies) as well as across the district (e.g., horizontal and vertical teams) to implement the strategies (7 percent). Respondents particularly highlighted the benefits of sending teams of teachers from the same school to the TRAs. For example:

- Having multiple teachers attend the training allowed them to come back to campus and work together.
- Teachers were able to have department planning and opportunities to share ideas and plan together.
- My teachers are using the information and having professional conversations. They all speak the same language and have common vocabulary.

Another notable set of factors that survey respondents described was their own participation in the TRA training (4 percent). The following are examples of such comments:

- I also attended an Academy. The principal must be aware of the content of academies and must be willing to help teachers with implementation.
- The biggest factor was my own training in the academy.
- Campus administrator attended a reading academy and found what teachers should be doing. This made the teachers more accountable. Administrators must attend this training.

Finally, school administrators were asked what factors at their campus hindered their teachers' efforts to implement what they learned at the TRAs. While administrators most commonly reported that nothing hindered teachers' implementation of academy principles (24 percent), they acknowledged that lack of time and many pressing priorities (such as TAKS testing or other reform initiatives) kept teachers from implementing what they learned through the TRAs (12 percent). Respondents also indicated that inadequate resources (9 percent), lack of follow-up (with additional professional development) (7 percent), and lack of opportunity to collaborate with other teachers (7 percent) hindered teacher's efforts to implement what they learned.

Examples of these responses included:

- Not enough hours in a day to meet all objectives with multitude of meetings and training off campus – subs are not able to meet objectives.
- Time lines and commitment to a variety of programs.
- The lack of funding for special interventions/programs placed higher demands on our teachers.

- The factors that hindered teachers efforts in implementing read/math academics are that the district has so many tests to be taken.
- We needed more reading training opportunities and more district follow-up.
- Maybe a lack of time for meaningful interaction among those trained.

## Interviews and Focus Groups

### Perceptions Regarding TRA Implementation

#### Struggling Learners – Assessment, Identification, and Differentiation

Interview and focus group participants discussed how attending the TRA training affected their use of both formal and informal diagnostic assessments in identifying struggling learners. Using formal diagnostic assessment as a tool for identifying struggling learners seemed to be a well-embedded practice among the campuses visited. Principals believed the TRAs reinforced existing practices and, more importantly, built teachers' confidence in using diagnostic assessments to direct instruction and inform conversations with parents. Consistently, teachers used the TRA-recommended formal strategies, such as the Texas Primary Reading Inventory (TPRI) and the Developmental Reading Assessment (DRA), when these strategies aligned with existing district practices. Some districts used alternative formal assessments, which sometimes duplicated TRA-supported assessments and made implementing academy assessments excessive. Regardless of which diagnostics they used, teachers said they benefited from "seeing which kids [have mastered the skill] and who is behind. [It] helps them to learn." Districts supported these efforts and often made them a priority by providing teachers with additional time and training to analyze data and plan curriculum based on the results of the data. In one district, the central office provided teachers with data disaggregated by TAKS learning strands for each student in their classes. Teachers used this information to develop individual learning portfolios.

Teachers also used several of the informal diagnostic tools presented at the TRAs. Fluency probes and student questioning were among the most widely used. Additionally, some teachers used the running records and comprehension strategies. Teachers implemented the informal approaches on an ongoing basis and relied on them in combination with formal assessments to guide their daily instruction. One teacher felt that the TRA's focus on formal and informal assessment "helped me to evaluate myself" in meeting the needs of the students.

The TRA's emphasis on identifying struggling learners made teachers more aware of the need for differentiated instruction. "One size fits all" was no longer adequate. Participants from a wide range of experience levels appreciated the emphasis and the time TRAs spent on teaching them how to make grouping effective for struggling learners. Additionally, principals noted that the TRA training in grouping affirmed what teachers were doing as well as giving them additional strategies for forming and monitoring groups. Teachers reported using multiple approaches for grouping learners. The TRAs taught them to be less rigid in their grouping practices and to use more flexible groups that allowed for reorganization and restructuring as student needs changed. Teachers created groups based on specific information about students' learning progress. Some teachers used information from formal diagnostic tools to structure groups while others used running records and fluency charts. Regardless of the source of information, teachers made informed, deliberate decisions. Teachers credited the TRAs for emphasizing the need for "purpose" when grouping rather than haphazardly assigning students based on arbitrary criteria such as seating patterns.

Some teachers based groups on similar reading levels, and students therefore shared similar material and content. Other groups combined low-level readers with middle-level readers and middle-level readers with high-level readers. In other cases, advanced readers and low readers were grouped together. These strategies allowed more advanced learners to shore up skills as they shared their knowledge with less advanced learners, as well as giving less advanced learners opportunities to build off of their peers' information. Some groups were designed according to fluency levels. One teacher shared that "fluency probes really help to keep track of students. [I] usually do these probes once a month. It helps [me] keep track of students so that groups can change as objectives are mastered." Within groups, teachers assigned different roles to students based on their learning progress. These groupings were fluid but intentional. Teachers analyzed who belonged where and why that setting would be most appropriate for that learner. In doing so, teachers saw grouping as a key strategy in attending to the needs of struggling learners.

While teachers thought flexible grouping strategies benefited all students, they emphasized its impact on struggling learners. Teachers and principals saw that beyond improving skills, it "built self-esteem," as well as taught students to work together. One teacher suggested, "often, students communicate better with each other than with the teacher." Participants found that it kept students of all levels engaged and resulted in "fewer classroom distractions."

Beyond grouping, teachers used other differentiated instructional approaches that the TRAs reinforced. Teachers stated that they understood differentiated instruction to be an approach to meeting the varied needs of students. One teacher noted, “You have to plan to implement different lessons for different learners. You adjust for the type of learning and for groups.” They used a variety of approaches, such as working with students one-on-one during class time while other students worked in groups. Teachers created centers to work on specific skills for struggling learners, such as chunking vocabulary and decoding words. Pairing learners to address specific skills helped struggling learners receive reinforcement beyond whole group instruction. Teachers also provided struggling learners with more graphic organizers and more practice with phonics. A teacher commented that “watching students complete graphic organizers is a good indicator [of learning progress].” Principals and teachers both reported the “clink and clunk” and “get the gist” strategies as being helpful in supporting struggling learners.

Some of the most common approaches for assisting struggling learners included offering more academic support beyond participation in daily classroom instruction. These services included placing students in additional programs to supplement classroom instruction, offering tutoring, and assigning mentors to work on reading skills.

Attending the TRAs provided teachers with a focused approach to using diagnostic information to inform daily instruction. Teachers walked away with a more structured plan and with more resources and tools to help them accomplish their plan. As one teacher commented, “Now, [our approach to instruction] is not informal or random. Now there is an order to what we do.” Additionally, participants said they gained confidence in how to interact with parents. They were no longer basing their decisions on arbitrary judgments but could now present systematic data to justify their decisions.

#### Were the TRA strategies easy to implement in the classroom?

Teachers responded positively to questions about the ease of implementation of the TRA strategies. Their praise echoed opinions offered about the quality of materials used in the training. Participants felt that one reason the TRA strategies were easily implemented was that the training modeled how to use them in a classroom setting. “Seeing [the strategies] in action” made it easy to use them. Additionally, teachers thought the strategies and supporting materials were well designed to be “teacher friendly without much preparation.” One teacher reinforced, “strategies did not take hours of making ‘stuff’ to use. [They were] things you could pick up and use the next

day.” As mentioned earlier, the resource notebooks also provided clear instructions with easy pull-out sheets and copies.

Teachers found that some strategies took longer to master but were worth the effort. “Fluency probes were challenging at first, but, with practice, they got easier. These are effective because progress is charted and students get to see their own growth.” One beginning teacher thought the strategies were difficult to implement but attributed this to being overwhelmed as a first-year teacher rather than a deficiency of the strategies, stating “Being a first year teacher, everything was difficult to implement.” Principals also observed that strategies were easier for more experienced teachers to implement.

#### How did the focus on diagnostic assessment assist with identifying students’ strengths and weaknesses?

Similar to identifying struggling learners, formal and informal diagnostic assessments were key district-wide strategies for identifying individual students’ strengths and weaknesses. Again, participants widely implemented fluency probes and running records. Formal diagnostics, the TPRI and DRA, were used in districts where they did not conflict with existing assessment practices. In some places, these tools would have been duplicating formal assessments already used. Assessment played an important and frequent role in how teachers designed their instruction. Teachers reported using district benchmarking data to reassess students periodically. They viewed assessments as useful diagnostic tools and viewed their purpose as to “monitor students—assess and assess again. Don’t keep kids at the same level.” Participants said the TRAs placed more emphasis on pre-testing than they had previously used. Principals reported that the TRAs helped to focus assessment efforts by providing concrete tools and outlining intervention plans.

Teachers also reported that the TRA’s focus on charting individual growth through informal assessments was especially helpful. Again, participants widely implemented phonics screeners and fluency probes, as well as running records. When probed about how the TRA might have changed existing practices, teachers again expressed that the TRAs provided more focus and direction for how to approach diagnostic assessment and instruction. Additionally, exposure to the TRAs offered participants a wider range of strategies than previously used. Principals viewed the TRAs as helping teachers be “deliberate” in their instructional planning.



How did the TRA training, early reading instruments, and online diagnostics result in adaptations to teaching practices within districts?

The ability of TRA training strategies to become part of a district-wide approach to teaching reading depended on several factors. Most importantly, it depended on how closely the TRAs matched existing district philosophies and approaches to teaching reading. Where this was the case, the TRAs received wider attention beyond individual classroom teachers who attended. For example, TRA strategies would be referred to in later district-provided training. In some instances, the TRAs provided a common language and approach for a constellation of district activities. Often, attending teachers returned and provided district-wide presentations of TRA research and strategies. However, teachers and principals felt the TRAs had the biggest impact on the teachers who had attended and then implemented with their grade-level campus colleagues. A common phenomenon was for trained teachers to return and share or model material from the TRAs in grade-level meeting or planning sessions.

Teachers and principals agreed there would have been more impact on districts if there had been more training at the district-level, as well as follow-up for training in terms of ongoing discussions and meetings. Additionally, teachers felt most supported in schools where entire grade levels attended together so that when they returned from the training, they could exchange ideas and information with their colleagues as they implemented strategies in their actual classrooms. Exhibit 46 summarizes teachers' perceptions of the strengths and weaknesses related to applying TEA strategies in the classroom.

**Exhibit 46**

**Summary of Teachers' Perceptions and Observations of TRA Classroom Application**

<p style="text-align: center;"><b>TRA Classroom Application Strengths</b></p>	<p style="text-align: center;"><b>TRA Classroom Application Weaknesses</b></p>
<ul style="list-style-type: none"> <li>• Teachers consistently used formal diagnostics tools, such as TPRI and DRA.</li> <li>• Teachers consistently used informal diagnostics tools, such as fluency probes, student questioning, written work, monitoring, and running records.</li> <li>• Teachers consistently used differentiated instructional techniques, such as flexible grouping.</li> <li>• Teachers consistently used strategies, such as choral reading, literacy circles, paired reading, and tape assisted stories.</li> <li>• Struggling learners received supplemental support.</li> <li>• Academy strategies were easily implemented by teachers.</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to attribute use of academy recommended strategies to academy training because content replicated other professional training.</li> <li>• Limited evidence of principal knowledge about academy strategies.</li> <li>• Limited evidence of change in teaching practice beyond individual teachers due to academy training.</li> </ul>

*Source: Analysis of teacher participant interview and observation data collected by evaluation team, 2004.*

**Observations Regarding TRA Implementation**

The TRAs also focused on using informal diagnostic tools to target specific topics, such as word study skills. Teachers kept running records on students as informal and ongoing assessments. These tools helped teachers plan for more targeted instruction. For example, some students needing more practice with letter-sound correspondence worked together using fingers to frame parts of words. Teachers also paired learners and taught in small groups to target those with similar needs, such as patterns of sounds. In one classroom, a lesson for struggling readers presented knowledge of letter sounds. The teacher presented a vowel sound and asked students to substitute different initial consonant sounds. As students proceeded, the teacher provided constant monitoring and redirection when appropriate.

Observations indicated that teachers used a variety of formal and informal diagnostic instruments and tools in the classrooms. As documented from the interview data, formal district-required assessments were widely implemented and used in directing instructional planning. While evaluators saw evidence of these assessments, such as student-level disaggregated data indicating areas of weakness, it is unreasonable to expect teachers to be administering a formal assessment

instrument during the observation period. It was more typical to see how these diagnostic tools informed teachers' instructional practices through differentiated instructional techniques. Teachers used diagnostic information to create literacy circles with leveled books. Students in these groups were assigned roles, such as wordsmith or illustrator, based on their learning progress. In one setting, groups were tiered based on the amount of support needed from the teacher for the focus skill. This arrangement allowed the teacher to spend more time with one group while not impeding the progress of another group. Some teachers grouped students in order to concentrate on specific skills. For example, one classroom was arranged into three groups all working on vocabulary. One worked on using words in sentences, while another focused on synonyms and antonyms, and the third group used concept word maps. Additionally, teachers pulled students from groups to work one-on-one with specific skills. The evaluation team also saw pairings based on designated criteria such as students working on similar vocabulary using word strips. Together, this information suggests that teachers had a deep understanding of each student's needs and made deliberate instructional decisions based on this information.

The TRAs also focused on using informal diagnostic tools to target specific topics, such as phonics skills. Teachers were observed implementing phonics screeners. Additionally, teachers kept running records on students as informal and ongoing assessments. These tools helped teachers group students for more targeted instruction, such as converting letters to sounds and blending sounds or using fingers to frame parts of words. Teachers also paired learners for scaffolding based on information from phonics screeners. In one classroom, the lesson focused on building students' knowledge of letter sounds. The teacher presented a vowel sound and asked students to substitute different initial consonant sounds. As students proceeded, the teacher provided constant monitoring and redirection when appropriate.

Another TRA goal was to increase teachers' knowledge about diagnosing and improving fluency levels. A key academy diagnostic strategy for this area was the use of fluency probes in which a student reads a passage; the teacher marks errors, and the student charts progress. This information resulted in the use of several research-based practices to improve fluency. Teachers widely used partner reading in which students read aloud and retold stories to one another. Students also participated in choral readings and tape-assisted reading centers. Another frequently implemented strategy was echo reading, where the teacher reads a sentence and the student reads the sentence back. Commonly, many of these strategies were used simultaneously in separate groups. For example, in one classroom, each of the students had separate texts appropriate to their

reading level. One group spent time working on oral reading, while another group broke into pairs for partner reading, and a third group retold a story through pictures.

To assess comprehension, teachers typically monitored individuals in small groups or pulled out students for individual assessment. Based on diagnostic information, teachers implemented a variety of academy-promoted comprehension strategies. For example, one teacher broke students into groups based on reading levels and then worked with each group using context clues to identify different elements of the story. Students then highlighted their own context clues and shared responses in their groups. In one setting, students were sent to different centers based on their skills after they were broken into groups and the groups then rotated to the teacher for one center for more individualized instruction. In another classroom, students used graphic organizers to compare story characters. Students used story maps and graphic organizers as summarizing strategies to help them monitor their own comprehension. Venn diagrams were completed by the students to show similarities and differences of the two main characters in the story. Direct instruction, questioning, and modeling were common instructional strategies for teaching comprehension. As an example, the focus skill was identifying characters in fairy tales. During whole group instruction, the teacher put on different costumes as a clue to which character she represented. Students were then asked to identify the character. Next the teacher demonstrated how she could create verbal and written clues. Then students broke into groups and prepared their own clues to exchange with other groups. The teacher monitored this process and helped groups needing support.

Several TRA-supported objectives were not frequently observed. These included writing and differentiated instruction for English Language Learners (ELLs). When teachers were probed about these areas, their responses indicated that it was not an oversight. Actually, teachers thought these were very important objectives and were attending to them, just not during the observation period. Charts documenting the writing process as well as examples of student writing evidenced writing occurred frequently. Also what emerged was that these needs were being met in alternative ways. For example, in many schools, teachers divided instructional responsibilities according to their strengths so that different teachers were responsible for writing instruction. Some schools split reading and language arts into separate topics and covered writing during language arts. In the classrooms where writing instruction occurred, some districts adopted local or regional variations of the New Jersey Writing Project in Texas. Concerning differentiated instruction for ELL, in some places this was simply not an issue because the classrooms did not

have ELL-designated students. In other locations, ELL students attended a separate campus. In the case of high enrollment ELL-designated students, entire classrooms were bilingual so that there was no need for specific differentiated instruction for ELL students.

### **C. Impact on Student Achievement**

In order to test the statistical relationship between TRA training and student achievement outcomes (as measured by TAKS passing rates and grade retention), several regression models were utilized. This approach allows researchers to isolate the impact of a particular variable of interest (e.g., the percentage of teachers trained through TRAs) on an outcome or dependent variable (e.g., TAKS passing rates). This section of the report will describe each of the statistical models and the results of each analysis.

In the following regression tables, the impact of academy training - the independent variable - is being measured against various types of student achievement outcomes (e.g., 2004 TAKS scores for Grade 3 at the Panel standard) - the dependent variables in the model. The “Multiple R” field measures the overall predictability of the model – the higher this value is, the more likely that the regression model used in this analysis can predict the relationship between the independent and dependent variables. A “Multiple R” value greater than 0.4 indicates a model with relatively high predictability. The “df” field refers to the degrees of freedom for the “T” value in the model. The higher the “T” value (i.e., the theoretical probability distribution), the more likely that the statistical relationship demonstrated by the model is real and not by chance. The “Beta” value measures the relative contribution of the independent variable (teacher training) to the prediction of the dependent variable. The “p-value” measures the statistical significance of the relationship between teacher training and student TAKS scores. A “p-value” of less than .05 indicates a statistically significant relationship between teacher training and student TAKS scores. The “B Weight” is the component of the regression equation that measures whether the teacher training has a positive or negative impact on student TAKS scores.

Exhibits 47 and 48 shows that there is a statistically significant (shown by the p-value) and positive (shown by the positive B-Weight) relationship between the percentage of teachers receiving TRA training and student performance (for all students and economically

disadvantaged students) on the Grade 3 TAKS test<sup>13</sup> at the recommended, panel and commended<sup>14</sup> passing standards and for the Grade 4 TAKS test at the panel passing standard. This means that the higher the percentage of TRA-trained teachers at a particular school, the better the TAKS scores for that school.

Another way of viewing these findings is that, based on prior data, for each 10 percent increase in the number of TRA-trained teachers at a school (as measured by Academy Trained Density (ATD)), there is an approximate 0.7 points gain in the proportion of students passing the reading portion of the TAKS test at the same school. This modest gain can make a significant difference in the nominal accountability rating of the campus. For an individual student, a gain of one raw score point might mean the difference in meeting the TAKS standard and being promoted to the next grade (though the impact in these terms cannot be computed from available data).

Although fewer teachers received training at Grade 4, the relationship between percent TRA-trained teachers and student performance at this grade level was the same. It is important to note that by 2004, the initial group of Kindergarten students that was at risk of not being promoted based on the TAKS test had reached Grade 4 and many of these students had already been exposed to TRA-trained teachers in previous grade levels. Perhaps more importantly, these regression results show that the higher the percentage of TRA-trained teachers in a school, the lower the percentage of student that require accelerated instruction.<sup>15</sup>

For a more detailed discussion on the methods used to create these regression models, see Appendix C.

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<sup>13</sup> For 2003 TAKS Grade 3 (-2 SEM) and 2004 TAKS Grade 3 (Panel), the T-values were 8.77 and 8.19, respectively. A T-value of approximately 2.0 or higher for positive relationships, or -2.0 or lower for negative relationships, indicates statistical significance.

<sup>14</sup> For 2004 TAK S Grade 3 (commended) the T value was 3.42.

<sup>15</sup> For 2003 TAKS Grade 3 (need accelerated instruction) the T value was -10.59. This is an extremely high level of significance. The directionality of the T value (negative) indicates a negative relationship between percent trained teachers and student TAKS test performance. The more trained teachers, the lower the percentage of students who require accelerated instruction.

**Exhibit 47**  
**Impact of TRA Training on 2003 and 2004 TAKS Results**  
**Regression Analysis for All Students, Campus-Level**

Outcome (Dependent Variable)	Overall Model		Percent Trained in Reading Academy			
	Mult. R	(df)	Beta	T	p-value	B Weight
2003 TAKS Grade 3 (-2 SEM)	0.591	2,3631	0.118	8.77	0.00000	0.067
2004 TAKS Grade 3 (Panel)	0.546	2,3643	0.114	8.19	0.00000	0.065
2004 TAKS Grade 4 (Panel)	0.579	2,3565	0.081	5.93	0.00000	0.058
2004 TAKS Grade 3 (commended)	0.585	2,3626	0.046	3.42	0.00006	0.036
2003 TAKS Grade 3 (need accelerated instruction)	0.595	2,3380	-0.147	-10.59	0.00000	-0.081

Source. Campus level TAKS 2003, TAKS 2004, AEIS 2003, TRA participation

Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.

Note2: All models include the intercept

Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

**Exhibit 48**  
**Impact of TRA Training on 2003 and 2004 TAKS Results**  
**Regression Analysis for Economically Disadvantaged Students, Campus-Level**

Outcome (Dependent Variable)	Overall Model		Percent Trained in Reading Academy			
	Mult. R	(df)	Beta	T	p-value	B Weight
2003 TAKS Grade 3 (-2 SEM)	0.3833	2,3358	0.131	8.21	0.0000	0.0832
2004 TAKS Grade 3 (Panel)	0.2955	2,3410	0.118	7.21	0.0000	0.0762
2004 TAKS Grade 4 (Panel)	0.2920	2,3326	0.0995	6.00	0.00000	0.0769
2004 TAKS Grade 3 (commend)	0.5916	2,3162	0.042	2.917	0.00355	0.0345

Source. Campus level TAKS 2003, TAKS 2004, AEIS 2003, TRA participation.

Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.

Note2: All models include the intercept

Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

Six additional independent variables were added to the regression model to further test the relationship between TRA-training and Grade 3 student TAKS scores at the panel standard: 1) percent of students categorized as economically disadvantaged; 2) percent of minority students; 3) district wealth per Pupil; 4) years of teaching experience; 5) 1999 TAAS reading results for Grade 3; and 6) percent of teachers trained at the TRA (ATD) (see Exhibit 49).

**Exhibit 49**  
**Impact of TRA Training on Grade 3 2004 TAKS Results**  
**Regression Analysis for All Students, Campus-Level**

Independent Variable)	Predicting TAKS Grade 3 Reading			
	Beta	T	p-value	B Weight
Percent Economic Disadvantage	-0.300	-11.34	0.0000	-0.103
Percent Minority	-0.168	-6.67	0.0000	-0.051
District Wealth	-0.020	-1.33	0.1845	-0.000
Teacher Experience	0.064	4.36	0.0000	0.210
TAAS 1999 Grade 3 Reading	0.189	11.15	0.0000	0.164
Percent ATD	0.051	3.40	0.0007	0.008

*Source. Campus level TAAS 1999, TAKS 2004, AEIS 2003, TRA participation.*

*Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.*

*Note2: All models include the intercept*

*Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students).*

The results mirrored those found before with Reading ADT significantly related to higher levels of student performance. The total amount of variance (generally, providing a better estimate of expected student performance) explained by the overall model did increase as compared to the simpler models used in Exhibits 47 and 48.<sup>16</sup> All of the variables entered into this model were significant except District Wealth per pupil, which was not statistically related to Grade 3 TAKS at the panel standard in 2004.

Is the relationship between ATD and TAKS performance stable with some substitution of multiple independent variables? To examine the use of different variables, a second full model was constructed using the above variables, but substituting performance on 2002 TAAS and removing teacher experience. In other words, the pretest (often a significant predictor of posttest – TAKS in this case) was substituted for teacher experience. Again, the model was stronger than with only ATD and percent economically disadvantaged included as predictor variables. The findings, however, remain the same – stronger student performance with higher ATD values (see Exhibit 50).<sup>17</sup>

<sup>16</sup> The Multiple R (a measure of statistical fit), increased to 0.5884 as compared to 0.2955 when only percent economic and Reading ATD were included. The multiple R indicated the percentage of variation in the dependent variable (e.g., TAKS passing rates) for which all the independent variables in the model account.

<sup>17</sup> In this case, the overall multiple R increased to 0.64136, a better prediction model. The overall B weight for ATD did decline to about half of what was found without the addition of more variables. B weights are measures of the relative importance of a variable in a model in relation to the relative importance of other variables in explaining the outcome.



**Exhibit 50**  
**Impact of TRA Training on Grade 3 2004 TAKS Results**  
**Regression Analysis for All Students, Campus-Level**  
**(Alternate Set of Independent Variables)**

Independent Variable)	Predicting TAKS Grade 3 Reading			
	Beta	T	p-value	B Weight
Percent Economic Disadvantage	-0.250	-10.46	0.0000	-0.085
Percent Minority	-0.151	-6.54	0.0000	-0.046
District Wealth	-0.012	-0.86	0.3875	0.000
TAAS 2002 Grade 3 Reading	0.349	22.78	0.0000	0.323
Percent ATD	0.046	3.34	0.0008	0.025

*Source. Campus level TAAS 2002, TAKS 2004, AEIS 2003, TRA participation.*

*Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.*

*Note2: All models include the intercept*

*Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students).*

Most importantly, while the relative importance of ATD did decline compared to what was found without the addition of more variables, it remains highly significant in relationship to student outcomes. This is true for both models that included more variables. In other words, while including more variables increased the overall degree of prediction, it did not change the relationships for ATD. Since the issue remains with ATD, not the overall model, it was accepted that the addition of extra variables did not contribute to a better understanding of the pertinent issue and would only serve to confound and confuse the issue. Generally, the use of the simplest, statistically significant model is preferable when examining relationships. The importance of ATD to student performance appears to be a consistently significant and robust factor across models.

How strong is the relationship between ATD and TAKS when the analysis is restricted to lower-performing campuses? Another analysis conducted at the school level used only schools that were below average in percent passing TAAS Grade 3 reading in 1999. The same relationship between ATD and student performance was found as with all schools, but the statistical relationship was stronger and ATD was more of a factor in predicting performance.<sup>18</sup> In other words, the statistical relationship was stronger and ATD was more of a factor in predicting performance. Having a larger proportion of TRA-trained teachers (i.e., a higher ATD) is even more important for lower performance campuses. While certainly expected from a common sense point of view, the analysis confirms the impact of ATD on performance, especially when beginning student achievement results are low (see Exhibit 51).

**Exhibit 51**  
**Impact of TRA Training on Grade 3 2004 TAKS Results**  
**Regression Analysis for Campuses with Below Average Performance**

Independent Variable)	Predicting TAKS Grade 3 Reading			
	Beta	T	p-value	B Weight
Percent Economic Disadvantage	-0.452	-20.13	0.0000	-0.195
Percent ATD	0.126	5.59	0.0000	0.075

Source. Campus level TAKS 2004, AEIS 2003, TRA participation.

Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.

Note2: All models include the intercept

Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

Is the same relationship between ATD and TAKS performance also evident when change in performance from one year to the next is considered? A reasonable question to pose is whether the ATD would impact a change in performance from one year to the next (a quasi-cohort of students). Generally, this restricted analysis (using only ATD) was not informative (see Exhibit 52). For example, change from Grade 3 reading, 2003 for all students at -2 SEM (the standard for that year) to Grade 4 reading for all students in 2004, produced non-significant results. State-wide, there was a loss of about 10 percentage points from 2003 at -2 SEM to 2004 at Panel as should be expected with the more difficult standard. Even though the Beta is negative for ATD, ATD was related to “less loss” for higher percentages of trained teachers. This is a positive finding for the TRAs.

**Exhibit 52**  
**Impact of TRA Training on Grade 3 2003 to Grade 4 2004 TAKS Results**  
**Regression Analysis for Campuses**

Independent Variable)	Predicting TAKS Reading Change			
	Beta	T	p-value	B Weight
Percent ATD	-0.061	-1.37	0.1711	-0.023

Source. Campus level TAAS 2002, TAKS 2004, AEIS 2003, TRA participation.

Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.

Note2: All models include the intercept

Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

Is there an impact on the predictive ability of ATD when select ESC data are removed? As discussed in Appendix C, three large ESCs could only supply teacher names for 1999 and 2000.

<sup>18</sup> There was a higher Beta and a higher B weight, indicating an increase in the relative importance of ATD in explaining the outcome in this model.

**Exhibit 53**  
**Impact of TRA Training on Grade 3 2004 TAKS Results**  
**Regression Analysis for Campuses After Removing Three ESCs**

Independent Variable)	Predicting TAKS Grade 3 Reading			
	Beta	T	p-value	B Weight
Percent Economic Disadvantage	-0.506	-27.85	0.0000	-0.185
Percent ATD	0.076	4.120	0.0000	0.041

Source. Campus level TAAS 2002, TAKS 2004, AEIS 2003, TRA participation.

Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.

Note2: All models include the intercept

Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students).

Removing from the analyses the campuses from these three ESCs reduced the number of schools that could be used in the analysis. However, the directionality and magnitude of percent economically disadvantaged and percent trained did not change remarkably; both variables are related to TAKS and statistically significant (see Exhibit 53).

Are the same findings evident at the district level as were found at the campus level? The same analysis that was conducted for all schools was conducted at the district level as well. The findings were similar to the findings obtained for the school level analysis (see Exhibit 54). The impact of both the percent economically disadvantaged and teacher training density were slightly different, but still exhibited the same statistically significant relationship to student performance.<sup>19</sup>

**Exhibit 54**  
**Impact of TRA Training on Grade 3 2004 TAKS Results (Panel)**  
**Regression Analysis for Districts**

Independent Variable)	Predicting TAKS Grade 3 Reading			
	Beta	T	p-value	B Weight
Percent Economic Disadvantage	-0.434	-15.82	0.0000	-0.209
Percent ATD	0.105	3.81	0.0001	0.090

Source. Campus level TAAS 2002, TAKS 2004, AEIS 2003, TRA participation.

Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.

Note2: All models include the intercept

Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

Are similar results found with only smaller districts? One final analysis included only small districts that are classified as K-6 or K-8 districts (no high school or middle schools in some cases). While only 125 districts fit within this category, the overall results of the model were

<sup>19</sup> The overall model was not as powerful in predicting TAKS (multiple  $R=0.435$ ), but was still statistically significant. The B weight for economically disadvantaged percentage was slightly lower, the one for training slightly higher, but not different enough to warrant a change in what has been presented.

about the same as for the school level (see Exhibit 55).<sup>20</sup> The impact of percent economically disadvantaged was lower than in any other model while the impact of teacher training was much higher. The percentage of economically disadvantaged students in these districts is also about 10 points higher than the overall state (50 percent). In addition, within a small district, one or two teachers can have a big impact on percent trained. Data from these districts, including measures of student performance, are less stable in general.

**Exhibit 55**  
**Impact of TRA Training on Grade 3 2004 TAKS Results (Panel)**  
**Regression Analysis for Small Districts (K-6, K-8)**

Independent Variable)	Predicting TAKS Grade 3 Reading			
	Beta	T	p-value	B Weight
Percent Economic Disadvantage	-0.348	-3.90	0.0002	-0.186
Percent ATD	0.282	3.16	0.0021	0.174

*Source. Campus level TAAS 2002, TAKS 2004, AEIS 2003, TRA participation.*

*Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.*

*Note2: All models include the intercept*

*Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)*

### Complex Relationships Among Variables

Of course, relationships among predictor and outcome variables are not strictly linear in nature. When the percentage of students categorized as economically disadvantaged and the percentage of TRA-trained teachers are analyzed with student TAKS scores, a very complicated relationship emerges. When the percentage of economically disadvantaged students is high in a school, TAKS scores are generally lower and therefore the impact of teacher training is more pronounced. Similarly, when schools have a lower percentage of economically disadvantaged students, TAKS scores are generally higher. While adding TRA training does increase TAKS performance in these schools, the impact is not nearly as dramatic as when the percentage of economically disadvantaged students is high.

The relationships among these variables, and indeed any educational variables, is quite complex. Lacking a true experimental design, a great deal of the causal relationship between training and TAKS performance can only be implied. However, given the significant relationships found in a variety of circumstances, it is clear that TRA training does impact performance in a positive manner.

<sup>20</sup> Multiple R=0.4246 for Grade 3 reading and 0.3968 for Grade 4 reading.

**Impact of Reading-Related Training on Summer School TAKS Passing Rates**

An additional analysis was conducted utilizing summer school data for 2004. Data collection instruments were sent to districts in June 2004. The following data were collected for up to two summer school teachers per district:

- TRA and Other training experience (TRA training, district training, no training);
- Number of reading academies attended;
- Grade level of TRA attended;
- Years of teaching experience;
- Number of summer school students taught (who failed first 2 administrations of the reading portion of the 2004 3<sup>rd</sup> Grade TAKS test); and
- Number of students who met the standard on reading portion of the June administration of the 3<sup>rd</sup> Grade TAKS test.

The instruments were distributed to schools where it was anticipated that remediation for students who had not passed TAKS reading at Grade 3 would be held. The team selected schools with a history of low passing rates at this grade level. This approach was only partially successful because some districts cluster students from several schools into a common campus for summer school instructional efforts. Many districts distributed the data collection instruments to the appropriate summer school. Of the 300 data collection instruments that were mailed to school districts (on which there was space for two teachers on each form), 161 were returned (54 percent return rate). From these, usable information for 178 teachers was included.<sup>21</sup>

Importantly, this data collection was not based on a controlled sample. Districts could include teachers of their choosing. No attempt was made, nor was it possible, to validate the information provided. While there is no reason to suspect a deliberate biasing of the results, the findings must be considered as preliminary and interesting, but not definitive.

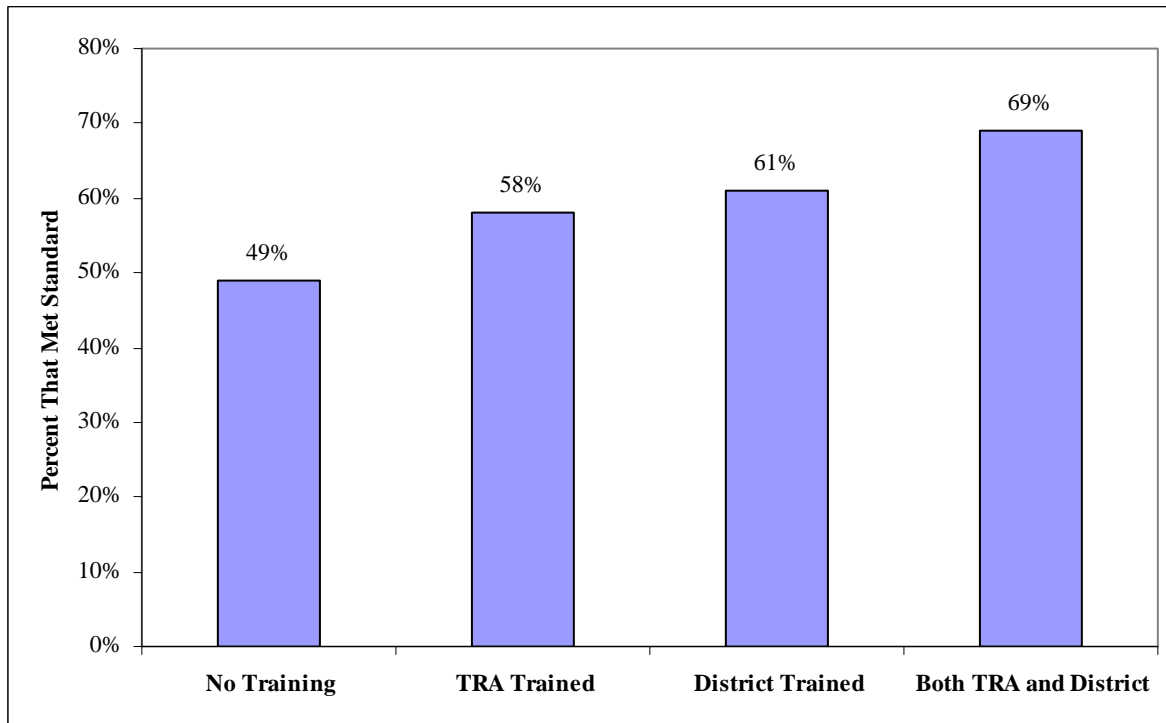
The findings from the summer school parallel information gathered in other parts of this study. The question at hand was whether students who had TRA trained teachers would have a higher pass rate on the third opportunity at meeting the standard for TAKS reading. Of those students who did not have a trained teacher (either at the district or ESC), just less than half (49 percent)

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<sup>21</sup> Another 53 teachers had incomplete data, such as reporting number of students served, but not number passed.

passed on the third attempt.<sup>22</sup> For teachers who were trained by the ESC, about 58 percent of students met the TAKS reading standard.<sup>23</sup> For teachers reported as trained only by the district, about 61 percent of students passed.<sup>24</sup> However, for teachers who were indicated as having been trained at the ESC and by the district (e.g., follow-ups, additional training, etc), the pass rate was 69 percent.<sup>25</sup> Almost 20 percent more students passed on the third attempt when they were taught by a teacher who attended multiple trainings as compared to those students with teachers who received no training. (See Exhibit 56.) While these results should be viewed with caution due to the small sample size and method of data collection, they do support the notion that multiple training opportunities (e.g., follow-up training after TRA training) result in better outcomes.

**Exhibit 56**  
**Percent of Students Meeting Standard on 3<sup>rd</sup> Administration of Grade 3 TAKS Test**  
**By Training Experience of Summer School Teacher**



Source: Self reported data from a sample of districts.

**Impact on Student Grade Retention**

Initially, the TRA targeted a cohort of students who would be in Grade 3 in 2003 by beginning with Kindergarten TRAs prior to the Kindergarten year for these students. Beginning in 2003,

<sup>22</sup> This is based on 68 teachers who had no professional development training in reading.

<sup>23</sup> This is based on 65 teachers who indicated that they received TRA training at an ESC.

<sup>24</sup> This is based on 18 teachers who indicated that they received training at their district.

<sup>25</sup> This is based on 27 teachers who indicated that they attended multiple trainings.

students in this grade level could be retained depending on their performance on TAKS. There are, however, measures of student success. For example, while Grade 3 promotion is clearly tied to TAKS, there is no state assessment with accountability consequences at Grades 1 and 2. One question that might be posed is the relationship between teacher training and promotion/retention rates. As already discussed previously, the retention rate has increased at Grades 1 and 2 over the past several years. Exhibit 57 contains results of analyses relating retention rates as reported in AEIS 2003 to teacher training in reading.

**Exhibit 57**  
**Impact of TRA Training on 2003 Grade Retention Results for Grades 1, 2 and 3**  
**Regression Analysis for All Students, Campus-Level**

Outcome (Dependent Variable)	Overall Model		Percent Trained in Reading Academy			
	Mult. R	(df)	Beta	T	p-value	B Weight
Retention Grade 1	0.300	2,2976	-0.016	-0.93	0.354	-0.006
Retention Grade 2	0.267	2,2445	-0.014	-0.73	0.467	-0.004
Retention Grade 3	0.324	2,2010	-0.084	-3.96	0.000	-0.022

*Source. Campus Level AEIS 2003, TRA participation.*

*Note: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted. All models include the intercept. Pairwise deletion of cases (campuses) with missing data (including less than 5 students).*

The only significant relationship found between ATD and student retention is at Grade 3 when higher values of ATD are associated with lower retention rates. That is, the higher the percentage of trained teachers, the lower the number of students who were retained.<sup>26</sup> Of considerable interest are the results found for training at these three grade levels. There is no significant relationship at either Grade 1 or 2. However, at Grade 3, where students are first at risk of non-promotion, there is a significant relationship.<sup>27</sup> While this might be somewhat expected given the significant relationship of training to TAKS and TAKS success to promotion, it is a measure that includes more than just test scores. Even though the relationship was not statistically significant at either Grades 1 or 2, the directionality of the relationship was in the appropriate direction. That is, the relationship is negative indicating the higher the percentage of trained teachers, the lower the student retention rate.

<sup>26</sup> The multiple R values for each of the three models in Exhibit 43 was lower in general than found with TAKS.

<sup>27</sup> The T value for this relationship is -3.96. A P value of .05 or lower indicates statistical significance for a relationship between variables.

## **D. Cost Effectiveness**

### **Introduction**

The Texas Education Agency (TEA) used the existing network of Education Service Centers (ESC) to implement the TRA. ESCs are intermediate educational units that provide professional development, technical assistance, administrative support, and other services as determined by the legislature, the Commissioner of Education, and the needs of local school districts and charter schools. TEA selected Region 13 ESC to be the hub for the design and development of the TRAs, and all ESCs were used to provide the training to Texas teachers.

The delivery mechanism utilized by TEA reached a large number of teachers allowing the cost structure to be spread out effectively and bring down the per participant cost. Although there was some variation in the ways ESCs accounted for their training costs, careful examination of the accounting records provided by each ESC allowed the evaluation team to reconstruct the costs in a manner that provided a fair assessment of costs.

The state invested approximately \$75 million on the TRA over a four-year period: \$17.8 million for the Kindergarten TRA, \$20.6 million for Grade 1, \$18.2 million for the Grade 2, and \$18.4 million for the Grade 3 TRAs. It should be noted that these expenditures have been adjusted to include in-kind and indirect costs that were not charged directly against the grant.

Overall, the TRA was cost effective and substantially below the per participant cost of targeted training in other states. The total training cost, including program development, program delivery and teacher stipends, ranged between \$1,098 and \$1,183 per participant. Approximately one-half of the total cost went to pay teacher stipends. The total training cost excluding the stipends ranged from \$498 to \$583 per participant. The cost per participant for each TRA grade level is presented in Exhibit 58.



**Exhibit 58**  
**Average Cost per Participant**  
**TRA**

<b>Expenditure</b>	<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>	<b>Grade 3</b>
Development Costs	\$212	\$117	\$113	\$144
Delivery Costs	\$371	\$420	\$385	\$371
<b>Total Training Cost per Participant</b>	<b>\$583</b>	<b>\$537</b>	<b>\$498</b>	<b>\$515</b>
Stipends	\$600	\$600	\$600	\$600
<b>Total Program Cost per Participant</b>	<b>\$1,183</b>	<b>\$1,137</b>	<b>\$1,098</b>	<b>\$1,115</b>

*Source: Education Service Centers, Detailed General Ledger and Participation Reports, 1998-99 through 2003-04.*

The total training delivery cost ranged from \$371 to \$420, or an average of less than \$100 per day for a four-day training session.

**Data Limitations – Determining Cost Effectiveness**

In order to evaluate the cost effectiveness of these academies, the evaluation team conducted site visits at nine of the twenty education service centers. The centers that were visited were Region 1 (Edinburg), Region 4 (Houston), Region 7 (Kilgore), Region 9 (Wichita Falls), Region 10 (Richardson), Region 13 (Austin), Region 14 (Abilene), Region 19 (El Paso), and Region 20 (San Antonio). These centers were chosen because they provided a good representation of small, medium and large centers, as well as representative student demographics. The state-wide reading academy initiative was administered by TEA staff housed at Region 13.

During the site visits, the evaluation team interviewed the business managers to gain an understanding of how the grant funds were expended while program staff provided information on how the training was delivered and rolled out in their region. The first TRA was conducted during the summer of 1999. This academy was for Kindergarten teachers and was funded through forty grants. Two grants were awarded to each education service center, one for teacher stipends and the other to pay training costs associated with setting up and conducting the TRAs. In each subsequent year, new grants were awarded for Grades 1, 2, and 3 reading academies. The funding was discontinued before Grade 4 reading academies could be rolled out. In the fall of 2004, all remaining TRA funds were recaptured by the state.

Each ESC provided detailed program accounting information to the evaluation team for each academy. The data were analyzed and an average cost per participant was calculated.

According to the ESC reported participant data that could be matched to the Public Education Information Management System (PEIMS) database, approximately 65,856 teachers were trained in the TRAs. The number of participants used in the development cost analysis is based on only those teachers that could be merged with the PEIMS data set used in the statistical analysis of teacher retention and student performance. Teachers who attended more than one academy were counted for each academy they attended.

There were no account codes established to effectively track the TRA costs from center to center. Many of the ESCs used additional funding sources to supplement training costs provided under the TRA grant. Not all ESCs charged indirect costs to the TRA grants, while many of the salary costs were charged to federal budgets under the guidelines of the federal Title grants. This made it difficult to compare the cost structure among ESCs and derive a true cost of providing the training.

The reading academies commenced in the summer of 1999 and phased out in 2003. Because of retirements and staff reductions at TEA and individual ESCs since that time, a great deal of the institutional memory associated with the reading academies has been lost.

Any remaining grant funds at the end of one year could be rolled over to the next year to be used for subsequent training sessions. In the late years of the TRAs, training grant funds were not distinguished by grade level and could be used to fund training costs for any grade-level academy. For example, if Kindergarten training funds were still available, they could be used for either Grades 1, 2, or 3 training costs, if needed. The ESCs were not required to track these carryover funds to the proper grade-level academy in their accounting records. This made it difficult to derive a true cost for each grade level TRA.

### **Development Costs – Training of Trainers**

The content of each grade level reading academy was developed by national and state experts. Once the content was developed, each region selected teachers to attend state training to become state trainers. The training was very structured and delivered in exactly the same manner from academy to academy. State trainers relied on scripted content to ensure that each teacher received identical training regardless of where the training was conducted.

Teachers throughout the state applied to become state trainers through their local education service center. An application was taken for each potential candidate, and ESC program staff interviewed candidates and made recommendations to TEA. The final selection of state trainer candidates was made by TEA. By training teachers from a number of districts, TEA was able to build capacity and provide school districts with a potentially valuable local resource to facilitate training and be available to follow-up with concepts and strategies for teachers in their district.

Region 13 ESC in Austin was selected by TEA to provide financial and administrative support to TEA’s state-wide TRA initiative. Region 13 maintained the financial records for the initiative and paid expenses for the design and development of each of the TRA programs. Exhibit 59 presents a breakdown of the costs associated with the development of the TRAs and the training of the state trainers. The per participant cost of developing the reading academies and training the state trainers ranged between \$113 and \$212.

**Exhibit 59**  
**Costs of Development and Training**  
**State-wide Reading Academies**

<b>Expenditure</b>	<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Grade 4</b>
Payroll Costs	\$142,696	\$178,066	\$194,356	\$232,348	\$160,885
Contracted Services	397,393	860,477	361,287	564,480	76,796
Supplies & Materials	518,245	329,634	600,910	711,790	262,028
Other Operating Expenses	125,856	237,999	327,285	282,270	6,151
Stipends	711,150	791,650	671,000	690,000	9,550
<b>Total Expenditures</b>	<b>\$1,895,340</b>	<b>\$2,397,826</b>	<b>\$2,154,838</b>	<b>\$2,480,888</b>	<b>\$515,410</b>
Number of Participants	8,925	20,525	19,132	17,274	0
<b>Per Participant Cost</b>	<b>\$212.36</b>	<b>\$116.82</b>	<b>\$112.63</b>	<b>\$143.62</b>	<b>N/A</b>

*Source: Region 13 Education Service Center, General Ledger, 1998-99 through 2002-03.*

**Delivery Costs – Education Service Centers**

The state chose to roll out the TRAs by providing the 20 education service centers funding to conduct the training.

Initially, funding from TEA to the ESCs was based on the number of eligible teachers in each region. Each training session was limited to 40 teachers. The sessions were expanded to a maximum of 60 teachers beginning with the Grade 2 TRAs. Each center conducted reading TRAs beginning with the kindergarten TRAs in the summer of 1999. TEA awarded grant funds to pay teacher stipends at \$150 dollars per day. The reading academies were conducted over four

consecutive days. Teacher stipends were only paid if the teachers attended all four days of training.

A second grant was awarded for each academy to cover the cost of the training, including printing, consultant fees and travel expenses, postage, instructional materials, room rental, refreshments and miscellaneous expenditures directly associated with training. Each ESC received \$9,750 per session to cover the costs of delivering the TRAs. In the final year of implementation, the Grade 3 TRAs' per session cost varied based on the amount of carryover funding remaining at each ESC.

Although many of the trainings were conducted with school district staff acting as trainers, all of the administration of the TRAs was conducted by the ESC in each region. ESC staff scheduled the training, prepared the materials, and tracked participation. In calculating the per participant cost of the reading academies, each ESC provided accounting detail related to the TRA grant. The evaluation team reviewed each cost and assigned an expenditure type to ensure consistent comparisons could be performed.

Several ESCs incurred costs that were not charged to the grant, but were directly related to the TRA program. Further, some ESCs charged indirect costs to the TRA grant and others did not. Accordingly, some assumptions were made to allocate payroll and indirect costs to the TRA that were actually charged to different funding sources. Exhibit 60 provides a summary of the additional staffing assumptions for all regions.

**Exhibit 60  
In-Kind Staffing Estimates  
Teacher Reading Academies**

Region	Professional Staff	Support Staff
Region 9	0.25 FTE	0.25 FTE
Regions 3, 5, 6, 8, 14, 15, 18	0.50 FTE	0.50 FTE
Regions 2, 12, 16, 17	0.75 FTE	0.75 FTE
Regions 1, 7, 13	1.0 FTE	1.0 FTE
Regions 11, 19	1.5 FTE	1.5 FTE
Regions 4, 10, 20	2.0 FTE	2.0 FTE

*Source: Evaluation team in coordination with Education Service Centers, Business Office and Program Staffing Estimates.*

In estimating total program costs, an average salary of \$58,000 was assumed for a professional and \$18,000 for support staff. In order to assign indirect costs, an indirect rate of 5 percent was assumed for the reading academies. This rate was applied for ESCs that did not allocate indirect costs on their own.

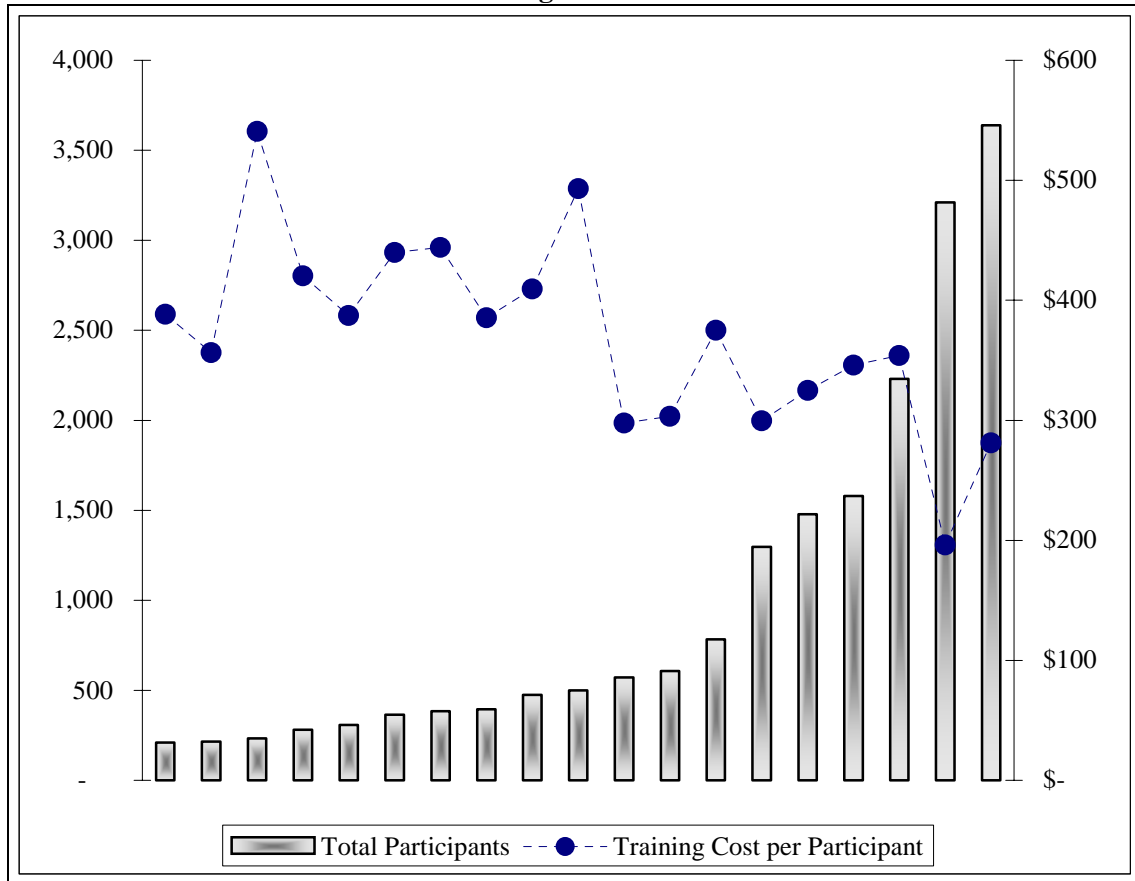
When examining costs by object code, some variances existed between ESCs. This is related to the variations in the ways each ESC conducted their TRAs. For example, some held TRAs throughout their regions associated with their clusters and satellites. This tended to increase ESC travel expenses but reduced participant travel expenses. ESCs that service a wide geographic area or a large number of districts or teachers were often at a disadvantage because class size was initially restricted to forty participants and every TRA was required to use three state trainers regardless of class size. This meant that the fixed costs of some TRAs such as facility rental and contracted services were spread over a smaller participant base in those TRAs that were held for less than forty participants.

Other than general provisions set forth in TEA's account code structure for public education, there was no accounting code criteria established for the TRA grants, with the exception of the stipend grants. This resulted in variations in the way each ESC coded expenditures in their accounting records. Some ESCs charged a portion of the contracted services (object code 6219) related to the reading academies against another funding source. Contracted services comprised the majority of the training costs associated with the TRAs. Printing costs (object code 6297) varied among ESCs. This can be explained by the fact that some ESCs printed the materials in-house and did not charge staff time to the reading academies, while others outsourced all printing costs.

Per participant cost dropped as participation increased in most cases. There were some outliers that can be explained by the variance in accounting codes used by ESCs and by the differences in what academy training costs ESCs passed through other funding sources. In the latter years of the program, the differences are somewhat more identifiable since some monies were combined between TRAs, unique to each ESC. Exhibit 61 illustrates the relationship between participation and cost per participant by ESC for the Kindergarten academy. The ESC data was sorted by the number of participants, which is shown in the vertical columns. Delivery cost per participant is shown in the plotted points. This data shows that the higher the enrollment, the lower the per-participant cost. The ESCs with larger student populations – and therefore larger teacher

populations - were able to take advantage of economies of scale in delivering the training by spreading the fixed costs over a larger number of participants.

**Exhibit 61**  
**Relationship between Participation and Program Delivery Cost**  
**Kindergarten TRAs**



Source: Education Service Centers, Detailed General Ledger and Participation Reports, 1998-99 through 2003-04.

The cost behavior patterns were similar for all subsequent TRA grade level training. Exhibit 62 presents the average total per participant cost associated with the delivery of the reading academies by grade level. The total costs of the reading academies, including stipends averaged \$971 per participant for the Kindergarten TRAs, \$1,020 per participant for the Grade 1 TRAs, \$985 for the Grade 2 TRAs, and \$971 for the Grade 3 TRAs. This was well below the cost reported in the California cost studies for specialized targeted training. The Grade 1 and Grade 2 TRAs had the highest average costs. Stipends accounted for an average of just above 60 percent of the total training delivery costs each year.

**Exhibit 62**  
**Average Per Participant Cost of Training**  
**Reading Academies**

	Kindergarten	Grade 1	Grade 2	Grade 3
<b>Per Participant Cost</b>	\$971	\$1,020	\$985	\$971
<b>Less Stipend</b>	\$600	\$600	\$600	\$600
<b>Per Participant Training Cost</b>	\$371	\$420	\$385	\$371

*Source: Education Service Centers, Detailed General Ledger and Participation Reports, 1998-99 through 2003-04.*

On a per-day basis, the delivery of training was less than \$100 per participant for a four-day session. This cost also compares favorably to private sector training programs. Three private sector training programs for reading were used as a benchmark for comparison. The daily rates for these alternatives were \$169, \$150, and \$125 per participant per day. These benchmarks do not include any additional costs for teacher travel expenses, but only the cost of the seminar training and training materials. The TRA training costs include all teacher travel expenses.

### **Online Reading Academies**

No data was provided by the developers of the online Grade 4 reading academies. In general, online professional development has higher development costs than face-to-face training. However, the delivery costs of online training are usually less than face-to-face training. Transportation costs and printing costs can be eliminated with online training. The low delivery costs of online training arise where the principle approach is self-study. If extensive tutorial support is needed, the costs will rise accordingly and could even exceed those associated with face-to-face classroom training.

### **Alternatives to Stipends**

Participants completing the four days of on-site training were given \$600 stipends. When the TRA funding was discontinued, the ESCs could no longer provide participants with stipends. Future TRAs were conducted by ESCs on a cost-recovery basis, with school districts or teachers having to pay for the training. Attendance at the TRAs was severely reduced without the additional stipends. Teachers were required to come to the training during off-duty hours with no financial compensation. Stipends obviously provided teachers with a financial incentive to attend professional development coursework outside their contract period.

Stipends represented approximately 60 percent of the program delivery costs and approximately 50 percent of the total TRA cost including development. There are alternatives to lower this element of cost:

- Lower the stipend amount – the factor that should be considered here is the value of teacher time outside their contract period.
- Tie a portion of the stipend amount to future results – similar to merit pay programs, a portion of the stipend could be withheld until future results are known. Since there are other variables that contribute to improved reading scores, this alternative may be difficult to implement.
- Conduct TRA training during the school year, in place of existing training - if the training takes place during the year in place of – in whole or in part - other training, the stipend paid could be reduced without reducing the effective daily stipend rate paid to teachers.
- Provide additional leave days instead of a stipend, or in combination with a smaller stipend – additional leave days during the year could be done at a lower cost since substitute daily rates are lower than the TRA daily stipend rate.

Each of these alternatives should be considered in the context of the overall state training strategy, recognizing fiscal constraints as well as other factors.

### **Summary of Teacher Reading Academy Evaluation**

The TRA evaluation showed positive results, and also showed consistent results across all aspects of the evaluation.

#### *Positive Student Outcomes*

When the impact of academy participation on students' TAKS scores was analyzed using a statistical model, the results showed that schools with a higher percentage of teachers who participated in the TRA experienced:

- Higher overall student performance on the TAKS test at the passing standard;
- Moderately higher student performance at the commended level;
- A decreased need for accelerated (remedial) instruction;



- Lower percentages of students who were retained and not promoted to the next grade level; and
- Similar student achievement results for economically disadvantaged students.

Student outcomes for the OTRA were not able to be calculated due to the lack of a mechanism to track teacher participants.

#### *Cost-Effective Approach*

From 1999 to 2002, the state invested \$75 million in the TRA. Approximately \$17.8 million was incurred to develop and deliver training for the Kindergarten academy, \$20.6 million for the Grade 1 academy, \$18.2 million for the Grade 2 academy, and \$18.4 million for the Grade 3 academy. It should be noted that these TRA expenditures have been adjusted to include in-kind and indirect costs that were not charged directly against the TEA grant by ESCs.

Overall, the costs to develop and deliver the TRA training materials to academy participants were lower than expected for this type of professional development program - ranging between \$1,000 and \$1,200 per academy participant over a four year period. These costs included the development of the content for the training materials, the cost of training the state trainers, the delivery of the training to teachers, and the stipends paid to teachers for participation during the summer months. When compared to similar professional development programs in other states, the cost to develop and deliver the TRA training in Texas compared favorably.

More than 50 percent of the total TRA cost related to teacher stipends. Teachers were paid \$150 per day for attending the four-day sessions outside their contract period. Program development costs represented approximately one-sixth of the total cost and program delivery was one-third of the total cost. Once the funding for the stipends was eliminated, teacher participation in the TRA dropped precipitously.

Neither cost data nor participation data was available for the OTRA.

#### *Favorable Reviews by National Experts*

National experts on reading and professional development concluded that the TRA and OTRA training materials were grounded in research and exhibited nine of the twelve professional development standards recommended by the National Staff Development Council (NSDC). Among the strongest features of the TRA and OTRA training materials were the scope and

sequence of reading materials across grade levels and the training's alignment with national staff development standards on design, learning, equity, and teaching quality.

Recommendations for improving the quality of TRA and OTRA training materials included: improving reading assessment tools, increasing student reading expectations at each grade level, and improving the ongoing evaluation of the TRA and OTRA training materials. These national experts also recommended that the TRA extend training opportunities to teacher participants throughout the school year rather than limit training to a finite four day session in order to provide greater opportunities for the introduction of new training topics, while continuing to reinforce basic teaching strategies for reading.

For the OTRA, the experts recommended building in more opportunities to interact with peers and instructors, as well as additional activities that engaged the participants in application, syntheses and evaluation of important ideas and techniques.

#### *Positive feedback from on-site observations*

Fifty-four classrooms in ten Texas school districts were visited to interview teachers and administrators, and observe classroom practices. The school districts were judgmentally selected based on district size, location, and student demographics to achieve a representative sample.

Information obtained from site visits and focus groups confirmed that academy participants consistently used several formal and informal diagnostic tools recommended by the TRA, such as the use of early reading instruments, when these diagnostic tools aligned with their previous teaching practices. Classroom observations with TRA participants also indicate that these teachers have implemented a variety of the differentiated instructional techniques taught in the TRAs. TRA participants who were observed also provided ample opportunities for supplemental instruction to support struggling learners using strategies promoted in the TRA training materials such as the promotion of additional academically focused classes, supplemental instructional time for individual students, reading-based mentoring and tutoring.

TRA participants, whose classrooms were observed for this study, easily implemented the TRA-promoted diagnostic tools and instructional strategies into their daily teaching practices due to three major factors. First, the TRA training modeled how to apply the teaching strategies in a classroom setting. Second, the teaching strategies and supporting

materials were well designed and required little preparation time. And third, the TRA resource notebooks provided clear and comprehensive instructions for implementation.

Teachers indicated that they prefer face-to-face training more than online training, and believe that online training would be more effective if combined with face-to-face training. Teachers also wanted more follow-up and program support during the school year. These and many other useful suggestions and comments were received from teachers and administrators during the on-site visits and through additional open-ended survey questions.

### *Positive Survey Results*

Surveys were sent to 2,769 teachers and 2,591 administrators to inquire about the TRA's delivery, classroom use and effectiveness. The survey response rate was high, 37 percent for teachers and 44 percent for administrators. However, the response rate for teachers participating in OTRA was significantly lower, at 18 percent.

Participants of the TRA and OTRA and school administrators who responded to the survey indicated that the overall quality of the academies was "good" or "very good." A higher percentage of respondents who participated in the face-to-face training rated the academy as very good (48 percent) compared to online academy survey respondents (32 percent). When asked what factors influenced their participation in the academies, teachers identified the key drivers were their campus principals, district administrators, and state or district requirements. Stipends also had a positive impact on participation. The most influential factors for administrators' decisions to select the academy as a professional development option was the content of the training, the availability of stipends, the location of the training, and the time of the year for the training.

Most teachers rated their level of implementation quite high; the majority of respondents generally reported using the TRA strategies often or all the time. Further, the large majority of survey respondents agreed or strongly agreed that the TRA strategies were easy to implement and that they have shared the strategies with others in their schools or districts. More specifically, teachers agreed that the reading diagnostic tools helped teachers identify students' strengths and weaknesses and use differentiated instruction.

Survey respondents who participated in the Online Teacher Academy (OTRA) reported somewhat similar experiences as the participants of the face-to-face academies, but there were some noteworthy differences. First, a higher percentage of respondents who participated in the online version of the academy have earned master's degrees. Second, while the majority of OTRA survey respondents agreed that the academy strategies were easy to implement, a smaller percentage of OTRA participants than those trained in the face-to-face TRAs agreed that the training helped identify and accelerate struggling learners and use differentiated instruction. Similarly, a smaller percentage of the OTRA survey respondents agreed that their teaching had improved or that student achievement had improved as a result of the online academy participation. Overall, the OTRA survey respondents reported generally positive ratings of the online academy, although their ratings were lower than those who participated in the face-to-face reading academies.

Administrators who had recommended or required their teachers to participate in the TRAs tended to be more familiar with the training, reported higher levels of teacher participation in the academies, and generally reported higher levels of teacher implementation of TRA strategies. For example, among those administrator respondents who required or recommended TRA participation, 71% reported that nearly all or all of their teachers were implementing most of the TRA strategies. Further, over 80% of administrator respondents agreed or strongly agreed that the academy improved reading instruction and students' reading achievement at their schools. In open-ended responses, administrators described factors that supported teachers' use of academy strategies.

## **V. EVALUATION OF THE TEACHER MATHEMATICS ACADEMY**

The first Teacher Mathematics Academies (TMA) were delivered in the summer of 2002 for Grades 5 and 6 teachers. A mathematics academy for Grade 7 and 8 was developed but only delivered to Grade 7 teachers during the summer of 2003.

<sup>28</sup> These efforts were directed by the Governor's Texas Math Initiative and were based on seven objectives related to algebra-readiness and identification of struggling mathematics students.

Teachers attending the three-day training received a stipend with an additional amount available for completion of a diagnostic assessment program (Texas Math Diagnostic System).

The purpose of this section is to assess the effectiveness of the TMA through the following evaluation questions:

- A. How do the TMAs compare with best practices?
- B. How do TMAs impact classroom practices?
- C. What impact have TMAs had on student achievement?
- D. How cost effective was the TMA and are there opportunities to improve the cost effectiveness of this program?

The major conclusions of this evaluation include:

- Based on statistical analysis, on-site observations, and survey results, the TMA showed mixed results;
- Schools with a higher percentage of teachers who attended the TMA for Grades 6 and 7 had higher TAKS scores than schools with lower teacher TMA participation rates; however, Grade 5 TMA training (when the Grade 5 was in an elementary school) for teachers resulted in lower TAKS scores and Grade 5 TMA training (when the Grade 5 was in a middle school) appeared to have no impact on TAKS scores;
- The TMA program was cost-effective, compared with similar professional development programs in other states and industry benchmarks;
- National mathematics education and professional development experts provided favorable reviews of the content of the TMA training materials, but identified areas where the TMA content could be substantially improved;

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<sup>28</sup> Funding was not available to deliver the TMA training to Grade 8 mathematics teachers.

- On-site visits and classroom observations found that teachers used the TMA-promoted teaching strategies and diagnostic tools in their daily practice when these tools and strategies supported what the teachers were already doing prior to TMA training; however, teachers who participated in the TMA thought the training materials were too scripted and experienced teachers viewed the academy content as repetitive; and
- Survey responses from teachers who participated in the TMA and school administrators indicated that the teaching strategies and subject matter covered in the TMA were valuable, but these findings were not as strong for mathematics as they were for reading.

## **A. Comparison with Best Practices**

In this section, the evaluation team examines how the professional development offered by the Teacher Mathematics Academy (TMA) compares with “best practices” in teacher professional development. To what extent does the TMA training reflect what recent research and clinical knowledge of teaching and learning have come to view as high quality professional development? How do the teachers who participated in the TMA trainings view the professional development experiences? The degree to which the TMA trainings compare to best practices was assessed in four ways: (a) a review by nationally-recognized experts, (b) a survey sent to participants of the TMAs, (c) a survey sent to administrators of the teachers surveyed, and (d) site visits to a sample of schools that included observations and focus group interview with teachers and school administrators. Within each of these data sources, the evaluation team examined the quality of the TMA trainings. The findings from these data sources are presented below.

### **Expert Reviews of the Teacher Mathematics Academy (TMA)**

Nationally recognized experts in teacher professional development reviewed the TMA training materials and activities and compared them to “best practices” in teacher professional development using recent research on teacher education and national standards on teacher professional development. Dr. Jere Confrey reviewed the TMA training materials focusing on the mathematics content. Dr. Stephanie Hirsh reviewed the TMA training materials concentrating on the delivery mechanisms of the trainings. Both of the experts were given materials and guides for both the Grade 5-6 TMA and the Grade 7-8 TMA but were directed to focus on the materials for the Grade 5-6 training materials using the other grades’ materials as a supplement. Attention was focused on Grade 5-6 in order to corroborate site-visit and student achievement analyses. Both of

the experts selected and referred to a variety of studies while conducting their reviews. Each of their reports contains a careful review of the TMA materials and resources, detailed suggestions for improving the TMA trainings, as well as a full list of references (See Appendix E for their complete reports).

### **Teacher Mathematics Academy: Content Review**

In her review of the TMA trainings, Dr. Jere Confrey of Washington University in Saint Louis reported that, “All in all, it is surely correct to say that [the TMA] materials are grounded in the research and clinical knowledge of teaching and learning mathematics.” She noted three important research areas that the TMA materials make use of in the trainings:

- Standards-based instruction;
- Research on at-risk learners; and
- Research on multiplicative reasoning and rational numbers.

### Strengths of the TMA Training

Notable strengths of the TMA trainings under each of these research areas were observed and reported.

In terms of standards-based instruction, Dr. Confrey indicated, “The [TMA] materials make proper use of the research on implementation of standards-based approaches with accountability” citing the research of Richard Elmore (1990), Marshall Smith and Jennifer O’Day (1991), and Susan Fuhrman (2001). In her review she wrote:

*The TMA materials repeatedly link to the state’s TEKS, reference to the TAKS exam, and link to the state’s diagnostic system. Using curricular webs, the concept of vertical alignment, and careful sequencing of content, the materials are closely related to the state’s choice of directions for mathematics instruction. In general, this is a wise choice, as it ensures relevance of the professional development to the demands and pressures of schools.*

Dr. Confrey also noted that the TMA materials connect to and rely upon the research on teaching at-risk learners, drawing from special education. She observed that the Grade 5 TMA materials rely on the use of the four-point instructional model adapted from direct instruction or active mathematics teaching (Good and Grouws, 1983) to diagnose struggling learners and prescribe appropriate instruction. She further described the benefit of such an approach in her review that:

*The materials are clear in indicating the need to monitor performance and, when necessary, to actively implement strategies to remediate and address student needs. This is done through the emphasis on careful examination of student work and patterns of errors, the use of systems of monitoring, the emphasis on the four-point model for reteaching missing content, and the links to formative assessment systems.*

In addition, Dr. Confrey described and recognized several positive connections between the TMA trainings and the research on student errors, the research on procedural fluency and mental arithmetic, and research on the appropriate use of calculators (*Principles and Standards for School Mathematics*, 2000, and *Adding it Up*, 2001).

Dr. Confrey identified a third area of research that is used extensively and competently by the TMA trainings—the research on multiplicative reasoning. Dr. Confrey wrote:

*The decision to focus on this area and its relationship to learning algebra is wise. The ways in which a careful and precise sequencing of topics facilitates student entry into the complex arena of rational number is also a positive quality of the TMA materials. The materials move through discussions in the first set of materials of multiples, equivalent fractions (using fraction bars), ratio, and then (in the second set), rates, percents, and scaling. Evidence of links to research is evident in the use of tables of data to describe equivalent ratios, the use of graphical representation, and the use of fraction bars in ways consistent with Cuisenaire rods. Emphasis on the unit ratio and its consistent use to link to percentage is quite extensively documented in research.*

### Weaknesses of the TMA Training

In three instances, Dr. Confrey noted a limited use of the research in the TMA trainings. First, while she applauded the use of the research on standards-based approach and noted the careful link between the TMA training activities to the state's standards and accountability system, she also noted a technical problem that is not addressed in the TMA trainings. She explained that:

*The results of a TAKS test cannot be interpreted at the level of individual strands, because difficulty is only equated at the whole test score, and from one test to the next, and items may vary in difficulty from year to year (Confrey and Carrejo, 2002). Similarly, the use of the diagnostic testing system at the level of concept strands should not be interpreted in absolute terms, but only in relation to the specific skills and their difficulty tested, which cannot be directly linked to the TAKS scores. Summary scores may mask the necessary specificity of teacher feedback needed to guide instructional decision-making. This deserves explicit discussion in the materials.*

Second, Dr. Confrey noted that the four-point model of instruction represents only “one particular slice of the research on teaching at-risk learners” and that this type of instruction “produced both the strongest and weakest results” in research studies (Good & Grouws, 1983). She explained that



a contrasting literature of research on the use of standards-based constructivist approaches with struggling learners (Woodrow & Baxter, 1997, 2001) showed that approaches that use more open-ended, contextually based and student-centered tasks showed significantly stronger results overall, for all quartiles of students and while the effects were less strong for at risk students, the approaches could be adapted to meet their needs with certain pedagogical strategies. She further explained that:

*...other research, including work on critical race theory (Tate, 2002), show that students who are at risk can find school alienating, dull, and culturally insensitive. For these students, more authentic tasks showing interesting complexity and challenge are needed to circumscribe the instruction and make the work relevant and meaningful. This literature seems to be ignored. The assumption is that all issues of equity and gaps will be solved by solid but traditional instruction. There is little doubt that this would contribute significantly, but interest, motivation, and mentoring on setting goals and expectations would provide a more advisable approach to addressing gaps. Professional development materials designed to reduce the gap must include direct discussions of racism, sexism, and classism, and how these are detrimental to school practices in mathematics.*

Third, Dr. Confrey described a concern that overall, across the three days of training, too much time is devoted to general pedagogical topics and too little time is devoted to challenging mathematics. She identified several specific instances in the TMA materials when the presentation of the content was weak, unclear, and/or confusing. For example, she noted that the TMA trainings fail to explore prime numbers and to link these to the lowest common multiple (LCM) and the greatest common factor (GCF). She also referred to the way the definitions and connections among ratio, rate, and percent lacked consistency. She noted that although the trainings do a solid job linking content with pedagogical content knowledge, the immersion in mathematics content is weak and may not be sufficiently challenging to more advanced teachers. Finally, Dr. Confrey noted that three days of TMA training was, “too short a time period to make substantial change.”

### **Delivery of the Teacher Mathematics Academies**

Dr. Stephanie Hirsh from the National Staff Development Council (NSDC) reviewed the TMA training materials with a concentration on the delivery design and methods. In her review, Dr. Hirsh primarily used the NSDC standards for high quality staff development (2001) as a framework and guide for her review but also referred to other NSDC publications such as *Designing Powerful Professional Development* (2002) and *Powerful Designs for Professional*

*Learning* (2004). The NSDC standards are grouped into three categories of standards which include:

#### Context Standards

- *Learning Communities*: Staff development that organizes adults into learning communities whose goals are aligned with those of the school and district.
- *Leadership*: Staff development that requires skillful school and district leaders who guide continuous instructional improvement.
- *Resources*: Staff development that requires resources to support adult learning and collaboration.

#### Process Standards

- *Data-Driven*: Staff development that uses disaggregated student data to determine adult learning priorities, monitor progress, and help sustain continuous improvement.
- *Evaluation*: Staff development that use multiple sources of information to guide improvement and demonstrate its impact.
- *Research-Based*: Staff development that prepares educators to apply research to decision making.
- *Design*: Staff development that use learning strategies appropriate to the intended goal.
- *Learning*: Staff development that applies knowledge about human learning and change.
- *Collaboration*: Staff development that provides educators with the knowledge and skills to collaborate.

#### Content Standards

- *Equity*: Staff development that prepares educators to understand and appreciate all students, create safe, orderly and supportive learning environments, and hold high expectations for their academic achievement.
- *Quality Teaching*: Staff development that deepens educators' content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately.
- *Family Involvement*: Staff development that provides educators with knowledge and skills to involve families and other stakeholders appropriately.

### Strengths of TMA Training

In her review of the TMA, Dr. Hirsh identified elements of nine of the twelve NSDC standards in the academy designs. According to Dr. Hirsh, the strongest feature of the TMA was its alignment with aspects of the standards on design, learning, equity, and teaching quality. Examples of these strengths are discussed below for each standard.

*Design:* Staff development that use learning strategies appropriate to the intended goal.

The NSDC design standard emphasizes several aspects of professional development necessary to enable adults to acquire new knowledge and skills and transfer that knowledge to classroom practice (NSDC, 2001, p. 22). Good designs include a variety of activities and learning strategies to support the goals of the training. Dr. Hirsh observed that the TMA design combines learning strategies. For example, in the TMA, participants are trained on a variety of instructional techniques including the Four Point Instructional Model, journaling, a case study, and an action research project.

*Learning:* Staff development that applies knowledge about human learning and change.

The NSDC learning standard emphasizes the need for methods used in the professional development to mirror as closely as possible the methods teachers are expected to use with their students (NSDC, 2001, p.24). Dr. Hirsh noted that participants of the TMA have numerous opportunities to experience the lesson frameworks they are expected to use in their classrooms. For example, Dr. Hirsh observed that in the TMA trainings, the Four Point Instructional Model is used throughout the TMA.

*Equity:* Staff development that prepares educators to understand and appreciate all students, create safe, orderly and supportive learning environments, and hold high expectations for their academic achievement.

The NSDC equity standard emphasizes the need for staff development to equip teachers with ways of providing various types of instruction based on individual difference (NSDC, 2001, p. 30). Dr. Hirsh noted that the TMA goals clearly align with this standard. Dr. Hirsh found examples within the TMA that illustrate how the TMA deals with equity issues. In her TMA review, she observed that a reflection activity for “Extending Thinking Beyond the Multiples” lesson helps teachers to identify beneficial strategies for struggling students. The “Continuum of

Learners” lesson made reference to a document in the resource section that outlined additional strategies for struggling students.

*Quality Teaching:* Staff development that deepens educators’ content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately.

The NSDC quality teaching standard emphasizes the need for staff development to integrate content with appropriate instructional strategies (NSDC, 2001, p.32). In her review, Dr. Hirsh reported the TMA presented a variety of teaching strategies that engage the participants in activities aligned with the content. For example, she noted that teacher’s model lessons on fractions and proportions and work with a variety of classroom based assessments and graphic organizers such as a curriculum web.

#### Weakness of TMA Training

Throughout her review of the TMA, Dr. Hirsh shared some concerns that mostly stemmed from the limitations of a three-day workshop design. She reported, “The limitations of a three-day academy model are evident when one examines the alignment of the Academy with the NSDC Standards for Staff Development. Certain standards cannot be addressed within this design.” According to Dr. Hirsh, the limitations of the TMA are its lack of alignment with the standards on learning communities, leadership, and family involvement.

Directly referencing the NSDC standards, Dr. Hirsh reported that, “[t]he most powerful forms of staff development occur in ongoing teams that meet on a regular basis, preferably several times a week, for the purpose of learning, joint lesson planning, and problem solving.” She observed that, “[t]he TMA materials do not appear to outline expectations or suggestions for individual participation in learning communities or teams back at the school site.” In terms of building the leadership to support the teachers’ implementation of what they learn, Dr. Hirsh noted that:

*[I]t is unlikely that principals will be able to provide the necessary support and follow up to ensure implementation without participation in the TMA or specialized training that addresses the specific responsibilities and roles of principals. Convening principals and teachers together develops a shared language for teaching and learning, clear expectations, and instills the accountability necessary for results.*

Lastly, Dr. Hirsh noted that creating a context supportive of professional development requires advocacy at every level.” She observed that the TMA fails to build partnerships between teachers, parents, and the community as a whole. She explained that:

*Education is a partnership between the school, home, and the community. To maximize student achievement, teachers must be knowledgeable about various ways in which families and community members can be involved meaningfully in aspects of the school. TMA can take advantage of this research by providing teachers with strategies for engendering support at home.*

Exhibit 63 provides an overall summary of these expert reviews of the TMA.

**Exhibit 63**  
**TMA Expert Review Summary**

	TMA Strengths	TMA Weaknesses
<p><b>Mathematics Expert:</b> Dr. Jere Confrey, Washington University</p>	<ul style="list-style-type: none"> <li>• Grounded in research and clinical knowledge of teaching and learning mathematics.</li> <li>• Consistent with research on implementation of standards-based approaches.</li> <li>• Connects to and relies on research on teaching at-risk learners, drawing from special education.</li> <li>• Focuses on and uses research on multiplicative reasoning and its relationship to learning algebra.</li> </ul>	<ul style="list-style-type: none"> <li>• Technical problem with the interpretability of the TEKS and its use for diagnostic purposes.</li> <li>• Limited use of research-based approaches for teaching at-risk learners.</li> <li>• Overemphasis of general pedagogical topics and under-emphasis of challenging mathematics.</li> </ul>
<p><b>Professional Development Expert:</b> Dr. Stephanie Hirsh, National Staff Development Council</p>	<ul style="list-style-type: none"> <li>• Elements of nine of the twelve NSDC standards identified in the academy designs.</li> <li>• Combines a variety of learning strategies.</li> <li>• Provides numerous opportunities for participants to experience lesson frameworks they are expected to use with students.</li> <li>• Opportunities to understand and support struggling learners.</li> <li>• Presents a variety of teaching strategies that engage the participants in activities aligned with the content</li> </ul>	<ul style="list-style-type: none"> <li>• The four-day academy model limited in its potential impact.</li> <li>• Without planned follow-up and support, research suggests that the state can expect little in the way of improved teacher practice and shared learning.</li> <li>• Lack of alignment with the standards on learning communities, leadership, and family involvement.</li> <li>• No expectations or suggestions for individual participation in learning communities or teams back at the school site.</li> <li>• Lack of principal participation in TMA makes it less likely that they will be able to provide support and follow up to ensure implementation.</li> <li>• No expectations or suggestions for partnerships between teachers, parents, and the community.</li> </ul>

Source: Expert Reviews of TMA Training Materials, 2004.

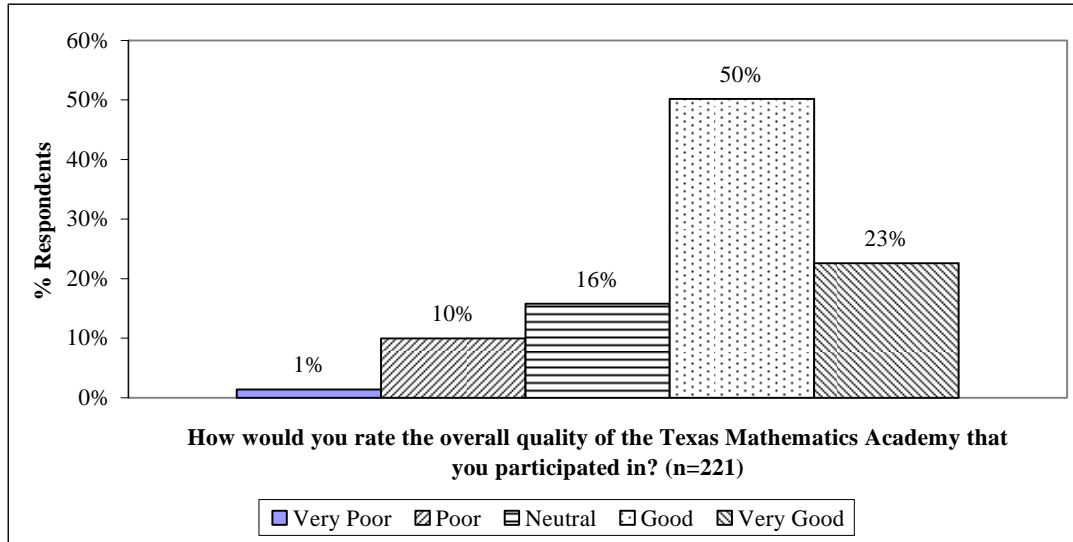
## **Survey Results**

### **Teacher/Administrator Perceptions of TMA Quality**

To better understand how the TMA trainings compare with “best practices” in professional development, the evaluation team surveyed teachers who participated in the trainings and administrators who recommended or required teachers to attend the trainings. Teachers and administrators were asked about their perceptions regarding the overall quality of the academies, how they compared to similar trainings they have participated in, and their level of familiarity with the content of the academy prior to attending. A total of 314 teachers completed the TMA survey with a response rate of 25 percent; 1,139 campus administrators completed and returned the Administrator survey with a response rate of 44 percent.

In the survey of teachers regarding TMA training, teachers were asked to respond to several items related to the quality of the TMAs. First, teachers were asked to rate the overall quality of the TMA they participated in and to compare their experience in the TMA to their experiences in other mathematics trainings. As Exhibit 64 illustrates, the majority of mathematics teachers rated the overall quality of the TMA as “good” (50 percent) or “very good” (23 percent). Just 10 percent of the survey respondents felt that the training was “poor” and only one percent of the respondents said it was “very poor.”

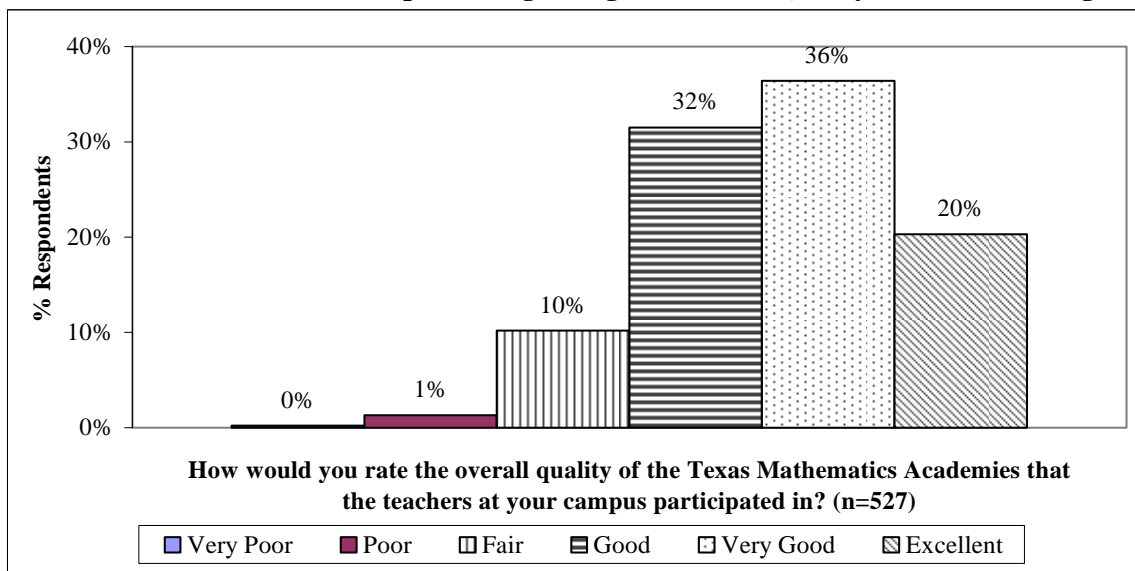
**Exhibit 64**  
**Teacher Perceptions of TMA Overall Quality**



Source: Survey of Teachers Regarding TMA Training, 2004.

Using a six-point scale, ranging from “very poor” to “excellent,” school administrators were asked to rate the overall quality of the TMAs in which the teachers on their campuses participated. As illustrated in Exhibit 65, the majority of school administrators (88 percent) rated the academies as “good,” “very good,” or “excellent.” A small percentage of survey respondents (10 percent) rated the TMAs as “fair.” Just 1 percent of the surveyed school administrators rated the TMAs as “poor.” None rated them “very poor.”

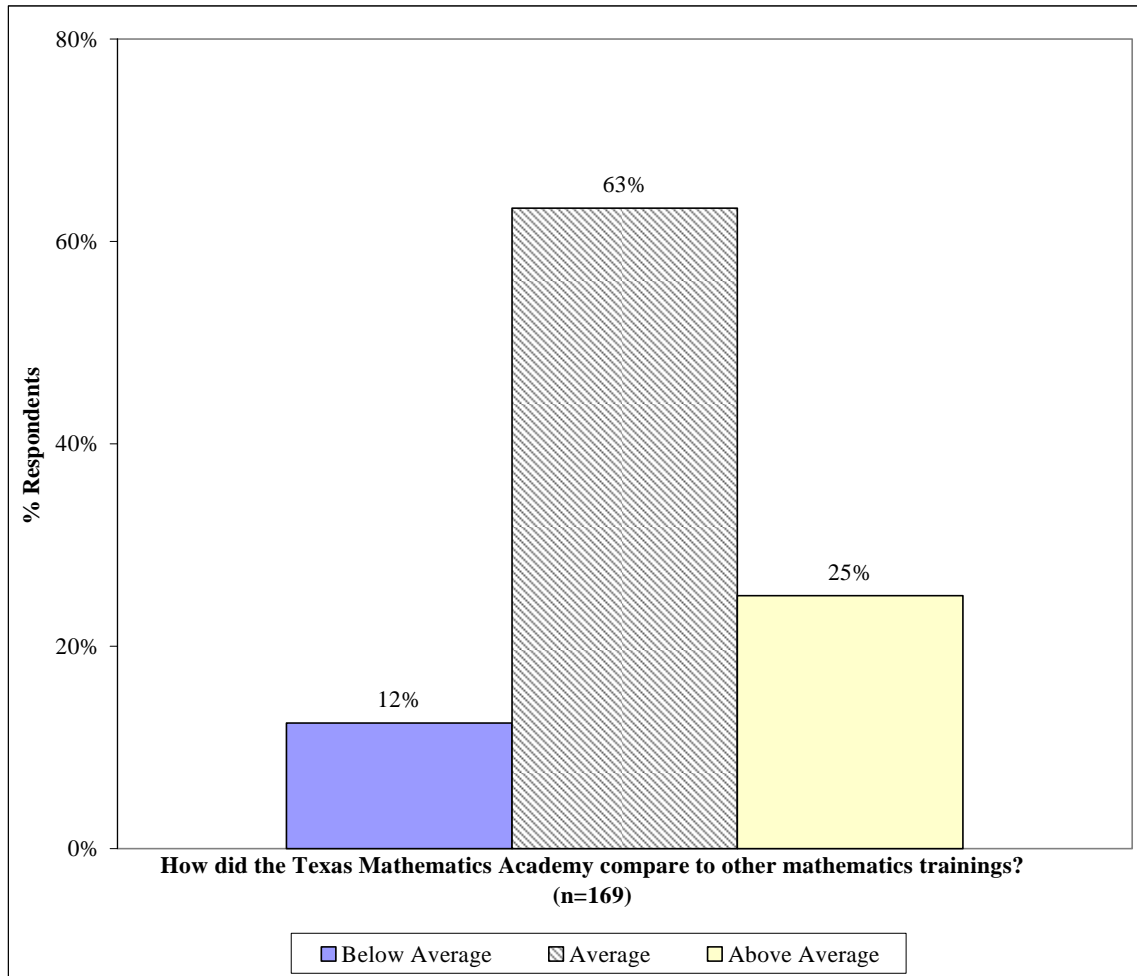
**Exhibit 65**  
**School Administrator Perceptions Regarding the Overall Quality of TMA Training**



Source: Survey of Administrators Regarding TMA Training, 2004.

The majority of the teacher respondents (63 percent) rated the TMA training as “average” when compared to other mathematics-related training seminars they have attended. One quarter (25 percent) felt the training was “above average” and 12 percent indicated that the TMA training was below average when compared to other mathematics-related sessions they have attended (See Exhibit 66).

**Exhibit 66**  
**Teacher Perspective: Comparison of TMA with Other Mathematics Training**



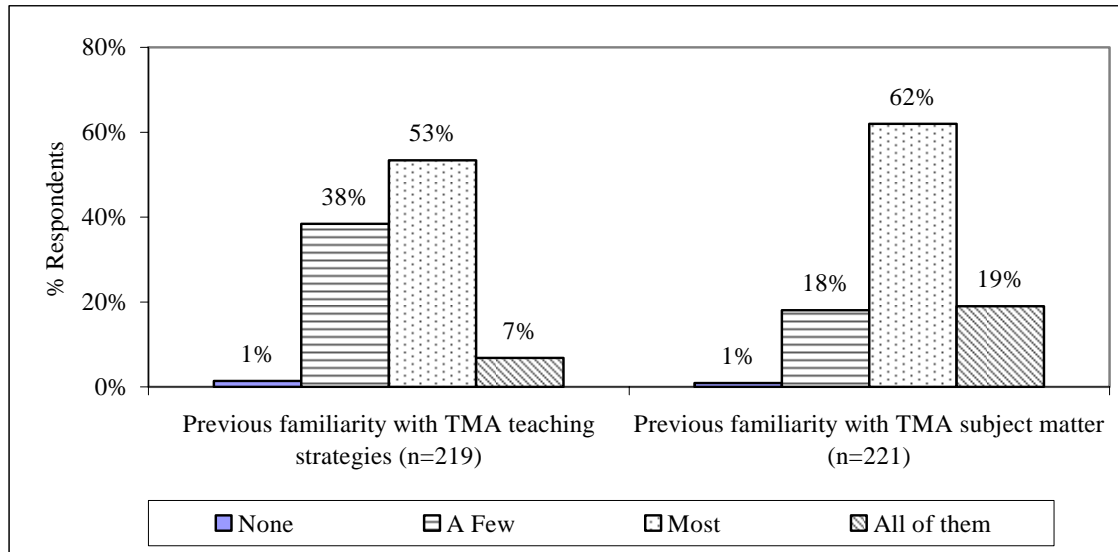
Source: Survey of Teachers Regarding TMA Training, 2004.

Another measure of the quality of the TMA is based upon teachers’ perceptions of whether the academies provided new information. Exhibit 67 illustrates the degree to which respondents reported their level of familiarity with the teaching strategies and subject matter that were presented in the academies. As indicated in Exhibit 67, the majority of respondents (60 percent) said that they knew most or all of the teaching strategies presented in the academies. Similarly,



the majority of respondents (81 percent) indicated that they knew most or all of the subject matter as well.

**Exhibit 67**  
**Teacher Perspective: Previous Familiarity with TMA Teaching Strategies & Subject Matter**



Source: Survey of Teachers Regarding TMA Training, 2004.

In comparison to the reading academies, the TMA participants tended to rate the overall quality of the academies lower than the TRA participants. For example, twice as many of TRA survey respondents (50 percent) rated the TRA as “above average” in comparison to only a quarter of the TMA survey respondents (25 percent). In addition, a larger percentage of TMA participants (19 percent) reported knowing all of the subject matter content in comparison to only 5 percent of the TRA participants.

**Teacher Perceptions of the Role of Stipends and other Factors that Influenced TMA Participation**

Another important component of the evaluation of the TMA was to understand the factors that contributed to teachers’ and administrators’ decisions to participate in the academy trainings. Teacher stipends to attend the mathematics academies constitute a substantial portion of the overall cost of the academies. For this reason, it was important to solicit information (via teacher surveys) about the role stipends played for academy participants. In addition, other factors may also contribute to teachers’ decisions to participate in the academies, such as logistics, reputation of the academies among teachers, and requirements or recommendations to attend by school administrators.

TMA participants were asked whether or not they received a stipend for their participation in the mathematics academies. Exhibit 68 shows the percentage of TMA participants who responded that they received stipends by grade level. Almost all participants reported receiving stipends. Only 16 of the 215 teachers who responded to this survey item said that they did not receive a stipend.

**Exhibit 68**  
**TMA Trained Teachers Who Received a Stipend**

<b>Received a Stipend</b>	<b>Yes</b>	<b>(%)</b>	<b>No</b>	<b>(%)</b>	<b>Total</b>	<b>(%)</b>
5&6 Academy	143	93.0	10	7.0	153	100.0
7&8 Academy	56	90.0	6	10.0	62	100.0
<b>Total</b>	199	93.0	16	7.0	215	100.0

*Source: Survey of Teachers Regarding TMA Training, 2004.*

TMA participants were also asked how influential various factors were in their decision to attend the mathematics academy. These survey items broadly addressed several types of influences, including monetary (stipend), logistical (time of year or location), and professional issues (district or state professional development requirements). Exhibit 69 presents all of the responses regarding motivations to attend the TMAs.

**Exhibit 69****Teacher Perspectives: Factors that Influenced Teachers to Participate in the TMA**

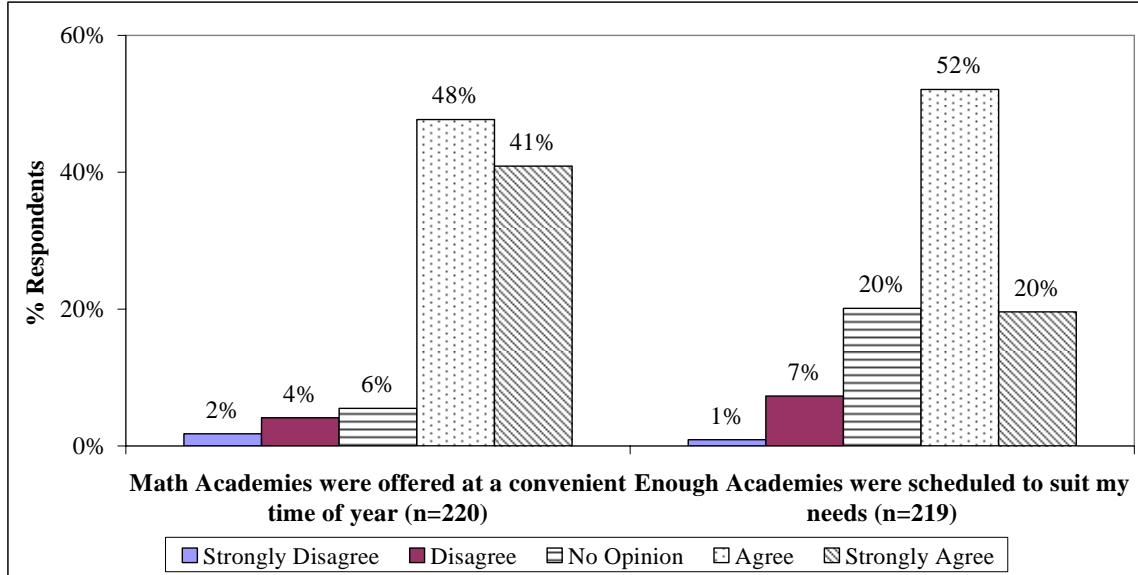
<b>Factors</b>	<b>No Influence</b>	<b>A Little Influence</b>	<b>Neutral</b>	<b>Somewhat Influenced</b>	<b>Strongly Influenced</b>
Length of the training (n=221)	21%	8%	35%	29%	8%
Recommendations from other teachers (n=221)	37%	8%	27%	20%	8%
Sponsor or trainer (n=221)	40%	3%	31%	18%	8%
Time of year (n=221)	12%	10%	23%	34%	22%
Location of the training (n=220)	11%	8%	24%	35%	24%
State or district prof. development reqs (n=221)	22%	6%	21%	25%	26%
Availability of stipend (n=220)	9%	7%	18%	32%	34%
Content of the training (n=222)	6%	8%	12%	38%	37%
Principal or other administrator (n=221)	11%	5%	14%	31%	39%

Source: Survey of Teachers Regarding TMA Training, 2004.

The factors that appeared to have most strongly influenced teachers' decisions to attend the academies were their principal or district administrator recommendation or requirement (39 percent) and the content of the training (37 percent). The third most important factor was the availability of the stipend (34 percent), followed by the state or district training requirements (26 percent). Respondents were mixed in terms of the influence of the location and the time of year in which the academies were offered. The factors that were rated least influential for the respondents' decision to attend the academy were the recommendations from other teachers, the length of the training, and the sponsor of the training.

TMA participants were also asked whether the TMAs were offered at a convenient time of year and whether enough academies were offered to suit teachers' needs. Responses to these items are presented in Exhibit 70.

**Exhibit 70**  
**Teacher Perceptions of TMA Accessibility**



Source: Survey of Teachers Regarding TMA Training, 2004.

The large majority of respondents “agreed” or “strongly agreed” that the academies were offered at a convenient time of the year (89 percent) and enough were offered to suit their needs (72 percent).

The combined findings related to factors that influenced teachers to attend TMA training and the trainings’ accessibility suggest that teachers are more likely to attend the TMA because they are required to and because they receive a stipend for attending, rather than other factors, such as the reputation of the training or convenient time or location. Nevertheless, academy offerings do appear to have been convenient for the majority of respondents and the stipends do indeed play a considerable role in teachers’ decisions to participate. For the most part, these findings mirror those reported by the teachers who attended the TRA trainings.

**School Administrator Perceptions of the Role of Stipends and other Factors that Influence Participation**

For those administrators who recommended or required their teachers to participate in the TMA training, survey items asked them to report the extent to which a set of factors influenced their decisions to select the TMA training as a professional development option for teachers in their schools. These survey items broadly addressed several types of influences, including monetary (stipend), logistical (time of year or location), and professional issues (district or state

professional development requirements). The factors were rated on a five-point scale (no influence, a little influence, neutral, somewhat influenced, strongly influenced). Administrators' responses to these items are presented in Exhibit 71.

**Exhibit 71**  
**Influences on Administrators' Decisions to Select**  
**TMA as a Professional Development Option for Teachers**

Factors	No Influence	A Little Influence	Neutral	Somewhat Influenced	Strongly Influenced
Length of the training (n=726)	20%	4%	40%	24%	12%
Recommendations from others (n=723)	22%	5%	34%	27%	14%
Sponsor or trainer (n=724)	22%	4%	42%	21%	11%
Time of year (n=725)	16%	4%	29%	27%	23%
Location of the training (n=726)	18%	4%	30%	26%	23%
State or district prof. development reqs (n=726)	19%	5%	28%	28%	20%
Availability of stipend (n=727)	20%	5%	21%	24%	30%
Content of the training (n=726)	13%	2%	15%	28%	43%

Source: Survey of Administrators Regarding TMA Training, 2004.

The most influential factor for administrators' decisions to select the academy as a professional development option was the content of the training, with 43 percent of respondents rating this factor as "strongly influential." A fairly large number of respondents were reportedly "neutral" across many of these factors, between 15-42 percent. The factors that were rated least influential for administrators' decision to select the TMA as a professional development option for their teachers were the recommendations from other teachers, the length of the training, and the sponsor of the training.

### Open-ended Comments

Finally, survey respondents were asked to suggest alternatives to financial stipends that would increase participation in the TMA. Teachers responding to these open-ended survey items insisted that no alternative to stipends would increase teacher participation in the TMA or that the financial remuneration through the stipends is the best way to encourage participation and urged

that the stipends be continued and even increased (25 percent). Others suggested that instructional materials, resources, or supplies be given to teachers at the end of the academy (17 Respondents also suggested other methods of paying teachers for their time including compensation time, choice time, providing substitutes during the school year, and counting TMA for professional development hours (13 percent). In addition, teachers suggested that improving the TMA so teachers would give it word-of-mouth promotion would increase participation (8 percent). (See the Appendix for the breakdown of responses to all open-ended items on the teacher survey.) Examples of teachers' comments regarding alternatives to financial stipends include:

- Nothing takes the place of being compensated for your time. Teachers are already the most overworked and underpaid professionals in our society. I will not attend another Academy unless I am paid a stipend, because I will still have to do all district-wide professional development regardless of whether I have met state requirements by attending Mathematics workshops. Therefore, I must give up hard-earned days of my summer for nothing!
- There are none. Stipends are the best way to attract teachers to in-services.
- Maybe by offering the academy during duty time with a substitute teacher provided.
- Option to "comp" out of an inservice day.
- Hearing teachers come back saying it was great and that they learned so much.

Additionally, school administrators were asked to provide suggestions for alternatives to financial stipends that would increase participation in the academies. In open-ended comments, administrators maintained that the financial remuneration through the stipends is the best way to encourage participation and to demonstrate that teachers are valued and treated as professionals (30 percent). Similar to the teacher respondents, administrators urged that the stipends be continued and even increased. Additionally, administrators suggested other methods for compensating teachers for their time including release time, compensation time, providing substitutes during the school year, and allowing teachers to use the academies for required professional development hours as an alternative to stipends (16 percent). Others suggested that instructional materials, resources, or supplies be given to teachers at the end of an academy (14 percent). Administrator respondents also suggested that teachers receive college credit for their participation as an alternative to stipends (6 percent). Examples of administrator comments regarding alternatives to stipends that would increase teacher participation in the TMAs included:

- Stipends caused teachers to feel like professionals - valued for expertise and time compensated.
- I really don't think there are any other alternatives to stipends that would increase teacher participation in the academies. Most teachers work long hours during the school year and expecting them to give up part of their vacation without receiving any monetary compensation is unfair.
- Provide the instructor compensation days - the state would repay the district the cost of a certified substitute.
- If teachers were supplied resources to implement the strategies they would be highly motivated to participate in the training.
- Classroom materials to implement or support instructional strategies presented in Academies.
- College credit, Professional development credit
- Perhaps college credit - 3 hours for a 40-hr course.

## **Interviews and Focus Groups**

### **School Administrator/Teacher Perceptions of TMA Quality**

Participation in and access to the TMA training varied across districts. Principals and teachers did not report a consistent pattern or criteria for how academy participants were chosen. No district made participation mandatory. In some locations, only new teachers were required to attend. Some teachers participated based on the grade level taught. In other schools, principal or teacher interest determined participation. Stipend availability drove attendance at other sites. Generally, those teachers interviewed wanted to attend but also felt that campus and district support encouraged attendance.

Of those attending the academies, most TMA participants reported receiving stipends. Teachers indicated that the stipend did not make a strong difference in whether they attended, since usually they were requested to go. However, an overwhelming majority of participants indicated that the stipends were a “nice incentive” that “motivated” them to attend and provided evidence that the district and state recognized the value of their time. Additionally, offering the stipend indicated to the participants that the state supported the training.

Reactions to the content, materials, and delivery of the TMA provided interesting insights. Although participants generally found the trainers to be knowledgeable, they indicated that the delivery of the training was rigid. Participants expressed concern that the content and material were not tailored to fit their contexts. Similar to the reading teachers, mathematics teachers expressed interest in attending the academies over a longer period of time and having follow up so that they could have time to implement recommended strategies and share their experiences.

Comments about the quality of the TMA content varied by the number of years of teaching experience that the TMA-trained teacher possessed. Teachers with less than five years experience found the vertical emphasis and link to algebra to be helpful but felt that the content should have been limited or the time allowed for the academies extended. Teachers with more than five years experience viewed the academy content as repetitive and suggested that the academies would be most helpful to new teachers. Possibly because the average number of years of teaching experience of the TMA participants was 16.9 years, the general consensus was that the content was more appropriate for less experienced teachers. Teachers specifically found the focus on student error analysis and questioning strategies helpful.

Interviews with teachers and principals indicated that principals had limited awareness of the TMAs. Most principals knew the basic tenets of the academies but had little knowledge of how information was shared across campuses or within districts. Few had attended academy awareness training. Since many of the principals who were on campus during the time of the academy trainings were no longer at the same campus, it is understandable that newer principals had less information about the academies. A summary of teachers' perceptions regarding TMA training is included in Exhibit 72.



**Exhibit 72  
Summary of Teachers' Perceptions of TMA Training and Delivery**

<b>TMA Training and Delivery Strengths</b>	<b>TMA Training and Delivery Weaknesses</b>
<ul style="list-style-type: none"> <li>• Teachers benefited from training on the analysis of student errors.</li> <li>• Teachers appreciated receiving compensation for their time.</li> </ul>	<ul style="list-style-type: none"> <li>• Experienced teachers found academy content repetitive.</li> <li>• Delivery of material was too rigid.</li> <li>• Academy training covered too much material in too short a time period.</li> <li>• Training lacked follow up support.</li> <li>• Participation in and access to academy training varied across districts resulting in different levels of dissemination.</li> <li>• Principals lacked awareness of TMA content and strategies.</li> </ul>

*Source: Analysis of teacher participant interview data collected by evaluation team, 2004.*

**B. Impact on Classroom Practices**

In this section, the evaluation team examines how the professional development offered by the TMA affected teachers' classroom practices. Implementation of TMA strategies and their impact on classroom practices were assessed in three ways: (a) a survey sent to participants of mathematics academies, (b) a survey sent to administrators of the teachers surveyed, and (c) site visits to a sample of schools which included observations and focus group interview with teachers and school administrators. Within each of these data sources, the evaluation team examined levels of teaching experience and reading instruction, implementation of the TMA strategies, and the perceived and observed impact these strategies have had on teaching practice and student achievement. The findings from these data sources are presented below.

**Survey Results**

**Teacher Perceptions Regarding TMA Implementation**

To better understand how the TMA affected classroom practices, the evaluation team surveyed teachers and their administrators regarding the implementation of TMA teaching strategies in the classroom. A total of 314 teachers completed the TMA survey with a response rate of 25 percent;

1,139 campus administrators completed and returned the Administrator survey with a response rate of 44 percent.<sup>29</sup>

#### TMA Teachers' Mathematics Instruction Experience

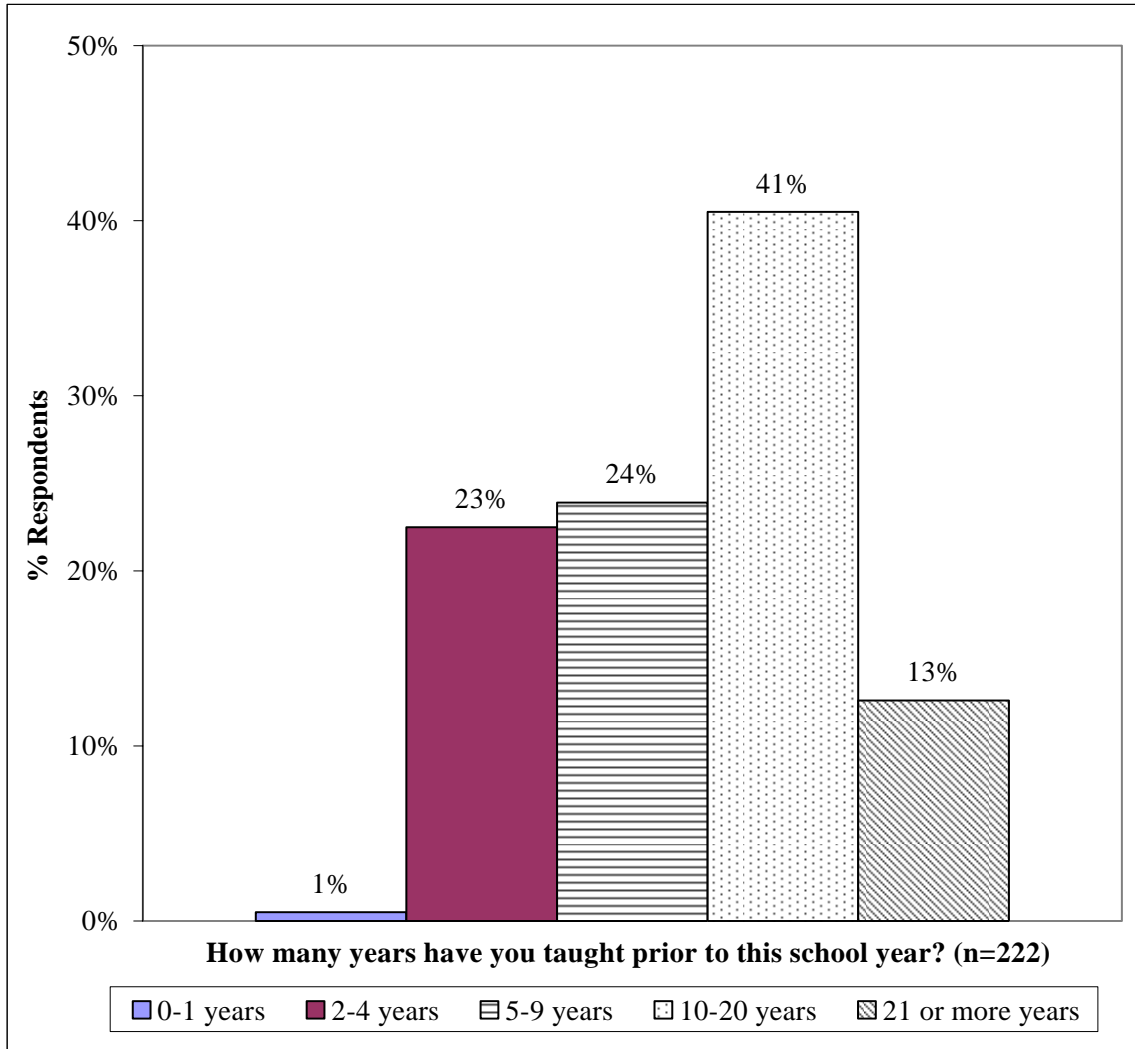
First, teachers were asked about their current experience with mathematics instruction in terms of their years in the teaching profession, the highest level of education attained, the grade level taught, and the number of hours devoted to mathematics instruction each week. The purpose of these survey items was to establish teachers' degree of experience and engagement in teaching mathematics to better understand the context within which implementation is assessed. Exhibits 73-76 show the years of teaching experience among the respondents, the percentage that have earned a Bachelor's or Master degree, the percentage of respondents who reported teaching at each grade, and the average number of hours devoted to mathematics each week.

As seen in Exhibits 73 & 74, the majority of respondents (54 percent) have taught for at least 10 years or more prior to this school year and just under one-quarter have Master's degrees. Exhibit 75 indicates that the majority of survey respondents taught Grades 5 and 6 (73 percent). Only 28 percent of the respondents taught Grades 7 and 8 (see Exhibit 75).

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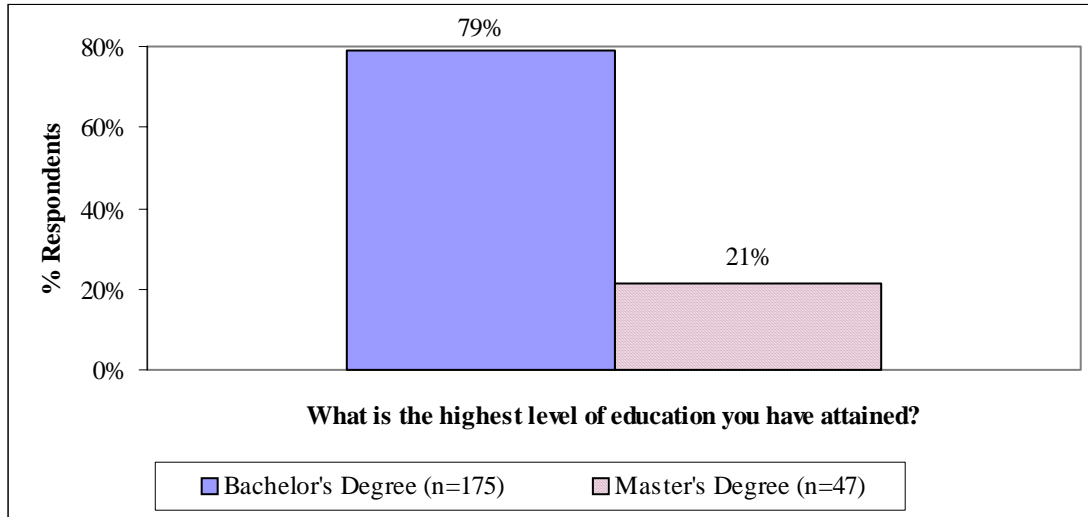
<sup>29</sup> An attempt was made to survey teachers who had not attended TMA training, so their classroom experiences could be compared to teachers who did attend the training; however due to a low response rate among non-TMA trained teachers, this analysis is not included in the report.

**Exhibit 73**  
**Years of Prior Teaching Experience of Teachers who attended the TMA**



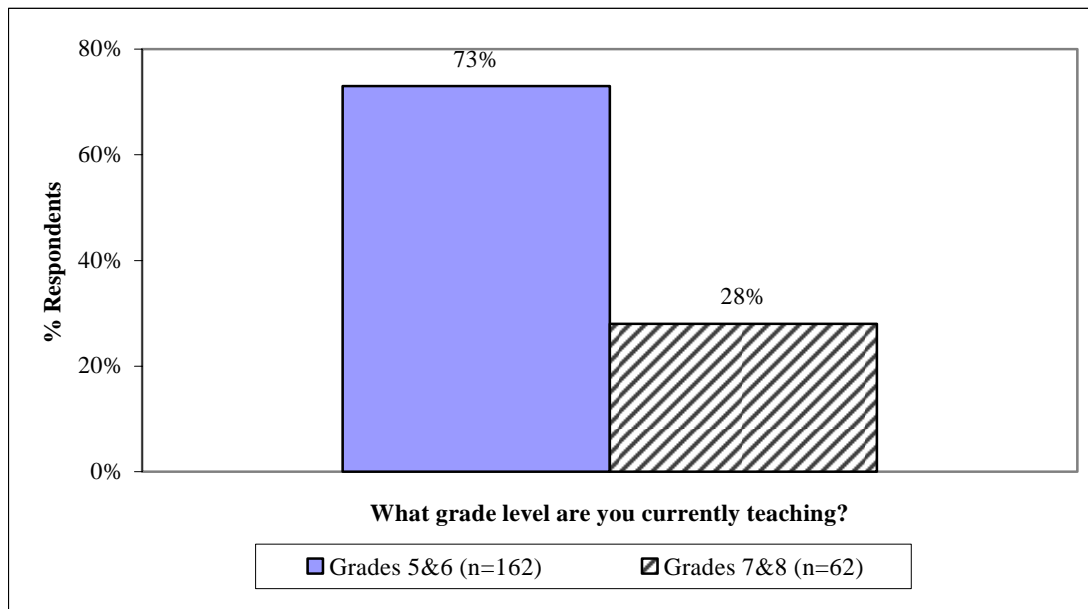
Source: Survey of Teachers Regarding TMA Training, 2004.

**Exhibit 74**  
**Highest Level of Education of Teachers who attended the TMA**



Source: Survey of Teachers Regarding TMA Training, 2004.

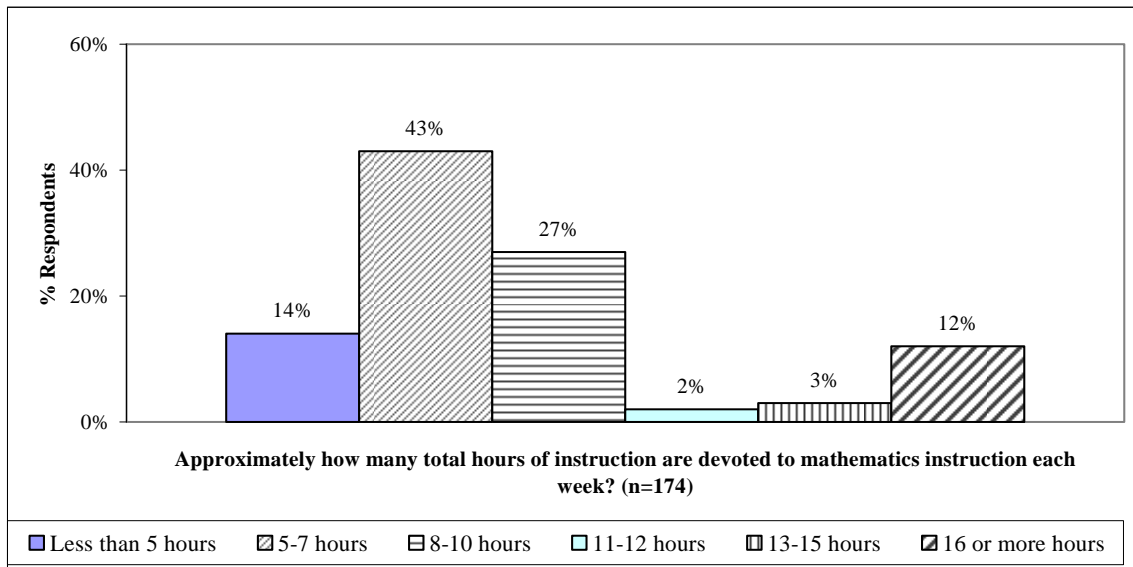
**Exhibit 75**  
**Current Grade Level of Teachers who attended the TMA**



Source: Survey of Teachers Regarding TMA Training, 2004.

Exhibit 76 shows the respondents' reporting of the approximate hours of instruction devoted to mathematics each week. The largest percentage of TMA survey respondents (43 percent) reportedly devote five to seven hours to mathematics instruction per week and another 27 percent reportedly devote 8-10 hours to mathematics instruction per week. A smaller percentage of respondents devote more than 10 hours per week or less than 5 hours per week to mathematics instruction.

**Exhibit 76**  
**Hours Devoted to Mathematics Instruction Each Week by Teachers who attended the TMA**

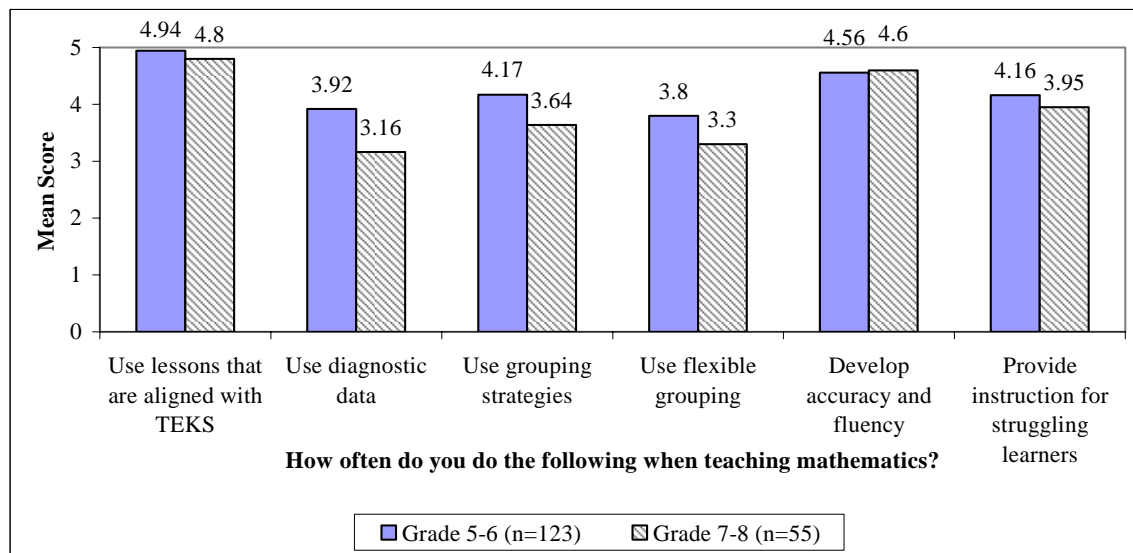


Source: Survey of Teachers Regarding TMA Training, 2004.

**Implementation of TMA Strategies**

The TMA survey contained a list of 16 skills and strategies for teaching mathematics in Grades 5-8 that were taught in the mathematics academies. Teachers were asked to identify the grade level they currently teach and rate the degree to which they use the teaching strategies for the corresponding grade level. Teachers were asked to rate their level of strategy use on a 5-point scale (1=never, 2=rarely, 3=sometimes, 4=often, and 5=all or almost all mathematics lessons). Exhibit 77 presents the teachers' mean responses to a sample of implementation survey items that were consistent across Grades 5-6 and Grades 7-8.

**Exhibit 77**  
**Mean Implementation of TMA Teaching Strategies**  
**Grades 5 & 6, 7 & 8**



Source: Survey of Teachers Regarding TMA Training, 2004.

Overall, teachers rated their level of strategy use quite high, with mean ratings ranging between 3.2 to 4.9 on a five point scale. Exhibit 77 provides a graphic illustration of survey respondents' mean ratings for how often they report using the TMA strategies. Survey respondents report very similar levels of use of certain strategies, for example, teachers reported a high frequency of using lessons aligned with TEKS and a high frequency of practice to develop accuracy and fluency. Furthermore, respondents in all grade levels reported a slightly lower frequency of using data from reading inventories and flexible grouping strategies. These ratings mirror those provided by teachers who participated in the reading academies.

TMA participants were also asked to provide information about the implementation of TMA strategies and whether they helped teachers with their mathematics instruction. As Exhibit 78 illustrates, the majority of TMA participants who responded to this survey "agreed" or "strongly agreed" that the TMA strategies were easy to implement (77 percent). Results were mixed however on other outcomes with nearly half of the respondents reporting agreement and the other half reporting no opinion or disagreement that:

- the diagnostic tool helped them to identify students' strengths and weaknesses;
- the TMA training helped them to identify struggling learners;
- they have shared what they learned with others;

- the diagnostic tool helped them to use differentiated instruction; and
- grouping strategies helped accelerate struggling learners.

**Exhibit 78**  
**Trained Teacher Perceptions of TMA Outcomes**

Perceptions	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
TMA resulted in instructional change in my district (n=218)	9%	19%	51%	19%	3%
Grouping strategies helped accelerate struggling learners (n=219)	4%	11%	37%	43%	5%
The diagnostic tool helped me use differentiated instruction (n=219)	3%	10%	33%	47%	6%
I have shared what I have learned with others (n=219)	6%	15%	24%	49%	6%
TMA training helped me identify struggling learners (n=220)	4%	19%	23%	50%	5%
The diagnostic tool helped me identify students' strengths and weaknesses (n=219)	3%	12%	31%	50%	4%
The TMA strategies were easy to implement (n=219)	1%	11%	11%	65%	12%

Source: Survey of Teachers Regarding TMA Training, 2004.

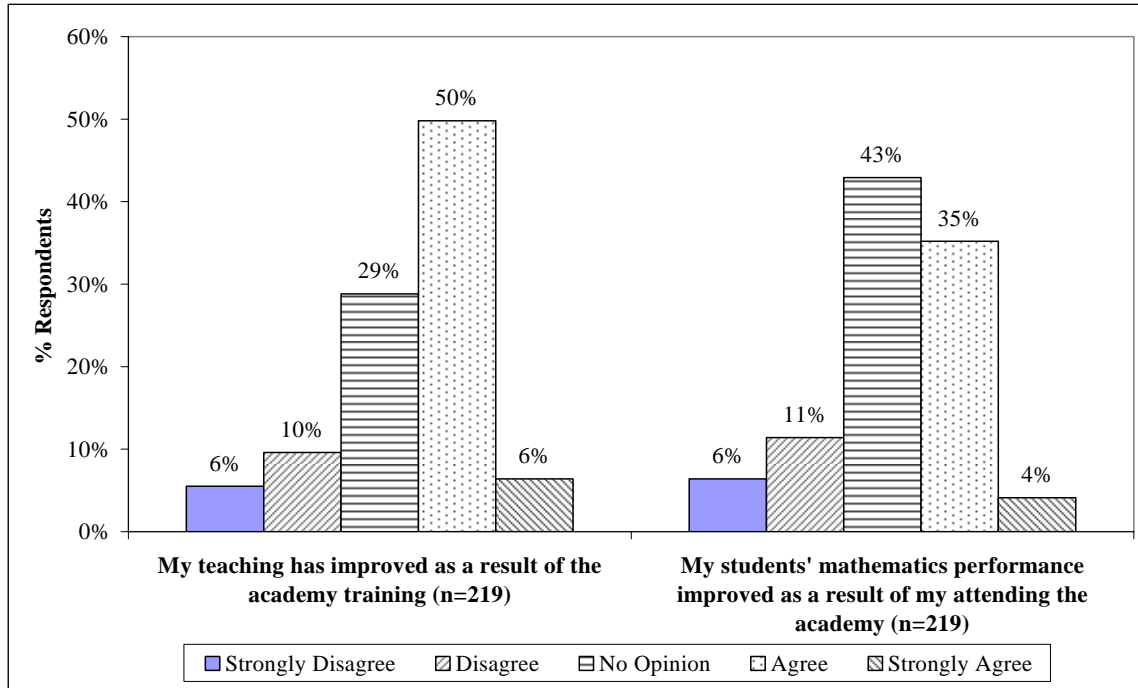
In contrast to the teachers who attended the TRA trainings, smaller percentages of participants of the TMA trainings indicated that they perceived these outcomes as a result of the training. Notably, 22 percent of the TMA respondents indicated that the mathematics academies resulted in instructional change in their district in contrast to 60 percent of the reading teachers who attended TRA trainings.

#### Perceptions of Impact of TMA Training on Teaching Practice and Student Achievement

An important aspect of implementation was whether teachers believe the TMA training improved their teaching practice and resulted in improved student achievement. As seen in Exhibit 79, 56 percent of respondents “agreed” or “strongly agreed” that their teaching practice improved as a result of attending the training. However the majority of respondents (43 percent) reported no opinion on whether the training had resulted in improved student performance in mathematics.

Only 39 percent agreed or strongly agreed that the training had indeed resulted in improved mathematics performance and 17 percent disagreed or strongly disagreed.

**Exhibit 79**  
**Trained Teacher Perceptions of TMA Student and Teacher Outcomes**



Source: Survey of Teachers Regarding TMA Training, 2004.

These combined findings suggest that many participants of the TMA training perceive effects on their individual teaching practices, but less effect on practices that affect student achievement outcomes for struggling students, or on teaching practices in their district. In comparison to teachers who attended the reading academies, where a majority reportedly recognized improvements in their teaching practice (77 percent) and in their students' reading achievement (72 percent), considerably smaller percentages of teachers who attended the TMA perceived such teacher (56 percent) and student (39 percent) outcomes.

School Administrator Perceptions of TMA Implementation

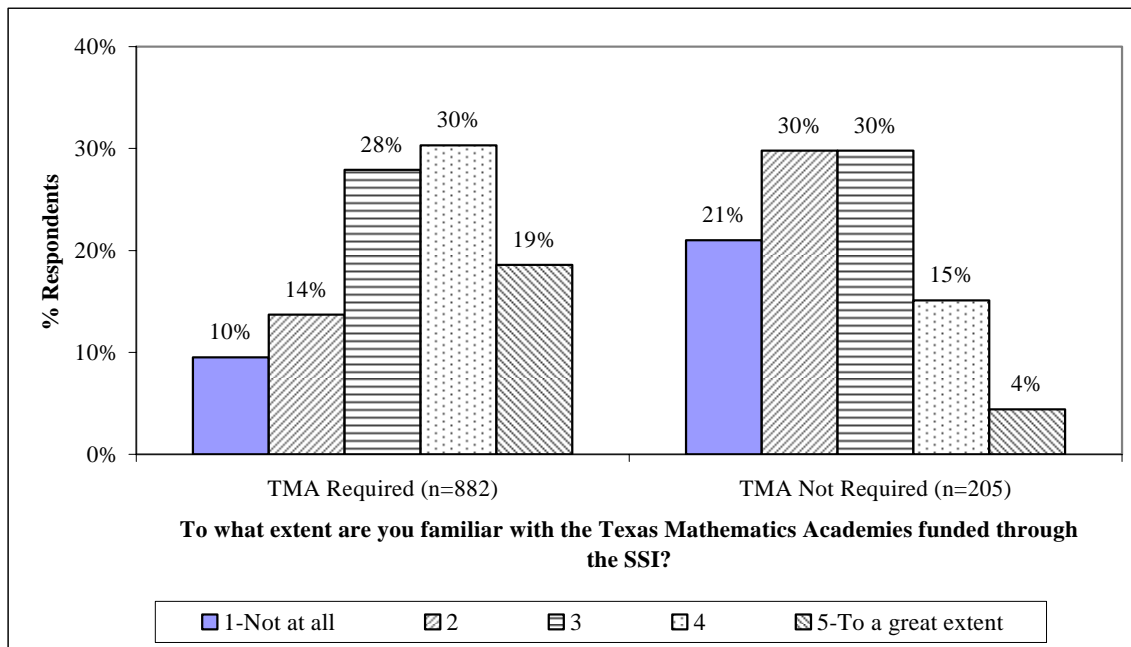
To further examine how classroom practices may have changed as a result of the TMA, the evaluation team surveyed school administrators regarding their perceptions of mathematics practices in their schools and the possible impact the TMA may have had on mathematics instruction and student achievement. Surveys were completed by 1,139 school administrators for a response rate of 44 percent.



Using a five-point scale that ranged from 1 “not at all” to 5 “to a great extent,” school administrators were asked to rate their familiarity with TMAs. Similar to the evaluation of the TRA trainings, survey responses were compared for those administrators who required or recommended that teachers participate in TMAs with those administrators who did not.

As illustrated in Exhibit 80, most school administrators were at least “somewhat familiar” with the TMAs, although 21 percent of administrators who did not require or recommend teachers to participate were not at all familiar. Almost half (49 percent) of the administrators who required or recommended that their teachers attend the TMAs were familiar (i.e., rated familiarity a 4 or 5 on the aforementioned 5-point scale) compared to just 19 percent of the school administrators who did not require or recommend TMA attendance.

**Exhibit 80**  
**School Administrators’ Familiarity with the Mathematics Academies**



Source: Survey of Teachers Regarding TMA Training, 2004.  
Note: Nine percent of the survey respondents marked “NA/Don’t Know.”

In a comparison of administrators perceptions regarding the TRA and TMA trainings, a much higher percent of administrators who recommended teachers to attend the TRA were familiar with the TRA trainings (79 percent assigning a 4 or 5 on the 5 point scale) than were with the TMA trainings (49 percent assigning a 4 or 5).

The school administrators were then asked to estimate the percentage of the Grade 5 through Grade 8 mathematics teachers at their schools who participated in TMA. As illustrated by Exhibit 81, administrators' estimates of teacher participation rates varied slightly by whether administrators recommended or required teachers to attend the TMAs. In general, administrators who required or recommended training reported slightly higher teacher participation rates than administrators who did not require attendance at the academies. However, the pattern was not as marked as the pattern among administrator estimates of teacher participation in the reading academies, where participation appeared to be greatly influenced by requirements or recommendations of school administrators. Teachers' participation in TMA was reportedly more sporadic and less attributable to administrator recommendations.

**Exhibit 81**  
**Administrators' Reports of Teacher Participation in TMAs**

<i>Approximately what percentage of the teachers from your campus participated in the Texas Mathematics Academy?</i>		
<b>Percent of Teachers Who Participated</b>	<b>Administrator Required or Recommended</b>	<b>Administrator Did Not Require or Recommend</b>
0-20%	39%	65%
30-50%	20%	19%
60-80%	15%	6%
90-100%	26%	10%
	n=791	n=189

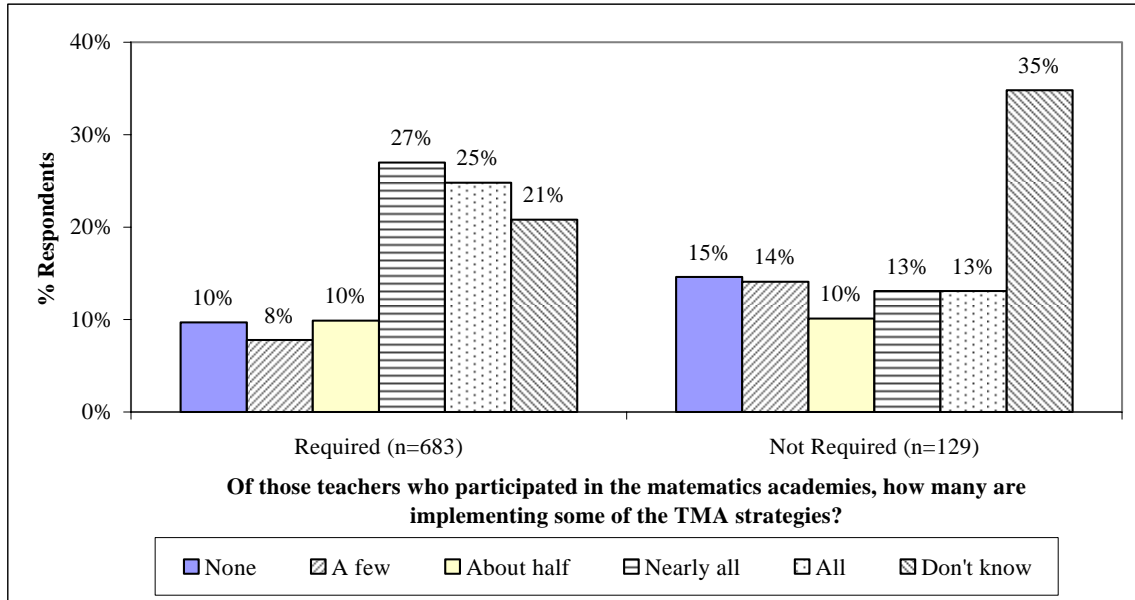
*Source: Survey of School Administrators Regarding TMA Training, 2004.*

The school administrators were also asked how many of their teachers who attended TMA are implementing the strategies they learned at the training. Administrators were asked to rate the level of implementation on a five-point scale where 1=none and 5=all. Respondents were also provided a "don't know" option. Administrators were asked to report how many teachers were implementing at least some of the TMA strategies and how many were implementing most of the TMA strategies. Exhibits 82 and 83 present administrators' responses to these items.

School administrators' responses to the two survey items, how many teachers are implementing at least some of the TMA strategies and how many are implementing most, suggest that implementation levels were relatively mixed. Roughly half (52 percent) of the administrators who required or recommended teachers to participate in the academies reported that nearly all or all of the teachers who participated in the training are implementing *at least some* of the TMA strategies. Just under a quarter of respondents marked "don't know." Approximately a third of

those who did not require teachers to attend TMA trainings were reportedly unsure and marked “don’t know.”

**Exhibit 82**  
**Administrator’s Perceptions of Teachers Implementing**  
**At Least Some of the TMA Strategies**

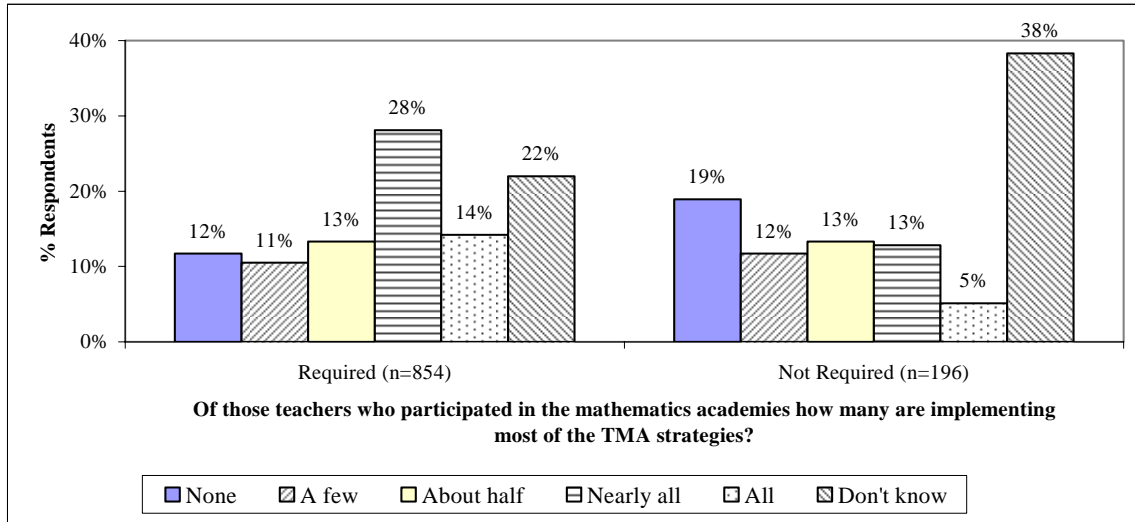


Source: Survey of School Administrators Regarding TMA Training, 2004.

Although slightly fewer (42 percent) of administrators who recommended/required teachers to participate in the training reported that nearly all or all of teachers are implementing *most* of the TMA strategies (See Exhibit 83).

As might be expected, those administrators who did not recommend or require teachers to participate in the academies reported that relatively fewer teachers are implementing *at least some* or *most* of the TMA strategies on their campuses. In fact, approximately a third responded “don’t know” to these two items.

**Exhibit 83**  
**Administrator’s Perceptions of Teachers Implementing**  
**Most of the TMA Strategies**



Source: Survey of School Administrators Regarding TMA Training, 2004

Again, in a comparison of administrators’ perceptions regarding the TRA and TMA trainings, school administrators reported lower percentages of teachers implementing TMA strategies than TRA strategies. This suggests that they perceive a wider use of TRA strategies in their schools than the use of TMA strategies.

School administrators were also asked to provide their opinions about the ways in which the TMAs have influenced teachers’ mathematics instruction and general mathematics practices in the district. Given a list of potential outcomes, administrators were fairly evenly divided among those who “agreed” or “strongly agreed” and those who shared “no opinion,” “disagreed,” or “strongly disagreed” regarding the possible outcomes listed on the survey about the TMA trainings. As illustrated in Exhibit 84, administrator respondents were mixed about whether the academy training helped teachers to identify struggling learners, whether the diagnostic tools helped teachers use differentiated instruction and identify students’ strengths and weaknesses, and whether the grouping strategies helped teachers to accelerate struggling learners. As before, administrators’ responses to similar items regarding the reading academies revealed that the reading academies are perceived to have resulted in more changes to teacher and district practices than the mathematics academies.

**Exhibit 84**  
**Administrators' Perceptions of TMA Outcomes**

<b>Perceptions</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>No Opinion</b>	<b>Agree</b>	<b>Strongly Agree</b>
I have shared academy strategies with others	2%	11%	53%	30%	4%
Student mathematics performance improved as a result of the academy	1%	8%	46%	38%	7%
The academies resulted in instructional changes in the district	2%	9%	48%	35%	7%
The diagnostic tools helped teachers use differentiated instruction	1%	5%	42%	45%	7%
Teaching in mathematics improved from the academy training	1%	6%	41%	44%	8%
The grouping strategies helped teachers accelerate struggling learners	0%	4%	44%	44%	8%
The diagnostic tools helped teachers identify students' strengths and weaknesses	1%	4%	41%	46%	9%
Academy training helped teachers identify struggling learners	1%	3%	40%	47%	10%
Academy strategies were easy to implement	1%	2%	35%	50%	13%
Enough academies scheduled to suit teachers needs	2%	13%	32%	41%	13%
The academies were offered at a convenient time of year	1%	3%	28%	45%	23%

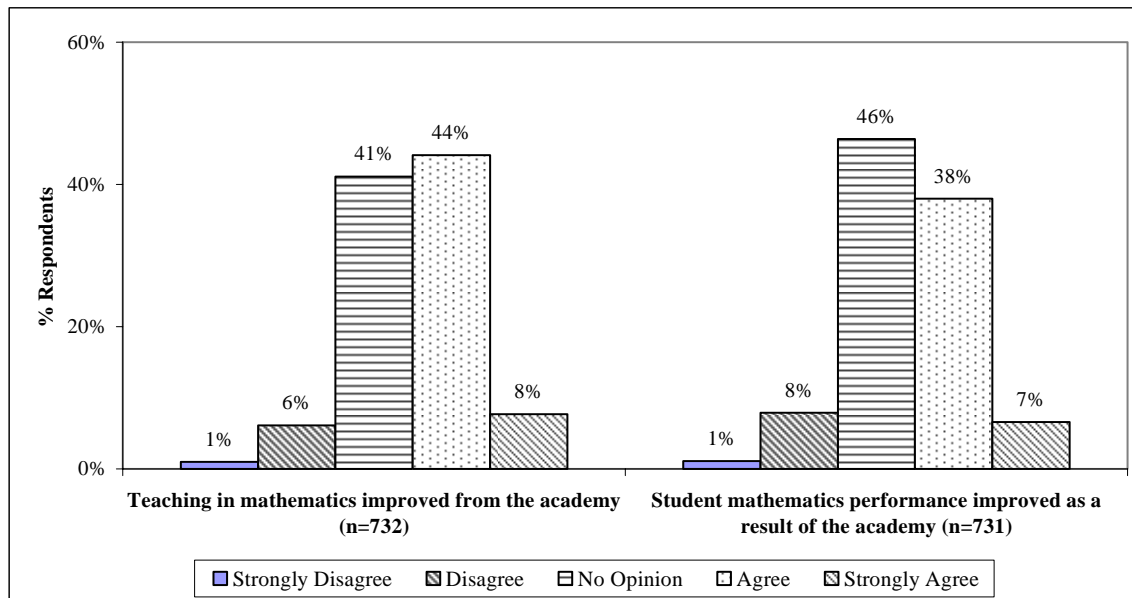
*Source: Survey of School Administrators Regarding TMA Training, 2004.*

**School Administrator Perceptions of Impact of TRA Training on Teaching Practice and Student Achievement**

When asked whether the TMA training had improved teaching practice and resulted in improved student achievement, responses varied with a little over half of administrators who responded to the survey (52 percent) indicating they “agreed” or “strongly agreed” that that the training had indeed resulted in improved teaching practice in mathematics and 45 percent of school administrators “agreed” or “strongly agreed” that students’ mathematics performance had

improved as a result of the teachers attending the training. Fairly large percentages of the administrator respondents shared no opinion or disagreed that these outcomes resulted from the academies (see Exhibit 85).

**Exhibit 85**  
**School Administrators' Perceptions of Teacher and Student Outcomes**



Source: Survey of School Administrators Regarding TMA Training, 2004.

Given the rather mixed findings from school administrators' perceptions of teacher participation in the academies, the various levels of implementation of TMA strategies perceived in the schools, and a rather large percentage of administrators who reportedly had "no opinion" on whether or not participation in the TMA trainings resulted in improved teacher practices and improved student performance in mathematics, it is difficult to draw conclusions regarding the influence of the TMA trainings on classroom practices.

### **Open-Ended Responses – Teacher Perceptions of Outcomes and Factors that Support Implementation**

Teachers were asked to respond to several open-ended items about the usefulness of the TMA training to their classroom practice. First, teachers were asked to indicate what components of the TMA most enabled them to assist struggling learners in mathematics. The most commonly cited items were as follows:

- the instructional strategies and ideas they received during the TMA (25 percent);
- the grouping strategies (12 percent);

- diagnostic tools (9 percent);
- the hands-on activities they learned from the academy provided them additional techniques for instruction (8 percent); and
- techniques they learned for analyzing student errors helped them to be responsive to individual student learning needs (6 percent).

Next, teachers were asked what factors at their campus supported their efforts to implement what they learned at TMA. Teachers reported that the general support they received from school administration (29 percent) or their principal (13 percent) encouraged them to implement TMA strategies directed at improving student achievement in mathematics. Survey respondents' comments indicated that administrators had general policies in place that fostered teacher innovation and growth in mathematics instruction. Administrators at the district or school level provided teachers with resources, supplies, and mathematics manipulatives they needed for instruction (8 percent). Principals provided teachers the autonomy to plan their time for additional instruction or collaboration with their colleagues (7 percent). Teachers were allowed to arrange their class, schedule, students, or adapt curriculum as they thought best to achieve their instructional purposes (7 percent). Teachers also valued the support they received from grade level peers or other teachers who had attended the academy (6 percent). Examples of support structures for implementing TMA at their schools included:

- The administrators, co-workers and school environment supported my efforts of implementing. New ideas and knowledge.
- Our principal supported our new knowledge and the need to make an algebra connection vertically among the grade levels.
- My principal is very supportive of using anything that is beneficial to students and he trust me to make those decisions as a professional.
- My district will always see that I get any supplies necessary i.e., chart tablets, manipulatives, etc. to teach a lesson successfully!
- The reasonably smaller class size of 25-28 students was the most helpful factor in supporting my efforts.
- Meeting with other team members and staff who have also gone through training.

Teacher respondents also reported the factors that hindered their efforts to effectively implement TMA principles at their campuses. Just over one-third (34 percent) of the survey respondents

indicated that nothing hindered their efforts to implement what they learned from TMA on their campuses. Other teachers who found it difficult to implement TMA cited a lack of time or other priorities that demanded their time as a hindrance to implementation (21 percent). Respondents also wrote that they lacked resources, equipment, or finances to accomplish what they wanted in their classroom instruction (9 percent). Some teachers reported that their districts or schools were implementing other mathematics programs or had a focus on helping students with standardized test preparation (8 percent). Examples of teachers' comments regarding factors that hindered their implementation of TMA strategies included:

- I don't feel there are any factors at my school that would prevent me from implementing what I learn at any in-service I attend.
- Sometimes the lack of time. Implementing other programs in our school makes it a little difficult to successfully get everything for math and other subjects.
- Not enough time in the day to accomplish all that needs to be done to properly reach every students on the appropriate level
- The time devoted (limited amount) to teaching math hinders my ability to implement various strategies.
- My school is in a very poor district. We lack of many things. For example, since April (last school year) I do not have light bulbs for the overhead projector, the internet is frequently down. I do not have enough materials for each of my students such as math booklets, rulers, and watch (timers).
- Sharon Wells Program has to be implemented at all times.
- Our TAKS training, there is such a push to get these kids to pass. It is hard to worry about algebra at this point.

### **Open-ended Comments – School Administrator Perceptions**

The school administrator survey asked for perceptions about what components of the academies supported teachers' use of the strategies they learned. This survey item referred to both reading and mathematics academies. As reported in the Reading Academy section of this report, administrators who responded to this open ended item most commonly cited the follow-up support provided by the district after training, such as additional staff development, coaching, modeling, and other support from district personnel with expertise to reinforce and enhance academies (19 percent). However, a number of respondents also reported that the mathematics academies were not promoted or supported by their districts as much as the reading academies



(n=23; 3%). The following comments illustrate the comparisons that administrators made between mathematics and reading academies:

- Reading has been far more supported than the math.
- The reading academies were much stronger training than math.
- We have not focused enough on Math.
- Our campus did not attend Math because we began a new Math program that already required summer time.
- There was no acknowledgement from the district about the Math Academy.
- Reading academies were a required program where the math was not emphasized or "forced" upon them. Therefore teachers did not attend the math.
- We have not had enough district leadership support for the mathematics instruction, and the district has chosen to continue with the math curriculum that has been implemented for several years.
- Math Academies at my campus only a few teachers were trained. Administrators were never trained.

Nevertheless, the comments provided by administrators to this open-ended survey item suggest that when districts did provide follow-up and support for teachers who attended the mathematics academies, this did enhance implementation, just as with the reading academies. The following comments illustrate the ways in which districts provided follow-up and support for teachers who attended the mathematics academies:

- The district curriculum director helped to arrange the training and alignment meetings are held to help teachers across grades. A stipend is paid to the Math lead teacher for extra planning.
- Continued staff development with Math teachers
- Support from district Math department
- Math planning committee.
- Additional stipend in math was tied in with implementation.
- The supportive math coordinator for our district. The curriculum guide from the district. Wealth of materials for math. Focus on math inservices.

School administrators reported additional factors that supported implementation, such as the provision of resources including materials, time, and additional personnel (14 percent). Examples of such resources included funding for literacy libraries and other instructional materials, substitutes or support staff to lower class sizes and cover classes during training, and time allotted for observing teachers implementing the academy strategies. Other respondents explained how existing school and district initiatives were consistent with the academy strategies and therefore supported the implementation in the classrooms (8 percent).

Another factor that administrator survey respondents described was the collaboration among teachers within schools (e.g., common planning time for planning and discussing academy strategies) as well as across the district (e.g., horizontal and vertical teams) to implement the academy strategies (7 percent). Respondents particularly highlighted the benefits of sending teams of teachers from the same school to the academies. For example:

- Having multiple teachers attend the training allowed them to come back to campus and work together.
- Teachers were able to have department planning and opportunities to share ideas and plan together.
- My teachers are using the information and having professional conversations. They all speak the same language and have common vocabulary.

Finally, another notable set of factors that survey respondents described was their own participation in the academy training (4 percent). The following are examples of such comments:

- I also attended an Academy. The principal must be aware of the content of academies and must be willing to help teachers with implementation.
- The biggest factor was my own training in the academy.
- Campus administrator attended a reading academy and found what teachers should be doing. This made the teachers more accountable. Administrators must attend this training.
- [Our school district] conducted a workshop for administrators. It helps when this occurs. It is easier to motivate and inspire others when you go to the in-services too! I also went to the TX reading academy.

Finally, school administrators were asked what factors at their campus hindered their teachers' efforts to implement what they learned at the academies. While administrators most commonly reported that nothing hindered teachers' implementation of academy principles (24 percent), they acknowledged that lack of time and many pressing priorities (such as TAKS testing or other reform initiatives) kept teachers from implementing what they learned through the academies (12 percent). Respondents also indicated that inadequate resources (9 percent), lack of follow-up (with additional professional development) (7 percent), and lack of opportunity to collaborate with other teachers (7 percent) hindered teacher's efforts to implement what they learned.

Examples of these responses included:

- Not enough hours in a day to meet all objectives with multitude of meetings and training off campus - subs not able to meet objectives.
- Time lines and commitment to a variety of programs.
- The lack of funding for special interventions/programs placed higher demands on our teachers.
- The factors that hindered teacher's efforts in implementing read/math academics are that the district have so many tests to be taken.
- We needed more Math training opportunities and more district follow-up.
- Maybe a lack of time for meaningful interaction among those trained.

## **Interviews and Focus Groups**

### **Perceptions regarding TMA Implementation**

This section discusses teacher and school administrator perceptions related to how they implemented strategies presented in TMAs.

#### *Struggling Learners – Assessment, Identification, and Differentiation*

Interview and focus group participants discussed how attending the TMA affected their use of both formal and informal diagnostic assessments in identifying struggling learners. Because the academies supported assessment practices already used by most districts, such as the TAKS and benchmark assessments to identify students who require intensive instruction, attending the academies mainly reinforced what districts were already doing. Teachers felt the training "pushed them to use and analyze data." One principal said the TMAs "raised awareness of scope and sequences and [taught teachers] to develop a plan for action." The TAKS was the primary formal

assessment tool used to identify struggling learners. Teachers reported using it to identify broad areas where students missed items and might be missing skills. Many reported that districts required additional six- or nine-week checkpoints. In one district, principals provided release time for teachers to meet with specialists and analyze student level data and outline instructional plans.

The application of TMA training was more apparent in the use of informal diagnostic tools. Teachers widely used student questioning to alert them to student's levels of understanding so that misunderstandings could be immediately corrected and re-teaching or other instructional support provided. Additionally, teachers said that guided practices, such as monitoring students' work at the board or on the overhead, provided an opportunity to watch the actual procedural steps a student takes in solving problems and make corrections before moving on to independent practice. One teacher stated that based on the academy training, he "now asked students to sketch it, write it, see it many ways," to make sure they had conceptual understanding. Teachers also indicated that the TMA training on analysis of student errors improved their instruction. It helped them to "understand the reasons for mistakes" and find "multiple ways to teach concepts." For some teachers, the academies fortified the relationship between assessment and instruction. Teachers reported using the information to identify content to introduce or re-teach. Some used the data to help them "prepare for more challenging lessons."

The TMA's emphasis on identifying struggling learners made teachers more aware of the need for differentiated instruction. A principal noted that the TMA training reminded "teachers to be deliberate about what they were doing for students. [This resulted in] whole class instruction, out-of-class support, and special programs."

Grouping was a primary TMA strategy for supporting struggling learners. Teacher opinion varied in how they thought academy training affected this strategy. One teacher stated, "Math was always whole group prior to TMA," while others indicated using grouping strategies before the TMA. Regardless of previous practices, teachers found value in grouping students and felt that often "students learned better from other students." They also saw it as a way for "each student to contribute" and be engaged. Further, teachers were able to work one-on-one with students while others participated in group activities. Struggling learners worked together in order to receive more teacher support, while other groups worked more independently.

Teachers implemented additional TMA strategies for differentiated instruction. A widely used academy approach was providing more time for students to build skills. This included using supplemental instruction where one teacher worked with groups of students who needed improvement on similar skills while other students received general instruction. In one setting, a mathematics specialist came into the classroom to work with struggling students. Other strategies included in-class and after-class individual instruction and tutoring. Many teachers found struggling students benefited from individualized attention. Teachers also discussed using centers in their instruction where different groups could work on targeted skill areas. Finally, many teachers found the TMA focus on four-point instruction “validated” and strengthened their approach to teaching struggling learners.

Were the TMA strategies easy to implement in the classroom?

Teachers frequently reported that the strategies that were easiest to implement were those that required little preparation or adaptation on the part of teachers. Teachers discussed being focused on using diagnostic information to plan instruction and how the strategies and materials that work best were the ones that needed little preparation. Additionally, teachers with less experience indicated they needed more content background in order to implement some of the objectives.

How did the focus on diagnostic assessment assist with identifying students’ strengths and weaknesses?

Formal diagnostic assessment tools, such as the TAKS, served as the basis for identifying individual students’ strengths and weaknesses. In many sites, teachers had student-level disaggregated data that indicated where students needed help and where they excel. Across campuses, teachers expressed a need for more time on fractions, as many of their students were weak in this area. Teachers reported using district benchmarking data each six-weeks to reassess student mastery of skills and adjust their instruction accordingly. Participants said the academies placed more emphasis on pre-testing than they had used previously, but they also indicated that this was time consuming to develop, administer, and interpret since other diagnostic tools were already in place.

There was also evidence of the use of informal diagnostic tools to assess students’ strengths and weaknesses. Student work and monitoring learning activities allowed teachers to keep ongoing records of individual student progress. Several teachers used student journals as a way of helping students take responsibility for recognizing areas needing improvement or review. Teachers

indicated using individual interviews with students as a method for checking understanding and providing an opportunity for the teacher to hear the student “think aloud.”

How did the TMA trainings and online diagnostics result in adaptations to teaching practices within districts?

This section of the report only refers to how the trainings resulted in adaptations to teaching practices within the district. *There is little evidence to support that TMA strategies were shared within districts or within campuses.* A possible explanation is that teachers were not required to attend. When they did attend, many were sent as isolates so that when they returned, they had no one to help them digest the information. Additionally, beyond a few teachers mentioning one-time presentations they gave during faculty or team meetings, most indicated limited opportunities or interest in sharing academy strategies.

### **Observations Regarding TMA Implementation – Results from Site Visits**

The evaluation team collected information on how formal and informal assessments were used and on their relationship to documentation of student progress and the selection of strategies for differentiating instruction. Additionally, information was collected as to the extent teachers used specific strategies from the academy such as analyzing student errors to inform instruction.

As documented from the interview data, teachers widely used TAKS and benchmarking data in directing instructional planning. Districts mandated data-driven instruction and provided time and support for teachers to use assessment data in planning. For example, one teacher reported meeting periodically with grade-level teachers to review data and “work backwards to design learning objectives.” The evaluation team saw evidence of this in the classroom, such as student-level disaggregated data used to indicate areas of need. Attending the academies reinforced what these teachers were already doing in this area.

Evaluators found strong evidence supporting TMA-recommended informal diagnostic tools. Teachers frequently used data sources, such as student answers to questions during instruction, student written work, and checks made while monitoring group and independent practice, to analyze student progress. Commonly, during direct instruction, teachers asked questions to check students’ levels of understanding and then adjusted the pace of the lesson based on responses. For example in one setting, a teacher was presenting a lesson on place value using decimals. The teachers asked a student to read the number “237.02.” A student responded by stating “Two

hundred thirty seven and two.” The teacher then redirected the student to pay attention to the use of the phrase “and” to mean decimal or point. She additionally asked the student to rethink the value of “two.” The student then replied “two.” The teacher then challenged the student to think of the place value held by the two. After a pause, the student said, “hundredths.” The student then reread the number “two hundred thirty seven and two hundredths. This example demonstrates how, through the use of questioning and analysis of how the student was thinking, the teacher was able to correct the student’s misconception.

Teachers implemented other approaches to correct and understand student errors. Teachers asked students to explain or justify why they chose certain responses over others and in doing so helped students recognize their own mistakes. Additionally, this strategy helped teachers and students move from correcting errors to understanding errors. As such, errors created opportunities for learning.

Another frequently used strategy was for teachers to monitor student practice. This occurred in both group settings and during independent work. Teachers circulated throughout the room spending time encouraging, redirecting, and listening to students. This activity was deliberate. In one classroom, students were grouped at tables sharing a basket of cubes. The objective of the lesson was on recognizing prime and composite numbers. The teacher asked the group to show each other how many different ways they could make the number fifty-four without duplicating one another. As the teacher monitored one group, she observed a student making one long line of fifty-four blocks and stated “One times fifty-four.” The next student made three rows of nineteen. The teacher asked the student to count the cubes. The student responded “fifty-seven.” “So what happened? What do you need to do?” prompted the teacher. “Put some back,” he stated. The student then had three rows of eighteen. Teachers also developed simple but effective mantras that students could use for self monitoring, such as “look, correct, adjust.” These serve as examples of how informal diagnostic strategies, as common as monitoring student work, can ensure understanding and help students be responsible for checking their own understanding.

### **Demonstration of Deep Content Knowledge – Results from Site Visits**

The TMA emphasized knowledge of the whole curriculum in order to know when and where to intervene with instruction. This included using a curriculum web to relate knowledge and skills from the curriculum to key algebra-readiness concepts; understanding the vertical alignment of particular knowledge and skills that students should learn before, during, and after the current

grade level; and understanding the sequence of concepts and skills within the grade level. During interviews, teachers shared strategies that helped them develop deep content knowledge, such as teaching multiple grade levels and specific district-level vertical training that was then followed up at the campus level. This knowledge is not always readily observable; however, evidence was found suggesting that teachers understood vertical alignment and algebra-readiness concepts. In one setting, the teacher showed that students' previous and current learnings were actually "algebra." She went to the board and asked, "Do you remember last year when you were asked to solve (she writes  $2 + ? = 5$ ). That is algebra. Solving for the unknown." She continued, "In this case, (she writes  $[5 * 5] - 1 = X$ ), you're still solving for the unknown." In another example, a teacher made the connection between algebra and geometry by introducing Euler's formula. She began with having students create three-dimensional shapes using marshmallows and toothpicks. Then students counted the number of faces, vertices, and edges of each shape. They charted this information in three columns indicating the number of faces in one column, edges in another column, and vertices in third column. The teacher asked students to identify a pattern occurring within the chart. Together students discovered there were always two more edges than the sum of faces and vertices. Then the teacher introduced Euler's formula: faces plus vertices equals edges plus two [ $F + V = E + 2$ ]. She explained they were linking geometric shapes to the algebraic formula.

Additionally, teachers demonstrated knowledge of the sequence of concepts and skills within grade level by the sequence in which they introduced topics building on prior knowledge and then continued with more complex concepts. One teacher presented a lesson on rounding decimals. He reviewed whole numbers, presented number lines, and then introduced decimals ranging from tenths up to the thousandths position. He asked students to round each type of example. Students needed more support as the number of decimal places increased. He accommodated this progression by first asking them to work independently on the easier examples and then allowing pairs to work together on more complex problems.

### **Observations regarding the use of instructional techniques for purposes of differentiation – Results from Site Visits**

Teachers demonstrated an understanding of the continuum of learners. For more advanced learners who required little instruction in new mathematical concepts and who often made connections to other concepts with ease, teachers modified their instruction by requiring these students to extend concepts and provided them with more challenging problems or challenged



them to solve the same problem in multiple ways. For more typical learners who were ready to learn a new concept or who required only some review of prerequisite knowledge, teachers typically introduced concepts step-by-step and allowed for more practice time than with advanced learners. Teachers spent additional time with struggling learners who lacked the necessary prerequisite knowledge for new concepts. For these students, teachers commonly modeled solutions multiple times, provided additional monitoring, reinforced vocabulary, gave students longer to answer, provided more prompts, provided more one-on-one support, and used inclusion teachers when appropriate.

While teachers clearly knew the different levels of their students, they generally addressed differences using the strategies described above in a whole group setting. Whole group instruction dominated observations. While teachers did talk about using differentiated instruction, such as flexible grouping and small group instruction, these were not widely observed. It was more common for teachers to pair learners or work with students one-on-one. Additionally, many schools provided differentiated instruction through tutoring during non-school hours. Schools also provided supplemental programs during the regular instructional day for students who needed more focused attention on shoring up specific skills. Teachers were widely observed using the academy-recommended strategy of providing 10 to 15 minutes of supplemental curriculum to review basic mathematics facts. Some teachers implemented this with focus questions at the beginning of class, others used mathematics journals, and some used this strategy to progress through TAKS-focused practice packets. A summary of teachers' perceptions and observations regarding TMA classroom application is included in Exhibit 86.

**Exhibit 86**

**Summary of Teachers’ Perceptions and Observations of TMA Classroom Application**

<b>TMA Classroom Application Strengths</b>	<b>TMA Classroom Application Weaknesses</b>
<ul style="list-style-type: none"> <li>• Teachers consistently used formal diagnostics tools, such as TAKS and benchmarking.</li> <li>• Teachers consistently used informal diagnostics tools, such as student questioning, monitoring, and written work.</li> <li>• Teachers demonstrated awareness of the continuum of learners.</li> <li>• Struggling learners received supplemental support.</li> <li>• Experienced teachers demonstrated strong content knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to attribute use of academy recommended strategies to academy training because content replicated other professional training..</li> <li>• Limited evidence of differentiated instructional strategies, such as grouping.</li> <li>• Limited evidence of principal knowledge about academy strategies.</li> <li>• Limited evidence of change in teaching practice beyond individual teachers due to academy training.</li> </ul>

*Source: Analysis of teacher participant interview and observation data collected by evaluation team, 2004.*

**C. Impact on Student Achievement**

**Relationship Between TMA Training and Student Achievement Results**

As was the case with the TRA analysis, a series of regression models were utilized to explore the relationship between TMA training and student achievement outcomes. The following analysis examines the relationship between the impact of academy training (as measured by the percent of teachers trained in the TMA) and student achievement (as measured by student TAKS performance in 2004). In order to quantify whether academy training does impact student TAKS scores, the evaluation team analyzed data for Grades 5, 6, and 7 and developed a regression model where TAKS mathematics passing rates at the panel recommended standard served as the dependent variable. The results of this regression analysis can be seen in Exhibit 87. In addition, Grade 5 mathematics TAKS passing rates at the standard (-2 SEM or two standard error measurements below the panel recommended standard) were also examined.

In the following regression tables, the impact of academy training - the independent variable - is being measured against various types of student achievement outcomes (e.g., 2004 TAKS scores for Grade 5 at the Panel standard) - the dependent variables in the model. The “Multiple R” field measures the overall predictability of the model – the higher this value is, the more likely that the regression model used in this analysis can predict the relationship between the independent and

dependent variables. A “Multiple R” value greater than 0.4 indicates a model with relatively high predictability. The “df” field refers to the degrees of freedom for the “T” value in the model. The higher the “T” value (i.e., the theoretical probability distribution), the more likely that the statistical relationship demonstrated by the model is real and not by chance. The “Beta” value measures the relative contribution of the independent variable (teacher training) to the prediction of the dependent variable. The “p-value” measures the statistical significance of the relationship between teacher training and student TAKS scores. A “p-value” of less than .05 indicates a statistically significant relationship between teacher training and student TAKS scores. The “B Weight” is the component of the regression equation that measures whether the teacher training has a positive or negative impact on student TAKS scores.

**Exhibit 87**  
**Impact of TMA Training on Grade 5-7 TAKS**  
**Regression Analysis for All Students**

Outcome (Dependent Variable)	Overall Model		Percent Trained in Teacher Mathematics Academy			
	Mult. R	(df)	Beta	T	p-value	B Weight
2003 TAKS Grade 5 (-2 SEM) <sup>1</sup>	.4554	2,2839	-0.0587	-3.5120	.00045	-0.1045
2004 TAKS Grade 5 (Panel) <sup>2</sup>	0.5029	2,2837	-0.03	-1.9917	.04650	-0.0637
2004 TAKS Grade6 (Panel)	0.4780	2,1839	0.0939	4.5354	.00000	0.20949
2004 TAKS Grade 7 (Panel)	0.6029	2,1212	.09133	3.968	.00008	0.2416

Source: TEA AEIS 2003, Student Assessment 2004, TMA academy teacher participation.

Note: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted. All models include the intercept.

Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

1. (-2 SEM) refers to the standard adopted for passing TAKS in 2003. This standard is equivalent to two Standard Error of Measurements below the Panel recommended standard.

2. (Panel) refers to the standard adopted for passing TAKS. This standard is anticipated to be used in 2005. Passing standards are adopted by the State Board of Education.

### Grade 5 Results

The results regarding the impact of academy training on student achievement are different for the Teacher Reading Academy (TRA) and the Teacher Mathematics Academy (TMA). Although the number of schools included in the TMA Grade 5 analysis group is similar to the number of schools seen for the TRA Grade 3 analysis group, there is a difference in the impact of academy training on student achievement (see Exhibit 87). For both 2003 and 2004, the relationship between percent teachers trained and student TAKS performance is negative for the Grade 5 TMA, meaning that the higher the percent of Grade 5 teachers who received TMA training, the lower the passing rates for students taking the TAKS test (at either the standard or recommended

panel levels).<sup>30</sup> In fact, the negative impact found for Grade 5, as measured by the B weight, is greater than the positive impact found for TRAs.

These data are based on only two years of TMA training (occurring in 2002 and 2003), only one of which was supported by stipends. On the other hand, regardless of the year (2003 or 2004), student group (i.e., all students, economically disadvantaged students), or even the TAKS performance level tested (i.e., performance at standard, -2 SEM, or the recommended panel level), Grade 5 student performance on the TAKS test was not enhanced by the TMA teacher training. In fact, just the opposite impact was observed. As previously discussed, if the training's learning objectives are not consistent with the objectives of the assessment test then increased teacher training may negatively impact student achievement.

### **Disaggregating Results for Elementary and Middle Schools**

To further investigate this finding, separate analyses were conducted for elementary schools and middle schools. Understanding that there are far fewer middle schools with a Grade 5 (N=107) than elementary (n=2,602), there is a greater probability of finding significant relationships in an elementary school analysis. When separate analyses were conducted for each grade span, some insight into this pattern was found. For middle schools, the relationship between mathematics academy training density (ATD) and student performance on TAKS at Grade 5 for all students (at the recommended panel level) was positive (see Exhibit 88); however, the impact of training was not statistically significant. The directionality was as with reading (positive). As might be expected, with only elementary schools included, the relationship between training and performance was even more significant and with a greater negative value—further supporting the notion that TMA training for Grade 5 mathematics teachers was ineffective in having a positive impact on student achievement results for Grade 5 students attending elementary schools.

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<sup>30</sup> The Beta values and B weights for Grade 5 TMA participation are negative.

**Exhibit 88**  
**Impact of TMA Training on Grade 5 TAKS**  
**Regression Analysis for All Students**  
**Disaggregated by Elementary and Middle Schools**

Outcome (Dependent Variable)	Overall Model		Percent Trained in Teacher Mathematics Academy			
	Mult. R	(df)	Beta	T	p-value	B Weight
2004 TAKS Grade 5 (Elementary Schools) <sup>1</sup>	0.564	2,2601	-0.037	-2.27	0.023	-0.085
2004 TAKS Grade 5 (Middle Schools)	0.615	2,107	0.041	0.532	0.596	0.067

Source: TEA AEIS 2003, Student Assessment 2004, TMA academy teacher participation.

Note: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted. All models include the intercept. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)

1. (-2 SEM) refers to the standard adopted for passing TAKS in 2003. This standard is equivalent to two Standard Error of Measurements below the Panel recommended standard.

2. (Panel) refers to the standard adopted for passing TAKS. This standard is anticipated to be used in 2005. Passing standards are adopted by the State Board of Education.

**Results for Grades 6 and 7**

On the other hand, the results for Grade 6 and Grade 7 TMA participation are positive. This means that as the proportion of Grade 6 and 7 teachers who received TMA training increased at a campus, the higher the mathematics passing rates for students taking the Grade 6 or 7 TAKS test. In fact, the results show that TMA teacher training for Grade 6 may even yield better outcome results (TAKS mathematics at Grades 6 and 7) than TRA teacher training for the earlier analysis for reading.<sup>31</sup> Understanding that the results of the regression analyses for reading and mathematics are not strictly equivalent, the impact of the TMAs on student performance in Grades 6 and 7 are more than twice as strong. In the case of Grade 7, for each 10 percent increase in ATD for mathematics, there is a 2 point gain in TAKS passing. It should be noted that these estimates are highly dependent on the exact model used.

**Concluding Observations from TMA Student Impact Analysis**

This analysis provides statistical support for the notion that TMA training for middle school mathematics teachers had a positive impact on the Mathematics TAKS results for Grade 6 and 7 students; however, it had a negative impact on the performance of elementary school Grade 5 students taught by teachers attending the Grade 5 TMA training.

From these data, there does appear to be an issue concerning TMA training for elementary grade teachers. A higher percentage of trained teachers results in lower student performance as

<sup>31</sup> The B weight for the Grade 6 TMA analysis is greater than that for any of the reading analyses.

measured by TAKS, but this is unique for Grade 5 in an elementary school. The percentage trained has no impact on Grade 5 performance when Grade 5 is in a middle school. The measured impact for Grades 6 and 7 TAKS appears to be greater than the impact of the TRAs on reading performance at either Grade 3 or 4. The findings for Grades 6 and 7 are influenced to a certain extent by a greater range of performance than for reading. That is, the distribution of percent meeting the Panel standard is wider than for reading, yielding a higher potential for finding significant relationships.

#### **D. Cost Effectiveness**

In a manner similar to the Teacher Reading Academy (TRA), the Texas Education Agency (TEA) used the existing network of Regional Education Service Centers (ESC) to implement the Teacher Reading Academy (TMA). The statewide program development for the TMA was developed and administered by Region 10 ESC.

Funding for the Teacher Mathematics Academy (TMA) was separated into two components. The first component was funded through a statewide initiative to develop the content material for the academy and the second component was funded through ESC grants that were ear-marked for training of trainers to deliver consistent academy training to teachers throughout the state. Each ESC was awarded a grant to deliver each grade level academy to eligible teachers within their region.

The state invested \$9.2 million on the TMA for Grades 5 and 6. The per-participant cost for the Grades 5 and 6 TMA was \$987, including program development costs, program delivery costs, and stipends paid to teachers. Total costs were not available for the Grades 7 and 8 academies. Exhibit 89 summarizes the total costs of the TMA.

**Exhibit 89**  
**Average Cost per Participant**  
**Teacher Mathematics Academies**

Expenditure	Grades 5 & 6	Grades 7 & 8
Development Costs	\$208	\$272
Delivery Costs	\$282	N/A
Stipends	\$497	\$ 0
<b>Total Cost per Participant</b>	<b>\$987</b>	<b>N/A</b>

*Source: Education Service Centers, Detailed General Ledger and Participation Reports, 2001-02 through 2003-04.*

It is difficult to compare the cost of the TMA to other programs since little if any cost analysis has been conducted on other programs. However, in terms of cost per participant, both the development and the delivery of the training compare favorably against the few specialized training initiatives in other states that did track costs.

The total training delivery cost was \$282 per participant, or an average of approximately \$94 per day for a three-day training session.

**Data Limitations – Determining Cost Effectiveness**

In order to evaluate the cost effectiveness of the TMA, the evaluation team conducted site visits at nine of the 20 ESCs. The centers that were visited included: Region 1 (Edinburg), Region 4 (Houston), Region 7 (Kilgore), Region 9 (Wichita Falls), Region 10 (Richardson), Region 13 (Austin), Region 14 (Abilene), Region 19 (El Paso), and Region 20 (San Antonio). These regions were selected because they provided a geographic representation of small, medium and large service centers, as well as representative student demographics.

During the ESC site visits, the evaluation team interviewed business managers to gain an understanding of how the grant funds were expended. In addition, program staff provided information on how the training was delivered in their region. The first mathematics academy was conducted in the summer of 2002 to Grade 5 and 6 mathematics teachers. Although, the initial plan was to roll out a Grade 7 and 8 mathematics academy in summer 2003, funds were not available to fund the Grade 8 TMAs.<sup>32</sup> Grade 8 mathematics academies have been conducted, but they were not funded by this initiative. As a result, ESC financial data on these academies were not captured under the TMA grants. In the fall of 2004, all remaining academy funds were recaptured by the state.

<sup>32</sup> TMAs which trained Grade 7 teachers took place in the summer of 2003.

Each ESC provided detailed accounting records to the evaluation team for each academy. The data was analyzed and an average cost per participant was calculated.

There were no account codes established to effectively track the TMA costs across ESCs. Many of the ESCs used additional funding sources to supplement training costs provided under the TMA grant, and not all ESCs charged indirect costs to the TMA grants. In fact many of the salary costs for administering the TMA grants were charged to federal budgets under the guidelines of the federal Title I grants. This made it difficult to compare the cost structures between ESCs and derive a true cost of providing the academy training on a per participant basis.

In addition, ESCs were able to use any excess TRA funds for TMA training. However, the ESCs were not required to separately track these expenditures. As a result, there were instances when TMA expenditures were reported with TRA grant dollars and reported as expenditures under the TRA grant, which made it difficult to accurately allocate costs to the proper academy. Excess funds did not represent a significant portion of the total cost, and do not materially affect the cost-per-participant analysis.

### **Development – Training of Trainers**

The content of the first mathematics academy was developed by national experts specifically for grade 5 and grade 6 teachers. Mathematics content for the 7<sup>th</sup> and 8<sup>th</sup> Grade TMAs was developed through a subcontract with the Dana Center at the University of Texas. Once the TMA content was developed, each ESC region selected teachers to attend a state-sponsored training to become academy trainers. The state-sponsored training was very structured and delivered in exactly the same manner from academy to academy. State trainers relied on scripted content to ensure that each teacher received identical training regardless of where the training was conducted.

Teachers throughout the state applied to become state trainers through their local ESCs. An application was taken for each potential candidate and ESC program staff interviewed candidates and made recommendations to TEA. The final selection of state trainer candidates was made by TEA.



Region 10 ESC in Richardson administered the development and implementation of the statewide TMA training initiative. They maintained the financial records for the TMA and paid expenses for the program. Region 10 scheduled the training of trainers sessions in coordination with TEA.

During the summer of 2002, 12,514 teachers attended the TMAs. This teacher participation figure is based on the number of TMA participants, identified through attendance logs maintained by ESCs and matched to PEIMS teacher records. Teachers who attended more than one academy were counted for each academy they attended.

The per-participant cost of developing the TMAs and training the state trainers for Grades 5 and 6 was \$208. The cost to develop the Grades 7 and 8 TMAs and to train the state trainers was \$272. Exhibit 90 presents the program development costs for the TMA, broken down by expenditure type.

**Exhibit 90**  
**Distribution of Development and Training Costs for**  
**Teacher Mathematics Academies**

<b>Expenditure Type</b>	<b>Grades 5 &amp; 6</b>	<b>Grades 7 &amp; 8</b>
Payroll Costs	\$80,507	\$45,791
Contracted Services	1,838,495	175,267
Supplies & Materials	30,227	2,239
Other Operating Expenses	308,308	62,206
Stipends	344,900	60,950
<b>Total Expenditures</b>	<b>\$2,602,437</b>	<b>\$346,453</b>
Number of Participants	12,514	1,272
<b>Per Participant Cost</b>	<b>\$208</b>	<b>\$272</b>

*Source: Region 10 Education Service Center, General Ledger, 2001-2002 through 2002-03.*

Very little research exists on the cost of developing professional development courses; therefore, it is difficult to make a comparable assessment of the cost effectiveness of the development of the TMA with other types of targeted professional development programs. When compared to the program development costs for the Teacher Reading Academy (TRA), TMA costs ranged from 4 to 18 percent higher on a per participant basis. One of the possible explanations for this higher cost was related to the travel costs for training the trainers. Rather than setting up sessions close to where a larger number of participants lived, TEA held an equal number of train the trainer sessions in Houston, Dallas and Corpus Christi. Participants from Houston were often required to attend training in Dallas or Corpus Christi when the Houston offerings reached capacity.

**Delivery Costs – Education Service Centers**

The state chose to implement the TMAs by providing the 20 ESCs funding to conduct the training. Each ESC conducted TMAs for Grade 5 and 6 teachers during the summer of 2002. TEA awarded each ESC grant funds to pay teacher stipends at \$150 dollars per day, and the TMAs were conducted over three consecutive days. Teacher stipends were only paid if the teachers attended all three days of training. An additional \$150 stipend was paid if the participant completed a project report that detailed ways in which they had integrated the teaching strategies they learned at the academies into a classroom project. Few teachers completed and returned the project report.

There were strict attendance rules throughout the academies, teachers had to be on time and in the classroom. There were no stipulations for missing time during the three days. If a teacher was not present at any time during the academy, they lost their eligibility for the stipend.

A second grant was awarded to each ESC by TEA for each academy to cover the cost of the training, including printing, consultant fees and travel expenses, postage, instructional materials, room rental, refreshments and miscellaneous expenditures directly associated with training. Most ESCs used other funding sources to cover salary expenditures. For this reason, the costs reported under the TMA do not accurately represent the actual cost of conducting the mathematics academies. In addition, few of the ESCs charged administrative and indirect costs to the academies. These costs would include business office time spent administering the grant, preparing and mailing stipend checks to all eligible participants, posting expenditures, and reporting grant activity back to TEA.

Although many of the trainings were conducted with school district staff acting as trainers, all of the administration of the academies was conducted by the ESC staff in each region. ESC staff scheduled the training, prepared the materials, and tracked participation. In calculating the per participant cost of the mathematics academies, each ESC forwarded accounting records related to the TMA grant.

Since no account standards were set other than general account coding prescribed by the state for public education, the evaluation team reviewed each cost and modified the expenditure type as needed to ensure that consistent comparisons could be performed. Stipends were considered

separately from all other expenditures. Printing costs, whether contracted out or performed in-house were grouped together. Some assumptions were made to allocate payroll and indirect costs to the TMA that were actually charged to different funding sources. Exhibit 91 provides a summary of the additional staffing assumptions for all regions. In order to estimate these additional program costs, an average salary of \$58,000 was assumed for a professional staff person and \$18,000 for a support staff person.

**Exhibit 91  
In-Kind Staffing Estimates for Teacher Mathematics Academies  
by ESC Region**

Region	Professional Staff	Support Staff
Region 9	0.25 FTE	0.25 FTE
Regions 3, 5, 6, 8, 14, 15, 18	0.50 FTE	0.50 FTE
Regions 2, 12, 16, 17	0.75 FTE	0.75 FTE
Regions 1, 7, 13	1.0 FTE	1.0 FTE
Regions 11, 19	1.5 FTE	1.5 FTE
Regions 4, 10, 20	2.0 FTE	2.0 FTE

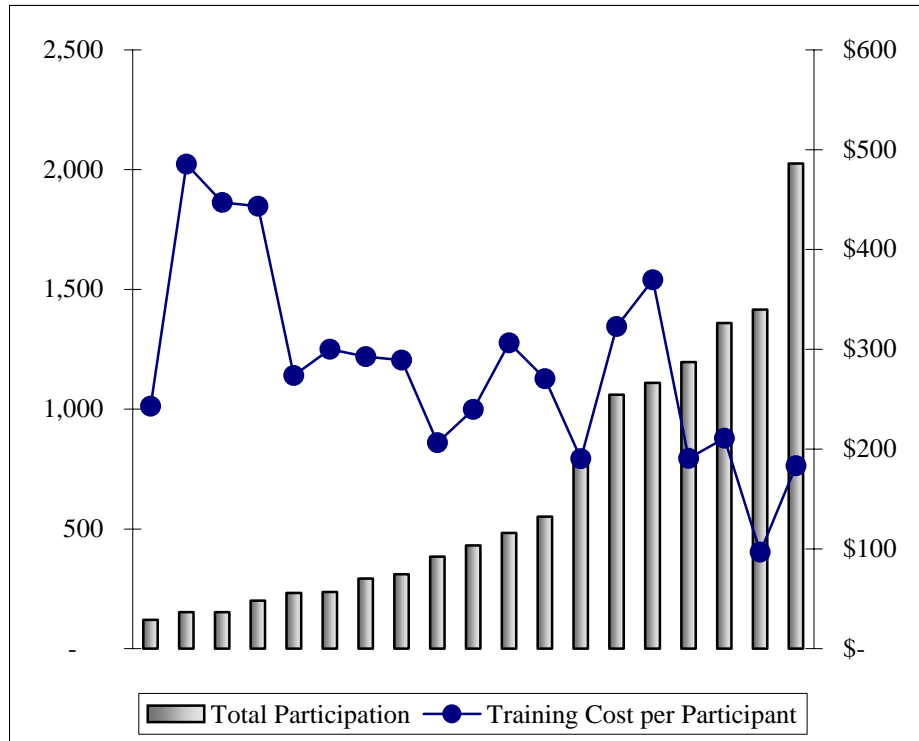
*Source: Evaluation team in coordination with Education Service Centers, Business Office and Program Staffing Estimates.*

In order to assign indirect costs, an indirect rate of 5 percent was assumed for the mathematics academies for those ESCs not applying indirect costs.

Some variances existed among certain types of ESC expenditures. Some variance was due to the number and dispersion of participants. Some ESCs held academies throughout their regions associated with their clusters and satellite offices. This tended to increase ESC travel expenses but reduced participant travel expenses. ESCs that service a wide geographic area or a large number of districts or teachers were often at a disadvantage because class size was restricted and every academy was required to use three state trainers regardless of class size. This meant that the fixed costs of some academies, such as facility rental and contracted services, were spread over a smaller participant base in those academies with a smaller number of participants.

Per participant cost dropped as participation increased in most cases. There were some outliers that can be explained by the variance in accounting codes used by ESCs and by the differences in what academy training costs ESCs passed through other funding sources. Exhibit 92 illustrates the relationship between participation and cost by ESC for each academy. The ESC participation data is sorted by the increasing number of participants, as reflected in the vertical columns.

**Exhibit 92**  
**Relationship between Participation and Cost**  
**Grades 5 & 6 Teacher Mathematics Academies**



Source: Education Service Centers, Detailed General Ledger and Participation Reports, 2001-02 through 2003-04.

Exhibit 93 presents the average total per participant cost associated with the delivery of the Grades 5 and 6 mathematics reading academies. The total training costs of the Grades 5 and 6 mathematics academies, including stipends averaged \$779 per participant. The average stipend was \$497. This was well below the cost reported in the California cost studies for targeted professional development. When the funding for TMA was discontinued, the ESCs no longer tracked mathematics training costs against the TMA grant. This precluded the analysis of Grade 7 and 8 program delivery costs.

**Exhibit 93**  
**Average Per Participant Cost of Training**  
**Teacher Mathematics Academies**

	Grades 5 & 6	Grades 7& 8
<b>Per Participant Cost</b>	\$779	N/A
<b>Less Stipend</b>	\$497	N/A
<b>Per Participant Training Cost</b>	\$282	N/A

*Source: Education Service Centers, Detailed General Ledger and Participation Reports, 2001-02 through 2003-04.*

**Alternatives to Stipends**

Participants completing the three days of on-site training were given \$450 stipends. An additional \$150 dollars was available if the teachers completed a project that showed they were implementing strategies provided in the academy in their classrooms. However, few teachers took advantage of this additional stipend. For this reason, the average stipend paid per teacher was \$497, or \$103 less than the target level.

When the TMA funding was discontinued, the ESCs had difficulty providing participants with stipends. Future academies were conducted by ESCs on a cost-recovery basis, with school districts or teachers paying for the training. Attendance at the academies was severely reduced without the stipends.

The stipend alternatives for the TRA are also applicable to the TMA. These options include lowering the stipend amount, providing some or all of the training during the school year in place of existing training, or use of additional leave days for teachers. The TMA stipend was different from the TRA in that it offered the final \$150 stipend contingent on future activities by the teacher. This was not very effective in motivating these activities as less than one-third of the teachers took advantage of it. There was no stipend provision contingency based on future student performance, but this remains an option for the mathematics academy as well as the reading academy. Each of these alternatives should be considered in the context of the overall state training strategy, recognizing fiscal constraints as well as other factors.

## Summary of TMA Evaluation

The TMA evaluation showed mixed results, and was not as strong as the TRA in instructional content or in the way the training was delivered. Teacher participation rates were also lower for the TMA trainings, yet the total cost-per-participant was lower than the reading academies.

### *Mixed Results on Student Performance*

The results of the statistical analysis shows that schools with a higher percentage of teachers who attended the TMA for Grades 6 and 7 had higher TAKS scores than schools with lower teacher TMA participation rates. However, a higher percentage of teachers who received TMA training for Grade 5 (when the Grade 5 was in an elementary school) resulted in lower TAKS scores, while TMA training appeared to have no impact on TAKS scores for Grade 5 students in middle schools. Insights as to why this occurred are presented later in this section.

### *Cost-Effective Approach*

The state invested \$12.4 million to design and deliver the TMA in the first year of its implementation. This amount includes some in-kind and indirect costs incurred by ESCs that were not charged to the grant program. The average cost to develop and deliver the TMA training for Grades 5 and 6 was \$987 per participant, including the teacher stipends. Program development costs were higher than the reading academies on a per participant basis, but the delivery cost was lower. Stipend expenditures were also lower, since \$150 of the \$600 total stipend was contingent on teacher actions after the initial training. Since some teachers did not exercise this option, the average stipend paid was less than \$500 per participant. These expenditure levels, like the reading academies, compare favorably to similar professional development programs in other states and industry benchmarks – even with the teacher stipend. Teacher stipends represented 50 percent of the total cost, with program delivery and program development comprising 30 percent and 20 percent, respectively.

Because funding for teacher stipends was discontinued during the implementation of the TMA, and since the ESCs were not required to track training delivery costs for the Grades 7 and 8 academies after the TMA grant funding was discontinued, the overall cost effectiveness of the Grades 7 and 8 TMAs could not be evaluated.

*Favorable Reviews by National Experts*

Reviews by national mathematics education experts concluded that the TMA training materials were grounded in research and demonstrated a clinical knowledge of teaching and learning mathematics, particularly in the areas of standards-based instruction, instructional content for at-risk learners, and current research on multiplicative reasoning and rational numbers. The TMA training materials contained nine of the twelve professional development standards recommended by the National State Development Council (NSDC), and in general, reflected the same strengths and weaknesses as the TRA training materials. Areas for improvement in the content of TMA materials included a more thorough use of research-based approaches for teaching at-risk learners and a stronger emphasis on more challenging mathematics.

*Mixed Feedback from On-site Observations*

The same 54 schools visited for the reading academies were also evaluated for the mathematics academies. The evaluation team interviewed teachers and observed classes, and like reading, met with teachers who did and who did not participate in academy training.

Overall, site visits and classroom observations found that teachers used TMA-promoted diagnostic tools and instructional strategies in daily practice when these tools and strategies supported what the teachers were already doing prior to TMA training. Interviews with TMA participants found that many of the TMA objectives did align with participants' previous teaching practices; however, when TMA teaching strategies differed from the previous teaching practices, there appeared to be less enthusiasm for implementation. Since many of the TMA teaching strategies were similar to those that teachers already used, the participating teachers felt that TMA training simply validated and fortified their existing teaching strategies.

Information gathered during site visits and focus groups indicated that teachers who participated in the TMA thought the delivery of the TMA training material was too rigid. Less experienced teachers stated that they benefited from the content of the TMA training materials and the TMA's focus on vertical alignment, but felt that either the content should have been limited over the three-day training period or the time allotted to training extended. Teachers with more experience viewed the academy content as repetitive.

*Survey Results Favorable, but Not as Strong as Reading*

Surveys were sent to 1,257 mathematics teachers and 2,591 administrators (same administrators surveyed for both reading and mathematics academies) to inquire about the TMA's delivery, classroom use and effectiveness. Teacher survey response rates of 25 percent were lower than reading (37 percent), but still a strong response rate.

Thirty-nine percent of teachers who participated in the TMA agreed or strongly agreed that their participation in the TMA improved their students' mathematics achievement. These results are much lower than the reading academies, but are consistent with the TMA statistical analysis.

Participants of the TMA and campus administrators who responded to the survey indicated that the overall quality of the academies was "good" or "very good." In comparison to the perceptions regarding the TRA training, the TMA participants tended to rate the overall quality of the TMA lower than TRA participants. For example, twice as many of TRA survey respondents (50 percent) rated the TRA as "above average" in comparison to only a quarter of the TMA survey respondents. In addition, a larger percentage of TMA participants (19 percent) reported knowing all of the subject matter content in comparison to only 5 percent of the TRA participants.

As with reading, most teachers rated their level of implementation of TMA teaching strategies as quite high. This was particularly true for Grade 5 and 6 teachers who, for the most part, reported using the TMA strategies often or all the time. Respondents who taught Grades 7 and 8 also reported high implementation, however the frequency of reported use of TMA strategies was slightly lower than Grade 5 and 6 teachers, specifically for the use of diagnostics data and the use of grouping strategies with their students. The large majority of survey respondents agreed or strongly agreed that the TMA strategies were easy to implement. However respondents were fairly divided on other outcomes with just half of the respondents reporting that they have shared the strategies with others in their schools or districts, that the mathematics diagnostic tools helped them to identify struggling students, and that the grouping strategies helped accelerate struggling learners. Furthermore, survey respondents provided mixed opinions about the potential teaching and student outcomes from participating in the TMA training. In contrast to the teachers who attended the TRA trainings, smaller percentages of TMA participants indicated that they perceive these outcomes as a result of the training.



The vast majority of TMA participants who responded to this survey indicated that they received a stipend for their participation. When asked the extent to which a variety of factors influenced their decisions to attend the TMA, the majority of the respondents indicated that the availability of stipends strongly influenced their decision to attend the academy. More influential however, according to survey responses, were teachers' principals, district administrators, and the content of the training. Similar to the TRA findings, the large majority of survey respondents agreed that the time of year was convenient and that enough academies were scheduled to suit their needs. Corroborating the perceptions of TRA participants and school administrators, the least influential factors were the time of year, the length of the training, and the location of the TMA trainings.

Survey respondents provided mixed opinions about the potential teaching and student outcomes from participating in the TMA training. While roughly 40 to 50 percent of survey respondents agreed that their teaching and their students' mathematics achievement have improved as a result of the academy training, another 30 and 40 percent reported no opinion on whether the training had resulted in these outcomes. In contrast to the teachers who attended the TRA trainings, smaller percentages of TMA participants indicated that they perceive these outcomes as a result of the training. Notably, 22 percent of the TMA respondents indicated that the TMAs resulted in instructional change in their district in contrast to 60 percent of the reading teachers who attended TRA trainings.

School administrators who had recommended or required their teachers to participate in the TMAs tended to be more familiar with the training, reported higher levels of teacher participation in the academies, and generally reported higher levels of teacher implementation of TMA strategies. In comparison to the reported outcomes of the TRA, administrators were less likely to agree that the TMA improved mathematics instruction and students' mathematics achievement at their schools with large percentages of administrators reporting no opinion rather than expressing agreement.

## **VI. EVALUATION OF TEXAS SCIENCE TEACHER QUALITY GRANTS**

Evaluation of the science teacher training programs is structured differently from the reading and math programs and utilizes a different set of evaluation elements:

1. A descriptive analysis of 2003-2004 student assessment data to assess the scope of the problem of students not meeting standards on the science portion of the TAKS test. This analysis will include a comparison of the scope of science-related TAKS failures to the percentages of students not meeting standards in math and English language arts.
2. Based on the number of failing students in science and the literature review of best practices, the team will provide guidance on how to best implement selected professional development models in Texas.
3. A description of the professional development model currently employed in Texas (e.g., the Type A and Type B grants awarded through a TEA/THECB collaboration).
4. A brief summary of the model for professional development in science versus the face-to-face and online academy approach employed for reading and math, including a review of existing literature supported by research for best practices in professional development in science.
5. Recommendations for an effective model of evaluating statewide professional development initiatives.

### **Student Assessment Trends in Science**

While reading and mathematics have been integral parts of the educational accountability program since its inception, science is a relative newcomer, having been added to the new state accountability system implemented in 2004. In addition, science is scheduled to be one of the components of Adequate Yearly Progress in 2006-2007. The increasing interest in science curriculum corresponds to the increasing importance that technology and related fields play in our lives and work.

Historically, student performance in science differs considerably from that in reading and mathematics. In Exhibit 94, data from the 2003 AEIS reports show that science performance is considerably below either reading or mathematics in Grade 5 at the 2003 standard (-2 SEM). Eighty percent of all Grade 5 students met the standard in reading and 86 percent met the

standard in mathematics, compared to 75 percent meeting the standard in science. In addition, the gap between the performance of all students and economically disadvantaged students, in meeting the standard is greater for science than either reading or mathematics.

Performance across Grades 3-11 at the Panel recommended standard shows similar trends, but the discrepancy between science and the other subjects is even more pronounced. The difference in the percentage of students at panel recommended standard between all students and economically disadvantaged students is greater for science (42 percent vs. 25 percent) than for either reading (73 percent v. 62 percent) or mathematics (57 percent vs. 46 percent). Performance at this level in 2005 (when Panel is scheduled to be the standard) will have severe implications for many campuses and districts.

Exhibit 94 contains information from the TEA Division of Student Assessment website. Data from AEIS were not available for the development of this report. Student assessment does not present all grades combined.

**Exhibit 94**  
**Percentage of Students Passing TAKS**  
**All Grade Levels, 2003**

TAKS Subject Area	2003 Standard (-2 SEM)		2003 at Panel	
	Grade 5		Grades 3-11	
	All Students	Eco-Dis Students	All Students	Eco-Dis Students
Reading	80.0%	71.2%	73.2%	62.0%
Mathematics	86.3%	80.3%	57.4%	45.6%
Science	74.5%	63.4%	42.4%	25.1%

*Source: 2003 Academic Excellence Indicator System Report, Texas Education Agency.*

Exhibit 95 presents 2004 testing information for Grade 5. Results for 2004 TAKS testing mirrors that of 2003, with lower passing rates for science than either reading or mathematics, and larger performance gaps for economically disadvantaged students in science than other tests. Grade 5 science performance is listed as a comparison to changes that have occurred in reading over the course of the TRAs. The same performance issues are also evident in science performance at Grades 10 and 11.

**Exhibit 95**  
**Percentage of Students Passing TAKS**  
**Grade 5, 2004**

TAKS Subject Areas	2004 Standard (-1 SEM)		2004 at Panel	
	All Students	Eco-Dis Students	All Students	Eco-Dis Students
Reading	79%	69%	73%	62%
Mathematics	82%	74%	73%	63%
Science	69%	58%	55%	41%

Source: TEA Division of Student Assessment Website, 2004.

Note: Only whole numbers are reported on this Web site.

Analyzing specific knowledge and skill areas, there is a much greater range in science than in reading and mathematics (see Exhibit 96). While there is variability in the percentage of items answered correctly in both reading and mathematics, a much larger range is seen in science. This may indicate that performance, and by extension instruction, is relatively effective across the various objectives in the subject areas other than science. This has implications for teacher training.

A similarly large range was seen in reading scores in 1999 and that gap has closed considerably in the intervening years. The lessening of the range across objectives may tend to raise overall performance more than concentrating on one particular area that might achieve very high percent mastery (or answered correctly). During the time period from 1999 until 2004, the TRAs were certainly one of the factors impacting a larger percentage of teachers in the grade levels leading up to TAKS. Clearly, having a balance of performance over all objectives is an indication of a well balanced and taught curriculum. As seen in Exhibit 96, this balance is not seen across all of the subject areas, especially for science. This same imbalance among objectives is also seen at the other grade levels where science is part of the state assessment program. This is an issue for consideration when considering the structure of science academies. For example, teacher training may need to be focused on increasing teacher content knowledge and pedagogical practices about each objective domain rather than focusing only on the objective where students scored the lowest. A similar approach has worked for reading.

**Exhibit 96**  
**Percentage of Items Correctly Answered by Objective,**  
**Grade 5, Reading, Mathematics and Science, All Students, 2004**

Reading		Mathematics		Science	
Objective	%	Objective	%	Objective	%
Basic Understanding	79%	Numbers, Operations	78%	Nature of Science	83%
Applying Knowledge	78%	Patterns	72%	Life Science	79%
Using Strategies	80%	Geometry	83%	Physical Science	74%
Critical Thinking	77%	Concepts	74%	Earth Science	60%
--		Statistics	77%	--	
--		Processes	74%	--	

Source: TEA Division of Student Assessment Website, 2004.

Note: Only whole numbers are reported on this Web site. Objective names have been abbreviated.

**Description of Current Science Professional Development Model**

The professional development model for science currently employed in Texas as represented in the two types of grants awarded through the Teacher Quality Grants Program is directed toward meeting federal requirements for using professional development to improve teaching and learning in science.<sup>34</sup> Professional development that enhances Grade 6-12 student achievement in science places a priority on increasing teachers’ knowledge and understanding of science by providing them with opportunities to improve their content knowledge and content-specific classroom practice.

The science professional development model is comprised of two components: (1) Type A is the development and statewide dissemination of comprehensive professional development modules in middle school and high school science and (2) Type B is the use of these modules for the professional development of middle school and high school science teachers. The two middle school science modules focus on the Texas Essential Knowledge and Skills (TEKS) for students in Grades 6 and 7 and another one for Grade 8 students. The science modules for high school students include Biology, Chemistry, Physics, and Integrated Physics and Chemistry (IPC).

Type A modules were developed by academically qualified university faculty that have successfully conducted effective teacher training programs in science and are comprehensive. The modules are designed to be college-level courses that reflect up-to-date scientifically-based research on teaching and learning. Academic credit or tuition waivers are offered to science

<sup>34</sup> See Math-Science Partnership Funding under Title 11, Parts A and B.

teachers who participate in the science professional development. With strong academic content, the professional development science modules also include content-specific pedagogical strategies that promote student learning and interest in science. The modules specifically address ways to help teachers identify and assist the learning of students who are from historically underrepresented groups, who have disabilities, who are from economically disadvantaged areas in the state, or who struggle in science.

The science training modules were developed for teachers, teams of teachers, and administrators from Texas schools and districts to participate in challenging, intense professional development experiences that provided lesson ideas, suggested instructional strategies with content background and rationale, resources, and techniques for the appropriate use of technology for learning science. Year-long instruction or a substantial term (90 contact hours) of sustained instruction (monthly contact) is the format for the science professional development sessions. In addition, the professional development sponsors an initial summer institute (45-60 contact hours) focused on learning and teaching of limited concepts from core science subject areas. Instructional staff has a strong background of exemplary teaching experience in science and model appropriate teaching behaviors and practices during the professional development. The professional development also makes use of follow-up sessions to sustain teacher change and makes available online electronic delivery options for the modules.

The high-quality professional development modules have also undergone rigorous evaluation through the peer-reviewed grant application process as well as required pilot testing in schools or districts during the module development phase. After the professional development grants were awarded, the evaluation requirements include developing plans that comparatively measure teachers' assessed and observed knowledge of science and instructional practices that lead to improved student achievement in science. The science professional development sessions require teachers to take pre- and post-content tests in the appropriate subject matter. Observation of the implementation of the knowledge and skills acquired during the professional development modules is also a component of evaluation. In addition, TEA reported that the State Board of Education (SBOE) evaluated and approved the content and skills of all science modules.

## Professional Development Models: Science Versus Reading and Math

Best practices in science professional development are consistent with what we know of best practices of developing teachers in other areas. Planning such professional development is guided by three questions:

1. What are all students expected to know and be able to do in science?
2. What must teachers know and do in order to ensure that students can demonstrate those standards?
3. Where are best practices in professional development that will meet both goals? (Adapted from National Staff Development Council.)

The TEKS provide clear articulations of what all students are expected to know and be able to do. The State Board for Educator Certification (SBEC) provides standards for certificates issued for EC-4 Generalist, Science 4-8, and Science 8-12, which were developed to address the second question shown above. While focused on beginning teachers, these standards provide a consensus statement on science teacher expectations in the state and thus can serve as a starting point in answering the second question. Additionally, SBEC has Master Science Teacher Standards and will begin offering this certificate in the fall of 2005.

The National Science Standards contain four standards related to professional development of science teachers:

- Professional development for teachers of science requires learning essential science content through the perspectives and methods of inquiry.
- Professional development for teachers of science requires integrating knowledge of science, learning, pedagogy, and students; it also requires applying that knowledge to science teaching.
- Professional development for teachers of science requires building understanding and ability for lifelong learning.
- Professional development programs for teachers of science must be coherent and integrated. (National Science Education Standards.)

One way to judge the effectiveness of the Type A and Type B grants is to look at the extent to which the professional development they provide are aligned with these standards. The criteria for the Teacher Quality Grants Program (pp. 2-3) and the definition of Sustained and Intensive

High Quality Professional Development (p. 4) in the RFP appear to be generally aligned with the national standards and require alignment with the TEKS as modules are developed though they lack science specificity.

In comparison with the TRA, the factor that seems to be missing is the consistent message that was especially effective in the TRA. The TRA sent the message to educators in the state that the state values this research-based methodology, and it is important that it be used by every teacher in the state. With the multiple modules created by multiple developers, it is possible that there will be inconsistencies in the message and that the training will be seen as an option and will be available only to those educators who have access to a trainer.

The National Sciences Resources Center (NSRC), a collaboration of the Smithsonian Institution and the National Academies, describes a fundamental change in the learning and teaching of science:

*Research tells us that students learn science best through an inquiry-centered process. When coupled with exemplary curriculum, the inquiry-centered process leads to better understanding and retention of content. For that reason, many educators are changing their approach from using the traditional textbook to hands-on inquiry science. This substantive change in teaching requires an equally substantive change in professional development practices.*

If the state wishes to implement such a research-based change, it will take a consistent, strong effort to reach all science educators in the state starting at Kindergarten. In addition to, or perhaps instead of, training individual teachers, the state may wish to train a trainer/lead teacher from every district or level (e.g., elementary, middle school, high school) within a district in the state. Teachers in focus groups and interviews repeatedly expressed the need for a coach to help them implement new instructional strategies that they learned in the academies. Additionally, they suggested that the training be spread out over a longer period of time rather than on consecutive days. One way to address these concerns would be to train master science teachers to provide customized training at the campus or district level and supplement the formal training with job-embedded professional development structures. In other words, teachers are not only teachers, but learners throughout their work day. Job-embedded professional development can consist of activities such as coaching, mentoring, action research, team planning, participating on curriculum development teams, observations of other teachers, structured discussions of student work, and/or book studies. Whatever the activity, it is designed to meet the needs of adult learners in that it is practical and meets their current needs.



Such a system will not work without leadership. The second standard of the National Staff Development Council's revised Standards for Staff Development states: "Staff development that improves the learning of all students requires skillful school and district leaders who guide continuous instructional improvement." Providing an overview of best practices in science teaching for principals and central office staff working with science curriculum is a critical element in the reform of science professional development and education.

### **Evaluating Statewide Professional Development Initiatives**

For whatever model(s) the state chooses to implement, it is suggested that a scientifically-based research design be used to evaluate a pilot. The design should use mixed methods and combine matched comparison and random assignment methodologies. The matched comparison portion of the evaluation should assess any impacts on pilot project teachers selected according to a set of criteria described below (treatment group) as compared to a matched cohort comparison group (control group). The evaluation should also include a study of the impact of the project on students, who will be randomly assigned to treatment and control group teachers. Thus, the project evaluation should include experimental and quasi-experimental design elements.

#### **Evaluation questions**

1. Do the treatment group teachers demonstrate more improvement in science content knowledge than those in the control group?
2. Do the treatment group teachers demonstrate more improvement in inquiry-based best practices in teaching science than those in the control group?
3. Do the students of the treatment group teachers demonstrate more science content knowledge than students of teachers in the control group?

#### **Selection of teacher treatment group and matched teacher control group**

Treatment and control group teachers will be chosen from similar campuses in the same district as treatment teachers, where possible, using the same criteria as was used to select treatment teachers.

**Selection of student treatment and control groups**

Students will be assigned to teachers in the usual method of assigning students to teachers used at the school or district.

**Teacher Data Sources**

The external evaluation team will work in collaboration with content specialists to develop three types of instruments that will provide data on teacher participation in the project:

1. Pre- and post-tests to measure teachers' science content knowledge and knowledge of research-based teaching strategies. Pre- and post-tests will include multiple-choice and constructed-response questions.
2. A standards-based observation process in which external evaluators gather data on treatment and control group teachers' actual classroom practices.
3. Teaching analysis/synthesis questions incorporated into professional development activities.

A common rubric will be developed to assess information gained from constructed response questions, the observation process, and teaching analysis/synthesis questions.

Teacher Pre- and Post-Tests. In investigating research question #1, the external evaluation team will work with the project management team to develop pre- and post-tests that treatment and control group teachers will take at the beginning and end of the project. Pre- and post-tests for each relevant grade level will consist of items assessing state science standards included in the preparation materials and released examinations available through the state's certification testing program, the Texas Examination of Educator Standards (TExES).<sup>35</sup>

Classroom practice observations. To assist in data gathering for question #2, an observation-based data gathering process will document evidence of the research-based teaching strategies, such as use of primary source documents in instruction and asking higher-order questions, which will be addressed in the project professional development. The process will involve a brief "walkthrough" observation in which the observer will record data in the framework of Erickson's Structure of Knowledge to note topics, concepts, generalizations, and patterns being taught and the methods used to teach them, including the strategies teachers use to address varied student

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<sup>35</sup> The basis for the state's science teacher certification tests are student science standards found in the TEKS.

needs and characteristics and to assess student progress and the use of primary resource materials in instruction.

Teaching analysis/synthesis activities. Analysis/synthesis activities after professional development sessions will be designed to provide additional information for questions #1 and #2. Teachers will be asked to relate new science content and research-based practices they've learned to their classroom practice. Teachers may also be asked to respond to a hypothetical situation or a reading or reflect on how their participation in the project is affecting their practice and the learning of their students.

#### *Student Data Sources*

For question #3, student results on the science TAKS will be analyzed.

A similar approach could be used for evaluation on long-term, scale-up results. A pilot of prospective models with a comprehensive evaluation is suggested to help ensure long-term efficiency and effectiveness.

### **Cost Effectiveness Analysis**

The teacher quality grants have not yet been rolled out making an analysis of cost effectiveness premature. Instead this section will discuss how these grants are budgeted and present some assessment of the evaluation team's perception of the cost effectiveness associated with professional development as it is expected to be presented under these grants.

The teacher quality grants were awarded for the following science modules:

- Middle School Science, Part I, Grades 6-7
- Middle School Science, Part II, Grade 8
- Integrated Physics and Chemistry (IPC)
- Biology
- Physics
- Chemistry

Experts from universities across the state were awarded the Type A grants to develop the training materials for each module. The delivery of the training is to be funded through approximately 30

Type B grants of \$80,000 each. Each Type B grant works to train 30 teachers, each of whom expects to work with approximately 150 students in the classroom. The training is intended for teachers in low performing districts.

The budget options include either tuition for teacher participants, or direct salary support for the higher education faculty, but typically not both. The salary support for higher education faculty members depends on how much direct instruction is being provided by that particular faculty member and varies from budget to budget. Salary support is also based on the faculty member's nine month salary from the institution, which varies across colleges and universities. The fringe benefits range from 9 percent of salary at some two year colleges and 40 percent of salary at some research universities. The indirect costs are federally prescribed as a modified 8 percent of direct costs. The calculation is based on 8 percent of total direct costs, less tuition and stipends. All costs evaluated under both grant types are based on budgeted totals.

### **Summary of Texas Science Teacher Quality Grants**

Historically, student performance in science has differed considerably from that in reading and mathematics. During 2003, 79 percent of all Grade 5 students met the TAKS passing standard in reading and 86 percent met the passing standard in mathematics, compared to only 74 percent of Grade 5 students in science. In addition, the gap between the performance of all students and economically disadvantaged students, in meeting these performance standards is greater for science than either reading or mathematics. For example, the difference in the percentage of all students and economically disadvantaged students who achieved the panel recommended standard on the 2003 Grade 5 TAKS is greater for science (39 percent vs. 25 percent) than for either reading (67 percent v. 56 percent) or mathematics (65 percent vs. 55 percent). Even larger gaps exist on both the 2003 and 2004 Grade 10 and 11 science TAKS and provide the underlying rationale for the Science Teacher Quality Grant Program.

The evaluation of the Science Teacher Quality Grants included a review of these programs against the following National Science Standards for professional development:

- Professional development for science teachers requires learning essential science content through the perspectives and methods of inquiry;

- Professional development for science teachers requires integrating knowledge of science, learning, pedagogy, and students; it also requires applying that knowledge to science teaching;
- Professional development for science teachers requires building understanding and ability for lifelong learning; and
- Professional development programs for science teachers must be coherent and integrated.

The professional development criteria for the Science Teacher Quality Grant program appear to be generally aligned with these national standards and the TEKS though they lack science specificity. However, in comparison with the TRA and TMA, the factor that seems to be missing in the Science Teacher Quality Grant program is the consistent message that was especially effective in the TRA. The TRA sent the message to educators in the state that the state values a research-based approach to professional development, and it is important that every teacher in the state use it. With the multiple professional development modules created by multiple developers under the Type A grants, it is possible that there will be inconsistencies in this message.

Regardless of the type of professional development for science teachers the state chooses to implement, the evaluation team suggests using a scientifically-based research design to evaluate the impact of these programs on a pilot basis. The design should use mixed methods, similar to the types of varied methods used in the evaluation of the TRA and TMA, to assess the impact of specialized science professional development training on the performance of students taught by pilot project teachers (treatment group) as compared to a matched cohort comparison group of students who are taught by teachers that do not receive the specialized professional development training (control group).

Unfortunately, it is too soon to derive any conclusions related to the cost effectiveness of the teacher quality science grants. The training content has only just been developed and no teachers have been trained at this time. However, that being said, in comparing the budgeted costs for the delivery of the training under the Type B grants to the academy delivery costs, it will be difficult for these grants to reach the same low ranges of per participant costs as were seen in the academies. The Type B grants are not intended to reach as broad of a participant base as the TRA and TMA. Rather, the delivery mechanism is considerably more focused under the Type B grants. From purely a cost effectiveness perspective, the Type B grants cannot provide the same “bang

for the buck” that was provided from the reading and math academies. In order to be as cost effective, the science training must be delivered to the same broad base of teachers across the state.

## VII. IMPACT ON TEACHER PARTICIPATION AND RETENTION

### Historical Context

It is self-evident that experienced teachers are more effective at helping achieve high student performance. Consequently, it is important to identify factors that contribute to teacher retention. One of the first steps in ascertaining the impact of the reading (TRA) and mathematics (TMA) training academies on teacher retention and student performance is to determine how many of the teachers who were trained still remain in the public school system. Given that skill sets developed for one grade level are not always transferable to a different grade level, another important aspect of teacher retention is the measure that, of those teachers who remain in the system, how many are assigned to the same grade level that they were teaching when they participated in the training academies.

To understand the context of teacher retention, the overall teacher retention rate in Texas public schools is presented in Exhibit 97. The exhibit presents a cohort of teachers from 1999 to 2003. As of the fall 1999 PEIMS snapshot date (October 1999), there were 271,045 teachers at all grade levels employed in the Texas public school system. By October 2000, 241,776 (about 89 percent) teachers from the cohort group identified in 1999 remained in the Texas public school system. This means that in one year's time, 11 percent of teachers were no longer teaching in Texas public schools.

**Exhibit 97**  
**Teacher Retention Rates in the Texas Public School System**  
**1999 – 2003 Cohorts**

Analysis Year	Cohort Year									
	1999		2000		2001		2002		2003	
	N	% Rem**	N	% Rem	N	% Rem	N	% Rem	N	% Rem
1999	271,045	100%	--	--	--	--	--	--	--	--
2000	241,776	89.2%	276,882	100%	--	--	--	--	--	--
2001	224,660	82.9%	247,960	89.6%	286,016	100%	--	--	--	--
2002	202,295	74.6%	228,967	82.7%	254,856	89.1%	291,709	100%	--	--
2003	196,284	72.4%	213,613	77.1%	235,383	82.3%	260,772	89.4%	293,760	100%

Source: Analysis of TEA individual teacher data derived from PEIMS, 1999-2003.

Note: Includes all teachers, all grade levels and all reasons for leaving the public school system.

\*\* Rem= remained in public school system.

Other than reporting errors, a teacher may not be counted or identified in the PEIMS database for the following reasons (among others):

- Left the public school system (e.g., to teach in private schools);
- Retired;
- Left the teaching profession (other occupation, not employed, etc.);
- Transferred out of state; or
- Death or disability.

The percent of teachers leaving the school system each year is stable over the 1999-2003 period. Of the 1999 cohort, 82.9 percent were still identified in the PEIMS system in 2001 (i.e., after two years). Of the 2000 cohort, 82.7 remained in 2002 (i.e., after two years), and 82.3 percent of the 2001 cohort were still employed in 2003 (i.e., after two years). Although the percentage of teachers who remain in the public school system varies by cohort, approximately three-quarters of teachers remain in the system after three years.<sup>36</sup> After four years, 72.4 percent of the teachers in the 1999 cohort were still working in the Texas public school system. The attrition rate is non-linear—a smaller percentage of teachers within a cohort leave the system over subsequent years. One factor that may help explain the decreasing rate of attrition is that there is a higher rate of beginning teachers leaving the system (as compared to all teachers) after the first cohort year.

Another issue that impacts the declining rate of teachers leaving is the fact that while teachers leave the public school system for a variety of reasons, they also return to the system as well (due to economic, family, or other personal factors). For example, from the 1999 cohort, about 18 percent of teachers who were not identified for at least one year in the PEIMS system from 2000-2002 were included in the system in 2003. One implication of this movement in and out of the system (and in the general decline in the number of teachers from any particular cohort who leave the system) is that when examining a particular school or district, the number or percentage of teachers who were trained may fluctuate, independent of the number of teachers who were trained in any particular year. (See also the discussion regarding the Academy Trained Density (ATD) in Appendix C.)



## Teacher Quality Measures

In addition to understanding issues regarding overall teacher retention, another important measure of training academy effectiveness is to assess the degree of teacher quality through academic preparation, experience, and tenure.

Exhibit 98 examines the percentage of teachers who obtained an advanced degree—a Masters of Art (M.A.) or a Doctorate degree (Ph.D.) Exhibit 98 indicates that there was a decline in the percentage of teachers with an advanced degree between 1999 and 2003, from 25.1 in 1999 to 22.7 in 2003. While there are many other measures of teacher quality, a teacher’s level of education is important. If the level of teacher preparation is declining, measured in part by the level of education, then the need for additional, specialized training becomes more important, especially when student performance expectations are rising. The federal *No Child Left Behind Act* (NCLB) requires significant increases in student performance and also requires “highly qualified teachers.”

**Exhibit 98**  
**Teacher and Student Information**  
**1999-2003**

Year	Teacher Characteristics			Student Characteristics
	% M.A. or Ph.D	Experience (Number of Years Teaching)	Tenure (Number of Year Teaching within the Same District)	Grade Retention Grades 1 and 2
1999	25.1%	11.8	8.0	4.10%
2000	24.8%	11.9	8.0	4.45%
2001	23.9%	11.9	7.9	4.45%
2002	23.3%	11.9	7.8	4.65%
2003	22.7%	11.8	7.7	4.70%

*Source: Texas Education Agency, Academic Excellence Indicator System reports, 1999-2003.*

The level of teacher experience, measured by the number of years employed in the teaching profession, has not changed noticeably from 1999 to 2003. However, the number of years of tenure has declined slightly. Tenure is defined as the number of years that a teacher is employed within the same district. A low average tenure might impact a district’s willingness to invest in teacher training.

<sup>36</sup> Almost three quarters (74.6 percent) of the teachers in the 1999 cohort were still in the system after three years (in 2002), and 77.1 percent of the teachers in the 2000 cohort were still in the system after three years (in 2003)

## Student Information

As a point of contrast, Exhibit 98 also presents student grade retention rates from 1999 - 2003 (i.e., the percentage of students not promoted to the next highest grade level), and indicates that student grade retention is increasing in Grades 1 and 2. The TAKS (or TAAS previously) is not administered in these grades. Because TAKS is a more difficult test, it is possible that more students are being retained to better prepare them for the Grade 3 TAKS. Students who fail TAKS in Grade 3 may be retained. In addition, student performance in Grade 3 impacts a school's accountability rating. An increased grade retention rate also may have an impact on students, as "over-age-for-grade" is identified as one of the primary predictors of a student dropping out of school.

## Teacher-Student Proportionality

The number of teachers employed in the public school system increased from 1999 to 2003 (see Exhibit 99) as did the number of students enrolled in the public school system. Exhibit 99 examines the relationship in the increase between the number of teachers and students, and suggests that this growth is not proportionate for all grade cohorts.

**Exhibit 99**  
**Teacher and Student Counts: Elementary, Middle and High School**  
**1999 to 2003**

Group	Grade Level	1999	2003	N Change	% Change
Teachers	Elementary	135,405	147,934	12,529	9.3%
	Middle School	56,802	60,127	3,325	5.9%
	High School	78,838	85,699	6,861	8.6%
Students	Elementary	1,964,282	2,100,933	136,651	7.0%
	Middle School	903,927	964,611	60,684	6.7%
	High School	1,077,158	1,172,367	95,209	8.8%

Source: Analysis of individual teacher PEIMS data, 1999, 2003 AEIS reports.

Note: Elementary is defined as grades K-5, middle school-6-8 and high school 9-12.

Exhibit 99 indicates that for high school students, there was an 8.8 percentage increase in the number of students enrolled between 1999 and 2003. Proportionately, the number of new high school teachers grew by 8.6 percentage points. This proportionate growth, however, is not observed in middle school and at the elementary school level. While the number of middle school teachers increased by 5.9 percent, student enrollment increased by 6.7 percent. The most disparate change is observed in elementary school. While the percentage of elementary grade teachers increased by 9.3 percent, student enrollment increased by 7 percent. This greater increase

in the number of teachers in the elementary grades may, in part, be due to class size and teacher/student ratios required in the early elementary grades that are not required in middle or high school classes. The impact of the reading and mathematics training academies may also be a factor in the higher percentage increase in teachers as well. As will be covered later in this section, TRA and TMA-trained teachers are more likely to remain in the profession. Given that the academies primarily address elementary teachers, and that there is a general teacher shortage across all grade levels, the increase in percentages of elementary teachers is partially attributable to “less loss” (in teachers leaving the public education system).

This imbalance has an impact on teacher training programs. It is reasonable to expect that with a disproportionate increase in elementary school teachers, and with a decline in the overall percentage of teachers with advanced degrees, training targeted to the elementary level is critical.

**Access to Training Academies**

Key study questions included an assessment of the availability of TRAs and TMAs, as well as an assessment of overall teacher participation. To that end, issues surrounding geographic area, district size, and individual teacher characteristics were examined. For reporting purposes, the 20 ESCs were clustered into four geographic areas, Central, Valley, East, and North/Midwest. The Valley cluster includes ESCs 1, 2, 3, 19 and 20; the East cluster includes ESCs 4, 5, 6, 7, and 8; the Central cluster includes ESCs 9, 10, 11, 12, and 13; and the North/Midwest cluster includes ESCs 14, 15, 16, 17, and 18. Exhibit 100 presents selected teacher and student characteristics by cluster.

**Exhibit 100  
Education Service Center Cluster  
Selected Teacher and Student Characteristics  
2003**

ESC Cluster	Teacher Characteristics			Student Characteristics		
	Teacher Experience	Teacher Tenure	% Advanced Degrees	% Economic Disadvantaged	% African American	% Hispanic
Valley	12.5	8.9	22.3%	66.2%	4.9%	72.0%
East	12.4	8.1	23.1%	48.8%	22.2%	18.7%
Central	11.6	7.3	20.3%	43.0%	15.2%	26.5%
North/Midwest	13.1	8.9	17.2%	53.7%	5.9%	43.4%

*Source: Texas Education Agency Academic Excellence Indicator System reports, 2003, simple averages across ESC regions.*

Exhibit 101 presents the geographic distribution of teachers who were trained, by academy type.<sup>37</sup> The data in Exhibit 101 indicate that there are few differences among clusters (with one exception in the East cluster), especially if the percent reported for elementary in the Central Cluster, 28.9 percent, is adjusted for the inability to accurately match by teacher name. A smaller percentage of teachers were trained in elementary and middle school mathematics in the East Cluster than in the other clusters. The information in this exhibit was calculated based on teachers receiving training in the respective subject, and grade span at any time during 1999-2003.

**Exhibit 101**  
**Percentage of Teachers Trained through the TRAs and TMAs**  
**by Education Service Center Cluster**  
**2003**

Subject/Grade Span	Valley	East	Central	North/mid-west
% Elementary, Reading	38.1%	36.5%	28.9%	39.2%
% Elementary, Mathematics	7.3%	3.8%	6.0%	7.7%
% Middle Mathematics	7.4%	4.3%	5.5%	5.8%

Source: Texas Education Agency, Analysis of PEIMS; ESCs provided teacher participation information.

Another way to examine the distribution of training is to examine participation by district size. The analysis in Exhibit 102 includes only teachers who participated in the Grade 3 TRA in 2003. Since reporting difficulties from the 1999 and 2000 data were most evident in three ESCs with large districts, a specific subject (e.g., reading, mathematics) and year (2003) were selected because social security numbers were available to provide the best comparison. Districts in the state were divided into roughly four equal quartiles based on number of students reported in the 2003 AEIS reports (approximately 1,000,000 students in each quartile). The number of districts in each quartile is also noted in Exhibit 102.

**Exhibit 102**  
**Percentage of Grade 3 TRA-Trained Teachers by District Size**  
**2003**

District Size Quartile	Number of Districts	% Academy Trained Teachers
Q1 (smallest in size)	1,058	69.4%
Q2	114	62.0%
Q3	35	65.9%
Q4 (largest in size)	17	50.5%

Source: Texas Education Agency, Academic Excellence Indicator System reports, 2003; analysis of PEIMS and ESC-provided teacher participation data.

<sup>37</sup> Three ESCs (one in the East cluster and two in the Central cluster) were not able to provide social security numbers for teachers in 1999 and 2000. Because of this, there is a percentage of teachers who were trained that could not be matched to the PEIMS database. This will impact the percentages reported, especially for 1999 and 2000 (elementary) reading.

Almost 20 percent more teachers were trained in Quartile 1 than in Quartile 4. This difference cannot be explained by the percentage of teachers that were not included because social security numbers could not be matched to the PEIMS database. Interview data indicate that the largest districts tend to conduct their own training, and thus, would have a smaller percentage of teachers attend the ESC-sponsored TRAs and TMAs.

### Teacher Participation in Training Academies

Exhibit 103 contains the number of teachers trained in each grade level and subject area. These numbers are based only on teachers that could be merged to the PEIMS data set. The teacher counts for 1999 and 2000 are likely lower than the actual number of teachers trained – see Appendix C for a discussion of ESC-supplied data and estimates of actual number of teachers receiving training. It should be noted that ESC attendance logs report that 18,760 Kindergarten teachers and 20,164 Grade 1 teachers were trained between 1998-99 and 2002-03.

**Exhibit 103**  
**Number of Teachers Attending Reading Academies<sup>1</sup>**  
**1999 - 2003**

Grade Level	Teachers Trained					TOTAL
	1999 <sup>2</sup>	2000 <sup>2</sup>	2001	2002	2003	
Kindergarten	6,613	1,788	296	114	114	8,925
1		14,432	3,047	2,770	276	20,525
2			13,631	3,851	1,650	19,132
3				14,616	2,658	17,274
Totals	6,613	16,220	16,974	21,351	4,698	65,856 <sup>3</sup>

Source: Analysis of PEIMS and ESC reported participation data, non-duplicated count within year/grade span.

Notes: <sup>1</sup>As matched in the Public Information Management System (PEIMS) database.

<sup>2</sup> Likely undercount in these years.

<sup>3</sup> Duplicated count based on teachers attending more than one reading academy.

Once stipends were no longer available in 2003, the number of teachers participating in TRAs significantly declined. As detailed in Appendix C, the teacher count for 1999 is probably about 97 percent higher (approximately 13,000 instead of 6,613) than Exhibit 103 indicates, given that only teacher names were available from three large ESCs. The number of teachers in 2000 is also estimated to be somewhat higher than reported in the exhibit (about 20,000).

Data were requested separately for 2004 from all ESCs. Given that training would still be occurring during the development of this report, the reported numbers are somewhat incomplete. However, there is little reason to expect that the number will increase significantly as most

information was reported in October 2004.<sup>38</sup> Based solely on the number reported (no attempt was made to match to PEIMS given the timing of the data request), 3,664 teachers participated in TRAs for Grades K-3. Note that with matching to PEIMS as a part of the data refinement process used for earlier data, the number might be 10 to 15 percent lower (see Appendix C). An additional 1,856 teachers were reported to have participated in Grade 4 TRAs. In any case, the numbers for Grades K-3 represent a further decline in participants.

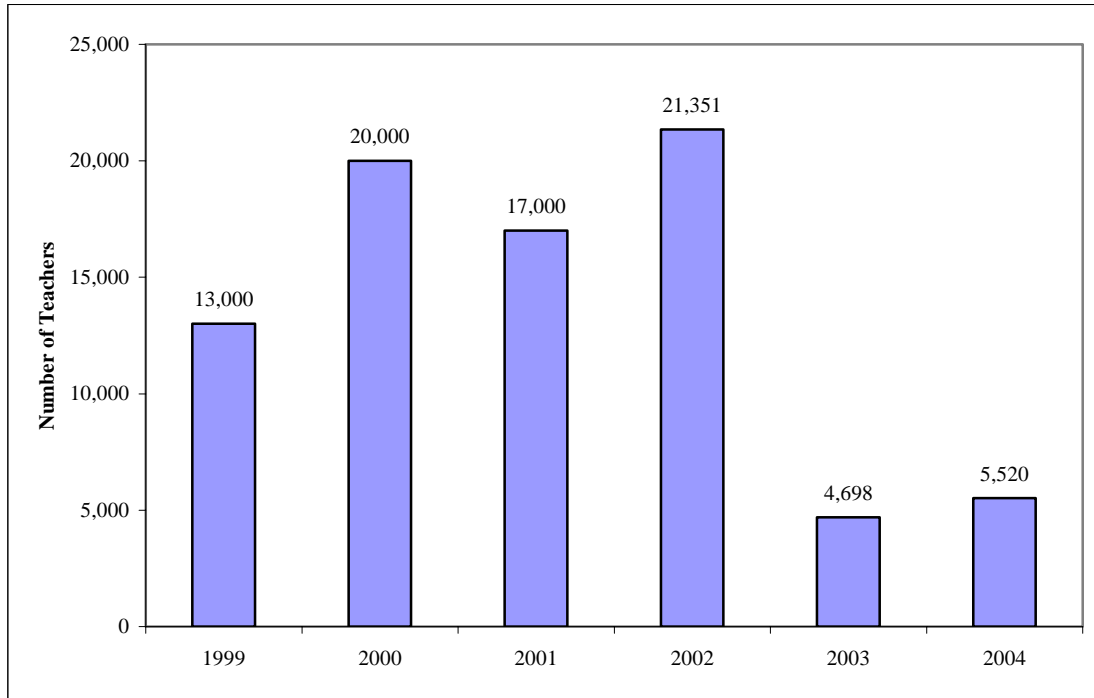
Exhibit 104 contains the number of teacher trainings reported in reading from 1999 - 2004. The numbers for 1999 and 2000 have been adjusted to account for likely underreporting. While it is clear that the number declined, more importantly, the number of teachers trained decreased faster than the likely needed replacement rate. For example, there were about 16,000 Kindergarten teachers in 2003. ESCs reported about 833 Kindergarten participants in 2004. This represents about 5 percent of all Kindergarten teachers. As previously discussed, in the first year after a cohort of teachers is established, about 10 percent are no longer working in the Texas public education system. Thus the training rate is about half of what is needed to maintain a constant academy-trained presence.<sup>39</sup>

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<sup>38</sup> Information was provided from all ESCs except Region 13.

<sup>39</sup> It should be noted that the 2004 data have not been subjected to attempts to refine the data as only numbers, not teacher identifications, were reported. In one case, about 30 percent of all Kindergarten teachers trained (n=242) were reported from one middle-sized ESC. This number and percentage does not correspond with earlier reported information.

**Exhibit 104**  
**Number of Teachers Trained at TRAs**  
**1999 – 2004**



Source: TRA Attendance Records, 1999-2004, Educational Service Centers.

**Relationship Between Teacher Participation and Student Performance**

It is reasonable to assume that the lower the performance on TAAS in 1999, the more likely that teachers would participate in academy training. This hypothesis was examined using 1999 TAAS reading performance at Grade 3 as compared to the Academy Trained Density (ATD) in reading. Findings from a regression analysis indicate that the opposite is true. Higher performance on TAAS was positively related to ATD. While statistically significant, the actual statistical relationship is weak. Low performance should be an impetus for teacher participation in training. Administrative decisions play an important part in determining teacher participation.

## Teacher Retention for Reading Academies

Exhibit 105 contains data that directly compares teachers trained through the TRAs to teachers who were not trained at the academies (non-trained teachers).<sup>40</sup> Regardless of the year or grade level, for every classification, teachers who attended a training academy are generally more likely to remain in the public school system.

**Exhibit 105**  
**Teachers Who Remain in the Public School System by Grade Level**  
**1999 - 2004**

Year and Grade Level	ESC Trained Status	School Year 2003-04 Percentages Remaining		
		Teachers Still identified in PEIMS	Teacher Assigned to Same Grade Level	Teacher still Assigned to Elementary
1999 Grade K	Trained	81.9%	56.6%	79.9%
	Non-trained	75.1%	48.2%	72.8%
2000 Grade 1	Trained	82.6%	52.0%	80.7%
	Non-trained	71.9%	35.3%	69.7%
2001 Grade 2	Trained	86.1%	55.4%	84.4%
	Non-trained	82.0%	30.0%	78.1%
2002 Grade 3	Trained	91.8%	70.7%	90.0%
	Non-trained	87.1%	55.2%	85.3%

Source: Analysis of PEIMS and ESC reported teacher participation data.

The percentage of teachers left in the public school system declines with each successive year. For trained teachers, 81.9 percent of Kindergarten teachers from the 1999 cohort are still in the system in 2003-04, compared to 91.8 percent of the 2002 Grade 3 cohort. Trained teachers remain in the public education system longer (i.e., there are a higher percentage remaining in PEIMS database) compared to non-trained teachers. In addition, a higher percentage remain in elementary schools and remain at the same grade level. While a direct, causal relationship cannot be established, there are clear, consistent differences between trained and non-trained retention rates, which strongly suggest that quality teacher training is associated with higher teacher retention rates.

When comparing Kindergarten teachers from 1999, both trained and not, that were in the PEIMS system in 2003-04, 86.8 percent were still employed in the same district (but not necessarily the same grade or school) versus 83.8 percent of teachers who were non-trained. While this difference is not large, it does support the idea that attending a training academy reduces the

<sup>40</sup> Teachers included in this analysis could have received training in any year after the target year. That is, although Kindergarten was the target grade level in 1999, other Kindergarten teachers were trained in later years. Obviously, there are different numbers of intervening years based on the targeted grade level between training and 2003-04.



potential for trained teachers to leave the district. In other words, the “investment” of training is not lost.

More teachers trained in a Kindergarten TRA remain in the public school system. While approximately the same percentages of teachers remain in the system by ethnic group for trained teachers, this is not true for the non-trained group. African American teachers who did not participate in TRA training are less likely to remain in the system than white or Hispanic teachers—about one-third no longer teach in the public school system. (See Exhibit 106.)

**Exhibit 106**  
**Percent of Kindergarten Teachers Trained in 1999**  
**Still Teaching in the Texas Public Education System in 2004, by Ethnic Group**

Group	Teachers Trained			Teachers Non-trained		
	African American	Hispanic	White	African American	Hispanic	White
% identified in PEIMS	84.1	83.4	81.2	67.5	79.2	74.2

Source: Analysis of PEIMS and ESC reported teacher participation data.

As shown in Exhibit 107, the average level of experience and tenure within the district is just slightly lower for teachers who did not participate in the teaching academies. Likewise, there is relatively little difference in the percentage of teachers with a B.A. or higher degrees. About 46 percent of all African American teachers in Kindergarten received training as compared to 42 percent of White teachers. However, slightly less than 32 percent of Hispanic teachers were trained in this same year. Remember that these percentages are understated due to the difficulty in matching ESC to PEIMS data already noted.

**Exhibit 107**  
**Characteristics of Kindergarten Teachers, 1999**

Status	Experience	Tenure	Afr-Am	Hisp	White	B.A.	MA/Ph.D	No Degree
Trained	11.9	9.1	45.8%	31.8%	42.0%	78.1%	21.9%	0.0%
Non-trained	11.3	8.4	54.2%	68.2%	58.0%	78.3%	21.2%	0.5%

Source: Analysis of PEIMS and ESC reported teacher participation data.

Exhibit 108 presents information regarding Grade 3 teachers in 2002-03, three years after the first year of training. As previously described, over this time period the average number of years of teacher experience has declined. However, the relationship between trained and non-trained is about the same. A major difference is evident in that the relative proportion of teachers across the ethnic groups who have been trained has shifted with a higher percentage of teachers trained than not.

**Exhibit 108**  
**Characteristics of Grade 3 Teachers, 2002-03**

Status	Experience	Tenure	Afr-Am	Hisp	White	B.A.	MA or Ph.D	No Degree
Trained	11.0	7.8	61.1%	71.2%	71.1%	85.0%	14.4%	0.6%
Non-trained	9.9	6.6	38.9%	28.8%	28.9%	84.0%	15.1%	1.0%

Source: Analysis of PEIMS and ESC reported teacher participation data.

Given that the entire population of teachers is included in the analyses, formal statistical analyses will almost always be “statistically significant.” However, two analyses were included that considered only two factors, either trained or not, and a flag whether or not the teacher was still working in the Texas public education system. This analysis indicates that there is a significant difference between teachers who attended a training academy and those who did not, with academy-trained teachers more likely to remain in the public school system.

A different analysis used a linear regression analysis with all of the variables included in Exhibit 108 entered into the equation to predict the number of teachers who remain in the public education system. The analysis used Kindergarten teachers to provide the longest intervening time period. As seen in Exhibit 109, there were only two significant predictors.

**Exhibit 109**  
**Teacher Retention, Kindergarten Teachers**  
**1999 to 2003**

Independent Variable	Remaining in Public Education			
	Beta	T	p-value	B Weight
Trained, Yes or No	.0814	9.69	0.00000	.0682
Ethnic	-0.0114	-1.35	0.17635	-0.0074
Degree	-0.0340	-3.76	0.00017	-0.0335
Tenure (within district)	0.0047	0.31	0.75819	0.0003
Experience (overall)	-0.0005	-0.03	0.97276	-0.0000

Source: Multiple Linear Regression, Statistica, StatSoft Pairwise deletion of cases (teachers) with missing data.

- 1) Teachers who received training through the academies were more likely to remain in the Texas public school system than non-trained teachers; and
- 2) An advanced degree was negatively associated with remaining in the system. As coded, this meant that having an advanced degree means that there is a slightly smaller chance of remaining. This seems plausible, as teachers with advanced degrees may be more likely to seek higher paying positions outside the teaching profession.

An additional analysis examined the average number of years of teaching experience when they attended training at the various grade levels and subject areas (see Exhibit 110). The average years of experience for teachers when a particular grade level/subject area is first offered is similar except for mathematics in 2003. One pattern is clear, the average years of experience for teachers attending academies rapidly declines over time. This may be indicative of large percentages of teachers attending academies when they are first offered, then moving to more inexperienced teachers (newer to the system) in subsequent years. It may also be indicative of teachers with a greater need for help attending the training academies. Both teacher need and experience are reasonably related.

**Exhibit 110**  
**Years of Teaching Experience by TRA or TMA Training Year**  
**1999 - 2003**

Training	Year of Training				
	1999	2000	2001	2002	2003
Reading Grade K	11.9	8.4	6.3	5.4	6.6
Reading Grade 1		11.2	7.0	6.5	6.9
Reading Grade 2			11.7	8.2	6.8
Reading Grade 3				11.0	7.8
Math Grades 5 & 6				11.3	9.1
Math Grades 7 & 8					9.8

*Source: Analysis of PEIMS and ESC reported teacher participation data.*

### **Teacher Retention Related to Mathematics Academies**

With only one year of stipend-supported training for Grades 5 and 6 and only one additional year of system-wide information, the amount of information that can be examined for TMA teacher retention is limited. However, there were sufficient data to establish a very preliminary trend (see Exhibit 111). Also note that this is based on a sample of teachers, not all teachers attending TMAs.

**Exhibit 111**  
**Teachers Attending TMAs for Grades 5 and 6**

	Still in PEIMS	Either Grade 5 or 6	Elementary
Trained	92.9%	71.3%	95.1%
Non-trained	88.6%	63.9%	91.8%

*Source: TEA PEIMS Files and ESC reported data.*

Based only on teachers who had a grade level included in PEIMS, of the 10,393 teachers with a grade level assignment in either Grade 5 or 6 in 2002, about 45 percent (n=4,698) attended TMA training. This compares to about 40 percent trained through TRAs. This 40 percent is based on teachers who could be matched to PEIMS with both a grade level and a matching SSN. The actual percentage trained is estimated to be between 45 and 50 percent. The total number of teachers (2002 and 2003) as reported by ESCs and matched solely on PEIMS identification numbers was 11,479 for Grade 5 mathematics. Training provided in 2002 was also the last year that teacher stipends were available. The patterns are similar in that more trained teachers remain in the system, stay at the same grade level and remain in elementary schools. An attempt was not made to match teachers only in middle schools because there was a small number and the uncertainty associated with particular grades being classified in either elementary or middle. In addition, many districts are in the process of restructuring grade levels, particularly at Grade 5 and 6 into other grade level spans (elementary or middle). Limited information is available for Grade 7 and 8 TMAs, begun in 2003. Retention rates for these teachers will not be available until February 2005. In addition, there were 2,165 teachers reported as attending the Grade 7 mathematics academies.

Information compiled from 19 ESCs indicates that the number of teachers trained in either the Grade 5, 6, 7, or 8 TMAs in 2004 was 1,002. This represents a substantial decline from 2003.

### **Summary of Impact on Teacher Retention**

Even with difficulties in matching teachers to PEIMS from TRAs in 1999 and 2000, the overall patterns and statistical analyses indicate a very strong relationship between attending a reading academy and remaining in the teaching profession. This is also true for remaining in the same grade level, same grade span (e.g., elementary), and even in the same district. The impact of the academies is noticeably stronger for African American teachers as measured by teacher retention. The impact on retention for the mathematics cannot be measured with any validity given the very brief amount of time that these academies were in place. Clearly, there was a significant decline in both the reading and mathematics academies after stipends were no longer available.

## VIII. CONCLUSIONS AND RECOMMENDATIONS

This study addresses several important research questions, but all relate to the overriding issues of whether or not the professional development programs for Texas teachers were effective in terms of improving student achievement and efficient in their use of state funds.

### Major Conclusions

The Teacher Reading Academy (TRA) was shown to be effective in each of the five evaluation components. Based on statistical analysis, expert reviews, on-site observations and survey results, the TRAs were consistently effective. The more teachers that were trained at schools, the more positive the impact on reading test scores. On-site observations provided support that the instructional tools were easy to implement and widely used by teachers. Surveys showed overwhelmingly favorable responses to the TRA by both teachers and school administrators. National experts on reading and professional development also commended the program for its instructional content and training methodology, and offered suggestions to make a good program better. The TRA was cost-effective, as the total cost-per-participant was significantly lower than national benchmarks. There was also a positive statistical relationship between teacher participation in TRAs and lower teacher turnover, particularly for African American teachers. Reducing teacher turnover alone could have significant cost-saving implications for the state.

The Teacher Mathematics Academy (TMA) showed mixed results in each evaluation component, with the exception of cost-effectiveness. The statistical analysis showed a positive relationship between TMA teacher training and higher test scores in some instances, but showed the opposite in others. Most teachers and administrators ranked the quality of the program high, but less than 40 percent of teachers acknowledged that it improved student performance. On-site observations indicated that there was limited evidence of the use of many instructional strategies taught in the academies, such as differentiating instruction for groups of students, and that most were more appropriate for newer teachers than experienced teachers. National experts on mathematics and professional development gave the program high marks, but suggested substantive changes to the content of the mathematics training. Like the TRA, the TMA was shown to be highly cost-effective.

The Science Teacher Quality Grants Program is in its second year of implementation, and first year of actual teacher training – making a judgment of the effectiveness and efficiency of the program premature. This program was structured differently from the TRA and TMA, in terms of targeted teachers and

students, and the training delivery model. This study contains recommendations to improve the effectiveness and efficiency of this program based on an analysis of the program elements currently in place.

### State Policy Issues

There are several statewide policy issues that surfaced during this evaluation. These issues will need to be addressed by the TEA, the Texas Legislature, and other decision-makers in the Texas public education system. An overview of these issues is provided below:

- **State training vs. district level training** – The TRA is proof that statewide training initiatives can work and be cost-effective. Of all training provided to Texas teachers, what percentage should be statewide versus locally-defined initiatives? Since there are statewide standards for learning, it would logically follow that there should be statewide programs for teacher training in line with those standards. However, school districts have traditionally made the decisions related to (and paid for) teacher professional development. The state may wish to communicate its intended balance of state vs. district level training, and take steps to achieve the desired balance.
- **Teacher training only vs. administrator and teacher training** – The TRA and TMA were developed to directly impact those closest to the students, and reached a large number of teachers. Principals and other district administrators, such as curriculum staff, were not the targets of this training. The lack of knowledge of school administrators sometimes resulted in problems when teachers returned to their classrooms to use new techniques that their administrators did not understand or in some cases, support. If the state is going to invest in statewide training, it would make sense to provide some degree of training to principals and perhaps other instructional leaders to ensure that there is consistent support for the instructional tools and techniques.
- **Length of training program commitment** – One year of consistent implementation is probably not long enough to determine the effectiveness of a program. How long should statewide training programs be implemented to determine effectiveness? The short time period was likely a contributing factor for the mixed reviews of the TMA. If the state cannot support the consistent implementation of a multi-year program, then it will be increasingly difficult to evaluate the effectiveness of that program. Statewide initiatives, like district initiatives, should be given a chance to succeed.

- **Face-to-face vs. online training** – While the OTRA received positive feedback, teachers expressed a stronger desire for face-to-face training and collaboration. What percentage of teacher training should be face-to-face versus online? Should online training be used more for follow-up and program support? And how can the effectiveness and cost-efficiency of online training be separately measured? As Texas teachers are becoming more familiar and comfortable with technology, online opportunities will continue to expand. The state should carefully plan its transition to online learning to ensure that it is equally as effective as face-to-face in supporting higher student achievement.
- **Summer training vs. in-service training during the school year** – One question for state policy makers is whether statewide training should supplement or replace district level training. This decision has major cost implications, as the TRA was clearly a supplemental program offered during the summer at no cost to school districts. Teachers and national experts agreed that more training needs to occur closer to the moment of instruction. The TRA or TMA could be provided during the school year as a supplemental, after-hours training program, or offered in place of other training programs. The state should carefully evaluate the displacement of district-based training against the additional cost of providing a supplemental training program.
- **Teacher compensation for attending training (stipends vs. no stipends)** – Since teachers attended TRA and TMA training during the summer, beyond their contract days of service, the stipend essentially paid them for their time. The stipend significantly influenced teacher participation, as participation rates dropped precipitously after stipends were eliminated. Should stipends be paid? And if so, how much should they be? The efficiency of the statewide training model allowed teacher stipends to be paid without exceeding national benchmarks for cost-effectiveness training programs – benchmarks that did not include stipends. If training is to be offered outside teacher contract periods, some form of compensation should be made, or attendance will not likely be sufficient to achieve the intended statewide goals of the training program.
- **Statewide training model** – Should the state implement any future statewide training through a similar delivery model? The existing training network offered through ESCs minimized travel expenses by providing multiple training sessions closer to the teachers. Generally, it was found that it is less expensive to bring the training to the teachers than to send teachers to the training.

The cost of providing professional development at the district level is not easily determined within the existing account code structure of state financial reporting. However, it is unlikely that Texas school districts could have implemented the TRA or TMA training on their own at a lower cost.

- **Program accountability** – The existing account code structure for Texas school districts does not support an adequate collection or analysis of training costs, at the district level or statewide. The statewide training initiatives were easier to track since the program was implemented through separately identifiable grants, but there were still cost reporting issues noted in this study. Further, the number of teachers trained had to be manually reconstructed from ESC records and matched to the PEIMS database. Online participants were not tracked at all. How can the state hold TEA and school districts more accountable for teacher training programs with the existing data limitations? The state should evaluate improvements to reporting standards by considering specific recommendations presented later in this chapter.
- **Future considerations** – In addition to considering other recommendations in this report, the state should determine what costs would be incurred if the TRA or TMA were reinstated. Since the development costs were incurred for five grade levels in reading and for the combined Grades 5 and 6, and Grades 7 and 8 in mathematics, only costs to update the programs will need to be incurred unless additional grades are added. This could reduce future program development costs by 50 percent or more, further lowering any future state investment.

## Recommendations

While each of the programs evaluated was shown to have strengths, there are opportunities to improve them if reinstated, continued or expanded to include additional grade levels. The following recommendations can improve instructional content, delivery methods, program support, and cost efficiency.

1. **Ensure that Texas teachers have access to high quality professional development opportunities structured to foster broad participation in training activities.**

While the state must balance many fiscal demands and each school district or charter school must have the opportunity to select the instructional approaches most suited to their needs, the findings from this



study indicate a positive association between attending a reading academy and higher student performance (i.e., on TAKS test and Grade 3 retention results). If the state decides to make additional investments in statewide professional development, efforts should be made to maximize teacher participation. This can be accomplished through the following:

- Require administrator and/or principal training sessions: These would be designed to provide awareness of the teacher training academy content, strategies to encourage teacher participation, and strategies to support implementation of key academy concepts at the campus level. Survey results indicated that more teachers attended from campuses in which the principal and/or other administrators were familiar with the academy purpose and content. Teachers were more likely to participate in academies when there was administrative support and encouragement for attendance. Expert reviewers noted that without administrator or principal support, teachers will be less likely to implement the strategies they learn in the academy. This is a strong indication that district support, especially at the building level with principals and other administrators, improves the impact of the academies by encouraging and supporting teacher's use of academy strategies in their classrooms. Knowledge of strategies highlighted in training by school administrators allows for follow-up after the training as well as support and resources for the practices themselves. Specific school administrator training related to the TRAs and TMAs was not originally part of the implementation of the academies. Consideration should be given to policies that assist in administrator understanding, identification with and support of future statewide professional development efforts.
- Provide incentives or compensation for teacher participation outside of their contract period: The academies were conducted primarily outside the teacher contract period and, as a result, the availability of stipends was clearly important to teacher participation. There was a significant reduction in teacher participation when stipends could no longer be funded. Overwhelmingly, teachers and school administrators perceived the availability of stipends to be one of the best ways to encourage participation in the TRA and TMA. Teachers indicated that the amount of the stipend might not have been as important as the fact that they were offered. Stipends accounted for approximately half of the total cost of the academies and must be given strong consideration as to what role they should play in future academies. It is important that some compensation be provided to teachers to support teacher attendance. Perhaps a lower daily stipend could be considered in future academies. To provide more funding, the state could designate teacher stipends as an allowable expense from the Accelerated Reading Instruction/Accelerated

Mathematics Instruction (ARI/AMI) funds or from other state and federal funds that carry the same objectives related to improved student performance of a particular subject content. Other forms of compensation (e.g., release time) might also be considered to support teacher attendance.

- Consider a more expansive training network to deliver science training: Given the focused delivery mechanisms of the Type B science grants, it will be difficult for these grants to reach the broad base of participants with the same consistent message as did the TRA and TMA. Consideration should be given to finding ways to extend the reach of these training sessions so they can be delivered to a broader base of teachers across the state.
- Require attendance by teachers at low performing schools: Consideration should be given to requiring academy attendance by staff at campuses that have not demonstrated success in student performance, do not meet the annual yearly progress requirements set out in No Child Left Behind, or are rated academically unacceptable by the state. If the area which caused the problem for the campus has a corresponding academy available (e.g., reading in Grade 3), the potential for positive student results to be obtained by additional numbers of teachers attending the training is great.

## **2. Improve the quality and effectiveness of the academies.**

Participants rated the reading and mathematics academies differently. Overall, the reading academies were perceived by teachers and school administrators to be more valuable than the mathematics academies. One of the key differences between the two academies is related to the level of perceived state support each academy received and the level of trainer preparedness. The TRAs used trainers who were given time to learn academy strategies and materials. While some of this material was redundant to teachers, having it packaged together reinforced and expanded their existing understanding. Many teachers reported that they believed that participation in the TRA training was mandated, which was not the case, but the perception greatly enhanced participation. Because many of the teachers were sent to the TRAs from their districts in groups and continued training through Grade 3, many teachers from the same campus attended together. This group attendance provided informal support to participants once they returned to their campuses.

Teachers attending the mathematics academies found them to be less useful and were less likely to implement the recommended strategies. Many TMA participants felt that content was repetitive, especially the experienced teachers. Teachers also indicated that the delivery of the content impeded its quality. Teachers did not perceive that the same level of local and state support existed for the TMA training as it had with the reading academies, which resulted in lower attendance. Those who did attend often attended as isolates due to the departmental nature of middle schools and because earlier grade level academies were not available for mathematics teachers.

Expert reviewers of the TRA and TMA noted that a three or four day academy model is limited in its potential impact. Without planned follow-up and support, research suggests that the state can expect little in the way of improved teacher practice and shared learning. Both TRA and TMA participants reported that the academies covered too much material in too short a time period, with no follow-up support provided to help them implement what they learned in the classroom.

If the academies are reinstated, continued, or expanded to include additional grade levels, the following quality improvements should be made.

- Revise the instructional content of the mathematics academy to be more research-based: One of the study outcomes suggests that the Grade 5 and 6 TMA content may need revision. The impact on student achievement outcomes in mathematics was not as consistently positive as it was for reading. In some cases, participation in these academies was apparently counter-productive. This was, however, limited only to Grade 5 mathematics when located in an elementary school – not so in a middle school. Expert reviews indicated that there is an over-emphasis of general pedagogical topics and an under-emphasis of challenging mathematics. In some cases the TMA materials' presentation of the content was weak, unclear, and/or confusing. Although the trainings do a solid job linking content with pedagogical content knowledge, the immersion in mathematics content was described to be weak and may not be sufficiently challenging to more advanced teachers. Teachers who participated in the TMA were less likely to perceive that their participation in the academy resulted in improved teaching practices and student achievement than participants in the TRA. Teachers suggested that the content should be separated into different sessions for new and more experienced teachers. A teacher's prior content knowledge and training is also a factor in mathematics in particular and at the middle school level in general. Prior to reinstating this academy, additional research into the probable causes of these concerns should be done to identify appropriate revisions.

- Provide awareness training to administrators to increase use of training tools and obtain buy-in by school leadership before implementation: Professional development systems will not be as effective as they could be without the support of school and district leaders. According to the expert reviewers, the TRA and TMA lack alignment with the National Staff Development Council's (NSDC's) revised Standards for Staff Development on leadership, which states that "staff development that improves the learning of all students requires skillful school and district leaders who guide continuous instructional improvement" (National Staff Development Council, <http://www.nsd.org/standards/leadership.cfm>). Providing an overview of best practices in reading, mathematics, and science teaching for principals and central office staff working with curriculum is a critical element in the reform of instructional practice. Providing the administrator leadership sessions previously recommended will address the campus support issue, as well as create a natural context for continued follow-up learning.
- Expand the time period over which the academies occur to be closer to the in-school use of teaching strategies: This will provide teachers time to implement and practice what they have learned and share their experiences with academy colleagues. For example, the three days could occur in one- or two-day training sessions over the course of the school year. Expert reviewers and teachers felt that wider implementation of the strategies would occur if they had an opportunity to try them with their students and then receive feedback. Varying the session length would also allow for differentiated instruction for teachers, either in terms of teacher experience or teacher content knowledge. For example, beginning teachers might attend a "Day One" session that might be included in an induction program, but which is optional for experienced teachers. Additionally, expanding the session length could allow for optional and/or additional academy content on differentiation of instruction based on the needs of students.
- Provide follow-up training and support for academy participants to ensure successful implementation of teaching strategies: Expert reviewers noted that without planned follow-up and support, improved teacher practice and student achievement is less likely. Such follow-up could be large group, small group, or individual. Other strategies might include encouraging campus teams to attend academies together and providing online "e-mentoring." Experienced teachers requested updates on new information. For beginning teachers or those changing grade levels, local trainers could serve as coaches to increase the extent to which strategies are implemented. Additionally, providing designated staff at the district central office or the local

education service center (ESC) for telephone or face-to-face consultation offers another mechanism for support. Finally, the state's Master Mathematics Teachers and Master Reading Teachers could receive an overview of the trainings for how to support their implementation. These master teachers could provide customized training at the campus or district level and supplement the formal training with job-embedded professional development structures. Job-embedded professional development consist of activities such as coaching, mentoring, action research, team planning, participating on curriculum development teams, observations of other teachers, structured discussions of student work, and/or book studies. Whatever the activity, it is designed to meet the needs of adult learners in that it is practical and addresses their current issues and questions.

### **3. Improve cost-effectiveness of academies.**

Overall, from a cost-effectiveness perspective the TRA and TMA initiatives were successful. The cost of the training was well within expected levels and far below the cost of specialized training conducted in other states. It is difficult to compare the cost of the TRA to other programs since little if any cost analysis has been conducted on other professional development programs. However, in terms of cost per participant, both the development and the delivery of the training were relatively low. Improvements in student academic performance and the increase in teacher retention rates suggest that the dollars spent for this teacher training initiative were worth the investment. This was certainly the case with the reading academies. The TMAs, although developed and delivered at a relatively low cost, did not consistently produce the same positive student achievement as those for reading. Because the TMAs were implemented for a much shorter period of time, cost information is not as stable.

Very little research has been done to attempt to correlate student achievement results with teacher training costs. Ultimately, an increase in the academic performance of students is the critical metric in assessing the success of a professional development program for teachers. Although a causal relationship to student performance to cost may not be possible, some benchmark standards may be set as to the kind of student achievement increases that should be observed given specific degrees of investment.

In order to more effectively direct, evaluate, and track the cost-effectiveness of future academies, it is recommended that the state:

- Develop a standardized cost reporting framework within the existing state accounting code structure to provide more meaningful, consistent, and complete program cost information for face-to-face and online training: Because there has been such limited research conducted to evaluate the cost-effectiveness of professional development, it is virtually impossible to tie investment to outcome. With the assistance of the education service centers, TEA should conduct a cost analysis to identify evaluation elements that should be tracked to evaluate the cost-effectiveness of professional development. As the state continues to be a major player in educational reform, this study could become a national model to provide financial accountability for different levels of professional development. As the state undertakes additional educational initiatives, a formal costing model would allow the state to more effectively allocate funding to programs that have the most positive impact on student performance and ensure that every dollar spent is effective.

In developing the cost framework for professional development programs, TEA should identify what cost elements to include in the analysis. All associated program costs, regardless of the funding source should be collected to derive accurate cost estimates. Any duplicate costs should be highlighted and coordinated efforts should be developed to ensure that all dollars, from all funding sources, are being spent effectively. Included in the cost reporting framework should be the following elements:

- *Establish detailed budgets for professional development grants;*
  - *Develop an account coding system that will track costs by program; and*
  - *Ensure that grant funds between initiatives can be differentiated throughout the life of the grant.*
- Clearly articulate allowable costs under the grant programs: There were some inconsistencies between ESCs as to what costs they charged against the TRA or TMA grants. Some ESCs charged back indirect costs to the grant. Many of the costs associated with the academies were charged to other funding sources, making a determination of which ESC delivered the academy training at the lowest cost impossible. Costs from each ESC were reconstructed to derive a reasonable per participant cost that could be representative of the actual costs of the TRAs and TMAs.

If the state had clearly established what types of charges were allowable when the funding was first provided, it would have made the process easier for the ESCs to track their costs similarly. If the state hopes to develop a costing model, allowable costs must be clearly defined. Specifically, the state should consider the following:

- *Allow indirect costs to be charged against the grant, subject to a cap; and*
  - *Provide salary funding for the administration of future grants to ensure that all program costs are captured;*
- Base the number of trainers on projected academy enrollment to reduce overall cost: The TRA and TMA training protocols specified that three trainers be used to conduct the training sessions. Each trainer was paid a daily fee to provide the training. Three trainers were required regardless of the number of participants. Many ESCs serve regions that are spread out over a fairly large geographic area. These ESCs have established satellites to provide the school districts and charter schools they serve with more efficient traveling options. In some of these smaller satellites, ESCs may not have served the maximum number of teachers, but still had to maintain the same number of trainers per session held. In these situations, the cost-effectiveness of the professional development program was adversely impacted. In discussions with ESC program staff, it is possible that the training could have been conducted with two trainers. This would substantially reduce the cost of training by reducing the largest expenditure line item—consultant fees. The academy developers should review the need for three trainers and provide guidelines as to when the number of trainers can be reduced without impacting the quality of the training.
  - Schedule training based on geographic needs: The decision to serve the same number of trainer-of-trainer (TOT) participants at each training site contributed to escalating the cost of the mathematics academies. A significant percentage of teachers come from the large regions and should have attended training in their area. TEA should establish criteria that would allow for a more centralized training site to accommodate the largest number of participants, where appropriate.
  - Maximize the number of participants reached through training: As the state identifies future professional development initiatives and expands both the grade levels and includes additional subjects (e.g., science), it should work to ensure that the training is provided to enough teachers to maximize the impact on students. One shortcoming that was found when reviewing the current

model for science training, from a cost-effectiveness perspective, is that the delivery model does not reach a wide group of teachers. These grants do not have the broad reach that was an integral part of both the reading and mathematics academies. The cost-effectiveness of the initiative drops exponentially if there are an insufficient number of participants over which the costs can be spread. The state should review the delivery system used in both the reading and mathematics academies and the science teacher quality grants and select items from each that will have the most profound impact on the objectives, increased student performance and teacher retention, to create an optimal delivery system to apply to future professional development academies.

**4. Build into each teacher training program an evaluation component to monitor and modify the effectiveness and efficiency of teacher training activities.**

Statewide initiatives can be a very important approach to increasing performance in the Texas public education system, whether for teachers, students, or at a school level. Statewide initiatives, because of their scope, tend to be resource intensive, including funding and staff time. The state must be able to determine if the commitment of these resources had the desired impact and to understand the exact level of resources that were required to achieve measured results. As each initiative is implemented, it must be monitored and revised to incorporate lessons learned, from student performance, teacher retention, and cost-effectiveness perspectives, into future initiatives.

In order to continue efforts to enhance the state investment in professional development, it is recommended that the state:

- Establish evaluation goals, objectives, and methodologies as integral parts of statewide professional development initiatives, regardless of topic or timelines. Specifically, the planned evaluation of the training provided by the Science Teacher Quality Grants, administered in collaboration with the Texas Higher Education Coordinating Board, should incorporate evaluation approaches as outlined below in Exhibit 112.

For many projects, the time necessary to accomplish a thorough evaluation can be divided into three periods.



**Exhibit 112**  
**Phases of Program Evaluation**

Phase	Tasks	Staffing	Percent of Time
Project Initiation	During this phase, the evaluation goals and objectives are adopted, evaluation method finalized, data collection methods set, and resources to conduct the evaluation determined.	Oversight/management & evaluation team	15%
Project Implementation	Data collections, on-site visits, mid-course assessments, interim reports	Evaluation team, on-site staff	35%
Project Summation	Data analyzed, preliminary findings discussed, and final report generated	Evaluation team	50%

*Source: TEA Evaluation Team, Evaluation of Student Success Initiative-Teacher Training Academies, 2004.*

There are no hard and fast rules that dictate the exact actions or percentages of time that should be dedicated to the various stages of a program evaluation; however the information provided in the table above provides a reasonable approximation of what should occur in an effective program evaluation project. It is highly recommended that any statewide (or other) intervention include the components noted above. While the evaluation component in many projects reaches 15 percent of the total, this percentage will vary depending on the size of the project. Generally, expenditures for evaluation that fall below 5 percent of the total will likely not yield comprehensive information.

It is important that a variety of approaches be utilized to conduct evaluations of statewide initiatives. For example, depending on the program, approaches may include the following criteria:

- Data collected from all projects at the school /program level;
- Data collected at the student /teacher level for a sample of schools;
- On-site program reviews for implementation and classroom observations;

- Administrator, staff, teacher, student, and parent surveys;
- Staff interviews;
- Review of best practices compared to program implementation;
- Focus groups; and
- Financial analysis.

The use of multiple data sources and evaluation approaches, both quantitative and qualitative, will set the stage for the most complete evaluation. Analysis of only outcomes without consideration of implementation issues and perceptions may yield an evaluation lacking depth and critical information.

- Establish a consistent data tracking mechanism for participants in all future academy programs, including online programs and for participants in the Science Teacher Quality Grant program. Because there was no mechanism to track teacher data to student data, the impact of the OTRA could not be evaluated. While some of the teachers trained using the online academies participated in the survey aspect of this study, data about teacher identity, including district and campus of assignment, were not collected in the online environment, making it impossible to observe implementation of strategies or to ascertain the student performance impact of the academies. In light of the concerns of the expert reviewers that the OTRA provided few opportunities to interact and collaborate with instructors or peers and that authentic application, synthesis and evaluation of important ideas and techniques was a weakness of the OTRA, assumptions about the impact of these academies cannot be made. Given the potential for the online academies to be extremely cost-effective, determining whether these academies have the same positive impact on student outcomes as the face-to-face trainings is essential.

## Appendix A: Glossary

Academic Excellence Indicator System (AEIS). A system for analyzing and presenting data that summarizes student performance, financial information, and staffing for each campus, district, ESC, and overall state. These data are combined into reports available on the TEA web site. Selected information contained within AEIS are used to compute campus and district accountability ratings and AYP.

Academy Objectives. Each academy developed content and strategies following specific objectives. The objectives for both reading and mathematics are included in the appendix.

Academy Trained Density (ATD). As used in the calculations for measuring the impact of training received through the ESC academies, this is a measure of the amount of training present at any time during the time period under consideration for this study 1999-2003 for student performance purposes.

Accountability ratings. Each campus and district are yearly rated using AEIS data. A series of nominal ratings ranging from Low-performing to Exemplary are used to describe the level of performance.

Adequate Yearly Progress (AYP). One of the requirements of the No Child Left Behind act is that schools must show progress from year to year on state assessments for each of several student groups. Failure to meet AYP can mean sanctions from the state. One hundred percent of all students are to be proficient in reading, mathematics, and science by 2013.

B Weights. This value, when combined with values of the independent variable, is used to predict outcomes. The exact B weight is highly dependent on the analysis model selected. Generally, the higher the number of independent variables, the lower the B weight for any one particular independent variable. This is not a measure of statistical significance.

Best practices. Instruction (and other) approaches that have been documented as leading to superior performance. Generally, these practices have been validated in a variety of settings, with different student groups, over several years, and by different entities.

Beta. A measure of statistical relationship between independent and dependent variables usually associated with regression analysis.

Correlation. The degree of numeric relationship among variables. For example, as values of one variable increase, values of another variable increase in a proportionate manner results in a positive correlation. A relationship that is exact, with no variability, results in a correlation of 1.00. If there is no relationship, the correlation is zero.

Degrees of freedom. A technical term that generally refers to the number of units in the analysis

Dependent variable. A variable, often an outcome such as percent passing TAKS, whose value depends on values of variables that have influence over the variable. For example, the amount of instructional time can directly impact student performance.

Direct Observation. The purpose of direct observation is to collect evidence related to the topic of interest. In this work, it involved using a structured protocol to guide data collection as well as observer's interpretation of events.

Economic disadvantaged. Used to describe students who are eligible for various services including additional instruction, meals, and other supplemental services. To be classified as economically disadvantaged a student's family income must be below certain levels. In practice, students eligible for free or reduced price lunch or breakfast or Pell grants are considered to be economically disadvantaged.

Education Service Centers. There are 20 regional Education Service Centers (ESC) distributed across Texas. These centers are quasi-state agencies that receive funding from the state, federal sources, and, under contract, from local school districts. ESCs provide a variety of services including training, instructional support, technology, and media materials.

Educationally significant. As opposed to statistically significant, an educational significant finding is one that, logically, has a meaningful impact on students or teachers. Typically, statistical significance is required, but not sufficient for a finding to be educationally significant. The degree to which a finding is educationally significant is subject to interpretation.

Focus Group. A small group brought together to engage in a guided discussion to provide relevant information to an outside entity regarding a practice, program or product. Participants are selected on the basis of relevance to the topic and are not typically chosen through rigorous probability sampling methods. The purpose of the interview is to allow people time to reflect and recall experiences as well as amend any initial accounts that upon hearing others' responses may have led to other ideas.

Independent variable. A variable, often instruction or student demographics, that has a direct impact on outcomes (dependent variable)

Multiple R. This is a measure of relationship among variables in a regression analysis. The higher the multiple R, the higher the degree of overall correlation of the variables in the model.

Met standard. A student who has met the performance expectation (for example 70 percent of items correct), has met the standard.

Model. also analysis model. A model is composed of independent and dependent variables used to perform statistical analysis. Selection of the model is critical in that the model must be as simple as is possible while not biasing results.

P value. The probability (P) value is a measure of how sure (statistically speaking) that a relationship is not due to chance. A P value of .05 means that a relationship is expected to be due to chance, or random, no more than one time out of 20. A P value of .001 means that a relationship would only occur 1 time out of 1,000 by chance.

Panel. In the case of TAKS, generally the number (or percent) of items to be answered correctly in order to demonstrate proficiency on the selected test. The number and percentage varies by grade level and subject matter.

Passing standard. Also "passing" used in conjunction with TAKS. A passing standard refers to the level of performance required at the student level to meet the performance expectation. The passing standard for TAKS is set by the State Board of Education.

Pedagogy. The art of teaching; the knowledge of how to communicate information to students separate from knowledge of the content area.

Public Education Information Management System (PEIMS). A data collection system used by districts to provide information to the Texas Education Agency covering student, staff and financial data. The term PEIMS is also used to describe the enterprise database at TEA that also includes student performance information.

Regression Analysis. Also multiple linear regression analysis. A statistical technique used to determine the relationship among multiple independent variables when predicting a dependent variable.

Standard Error of Measurement. Generally the amount of uncertainty of measurement around a particular score. In the case of TAKS, for 2003, a standard 2 SEM below the Panel recommendation, with a standard of 1 SEM in 2004, was selected by the SBOE as a phased-in passing standard in order to transition into TAKS.

Statistically significant. Based on probability theory, statistically significant refers to the degree of certainty that a finding has not occurred by chance. Typically, if a finding has a less than one chance out of twenty of being a random occurrence, it is deemed statistically significant.

Structured Interview. The purpose of a structured interview is to elicit responses to preformed questions about a topic or situation. In this case, protocols guided each interview.

Student retention. This is a measure of the number and percentage of students who remain at the same grade level for more than one year. A student who was in Grade 3 in 2002 and again in 2003 has been retained.

T values. Values derived from a statistical test “T” that determine whether a finding is statistically significant.

Teacher retention. This is a measure of the number and percentage of teachers who remain in the profession over one-year or longer periods of time.

Texas Assessment of Academic Skills (TAAS). The state assessment given to all students in grades 3-8 and 10 used as part of the Accountability Ratings. Subjects included reading, mathematics, writing, science, and social studies. This assessment was last given in 2002.

Texas Assessment of Knowledge and Skills (TAKS). The replacement for TAAS, TAKS is based on more recent curriculum requirements. Results from TAKS are used to calculate Accountability Ratings and AYP. Grade levels include 3-11 with reading, mathematics, writing, English language arts, science and social students tested.

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## Appendix C: Supporting Materials to Study Methodology

The supporting materials are provided readers to further understand the methodological and statistical issues used in this study. The following sections are included:

- Description of an ideal approach to the study and limitations encountered during this course of the study.
- A description of the study databases and issues with accuracy
- A discussion of TAAS, TAKS, and Retention in the context of outcome variables used in the study
- A brief discussion of the use of regression analysis
- A description of the analysis model used

### Ideal Study Design

Under ideal conditions, the most appropriate way to measure the impact of the reading and mathematics academies on student performance would be to establish a true experimental design. For example, on one set of schools, every teacher would be trained through the academies at the grade levels of interest. On another set of schools, the teachers would not receive training, either through the academies or other types of training. This helps eliminate the impact of sharing of information from trained to non-trained teachers. In addition, within each set of schools, there are student demographics, teacher experience, prior test performance, etc. that can be matched to schools in the non-trained set. In the ideal design, all teachers included in the study would remain on the particular schools for the five-year time period of the study.

Another type of approach for this study is to use a linear model that actually links students to teachers. An example would have the following information (at a minimum) for each student:

- Gender
- Age
- Ethnicity / student group
- Economic Disadvantaged status
- Kindergarten with a teacher who was trained Y/N
- Grade 1 with a teacher who was trained Y/N
- Grade 2 with a teacher who was trained Y/N

- Grade 3 with a teacher who was trained Y/N
- Teacher demographics – years of experience and degree (B.A, M.A., etc.)
- Primary reading proficiency data
- Grade 3 TAKS
- Grade 4 TAKS

This information (along with other type of information) would be used to determine if a relationship exists between teacher training and TAKS performance in Grade 4. Unfortunately, this linkage between teacher and student information is not available to the evaluation team. It is possible that some school districts could reconstruct this information. However, the amount of time and resources required by districts would be considerable.

The environment in which to conduct this study differed considerably from the approaches described above. The study team obtained as much data as could be reasonably expected during the time constraints associated with the study. Efforts were made to ensure the accuracy of the data by using various methods to remove duplicated or incorrect information. Lacking linkages between individual teachers and students, teacher training participation and student performance could only be analyzed at the school level. Generally, analysis at this higher level tends to diminish the likelihood that significant relationships will be found.

### **Study Databases: Construction and Validity**

Many of the questions of this study involve data analyses of teacher retention and the impact of training on student performance. To conduct these analyses, four separate databases were established leading to a unified study database:

- Public Education Information Management System (PEIMS) data for teachers
- Academic Excellence Indicator System (AEIS) and TEA Division of Student Assessment student performance data,
- AEIS campus and district demographics,
- ESC participation data.

Two more databases were provided by the University of Texas regarding on-line and CD-ROM training delivery. These two were restricted in their utility because there was limited information regarding which

teachers participated and the extent to which training actually occurred. For example, even if the recipients of CD-ROMs were known, it is not known if the program and lessons were ever used.

Confidentiality. Two of the primary databases noted above contain confidential teacher information, Social Security Numbers (SSNs). To preserve confidentiality, only one of the evaluation team members has access to these data. In some cases, team members acted as delivery agents, however, they did not keep any record of the information. External data transcribers were used in some cases when data were available in a paper format. Each transcriber signed a letter of confidentiality. At the termination of the project, all information regarding SSNs will be destroyed or returned to TEA. The evaluation team will not maintain any confidential records past the end of the project.

PEIMS teacher database. A data request was sent to the PEIMS ad hoc Reporting Division immediately after the project award. This request was for teacher information from the 1998-99 through 2003-2004 school years. The following data elements were requested.

- Teacher SSN
- Teacher Name (last and first)
- Campus Number (in each year)
- Grade Level (when available)
- Highest Degree
- Experience (total)
- Tenure (within current district)
- Ethnicity
- Gender

This information was provided to the evaluation team in five separate data sets containing information on 271,045 teachers (PEIMS Service ID=28 or 29, teachers and master teachers) from 1999 and 293,760 teachers in 2003. These data sets were merged into one master set using SSNs. Grade level is only available through Grade 6 for most, but not all elementary teachers. Confounds exist for other teachers in that a teacher may have coaching responsibility, teach a science course, and one mathematics course. School number codes (e.g., specific campus numbers 040-099 are generally middle or junior high schools) were used to partition teachers into grade levels for some analyses. AEIS designations for campuses (Elementary, Middle, High, and “Both” – or multiple grade span) were also used whenever

possible. The total teacher database covering 1999-2003 consists of 395,047 teachers covering all grade levels and teachers trained or not trained.

AEIS and TEA Division of Student Assessment student performance data. Some study questions relate teacher training to student performance. Linking training (of any type) to student performance in a causal fashion is a challenge, yet information was accumulated that allowed the issue to be examined. TEA publishes Academic Excellence Indicator System (AEIS) reports each fall. These reports contain information on each school, district, ESC, and the state. The AIES report includes information on student performance as measured by the state assessment. For 1999 through 2002, the assessment program was the Texas Assessment of Academic Skills (TAAS). After adoption of the Texas Essential Knowledge and Skills (TEKS) in 1997, a new assessment, the Texas Assessment of Knowledge and Skills (TAKS) was first administered in spring 2003. While additional subject areas and grade levels were included in the TAKS, the impact on this study was not appreciable. However, there were differences in the difficulty level and standards used to assess student success. These will be covered in the section specifically examining student performance.

AEIS campus and district demographic information. As part of the interpretation of the student performance and teacher participation, it was anticipated that certain campus and district characteristics might prove significant in the analyses. Some of these variables are district size, tax rate, wealth, student demographics, and ESC region. These data were obtained from the TEA AEIS reports already noted. As of the 2003 AEIS reports, there were 7,733 campuses and 1,224 districts. District size (6 students in one district versus 211,762 in Houston) is a complicating factor in any analysis and is discussed in this report.

ESC participation data. Obtaining complete, accurate teacher participation data was difficult. To aid in this effort, a study contact person was named by each ESC executive director. Given the sensitive nature of the data (e.g., teacher SSNs), some direct communication between TEA staff and the executive directors was required to facilitate the data delivery. It was difficult for some ESCs to obtain data dating back to 1999. Some data, like participation in teacher training academies were available through one department, while SSNs, used to pay stipends, in some ESCs, were available in a completely separate unit, or even by an external contractor. Data were provided in a variety of formats including electronic data files, paper copies, and word-processing documents. The evaluation team used a variety of techniques to obtain useful electronic data sets. When the ESCs were able to provide teacher SSNs, direct linkages to the main database was established. However, three large ESCs were only able to provide teacher names for the years 1999 and 2000.

The percentage of teacher matches based on the SSNs provided by the ESCs resulted in an approximate 98 percent match when matched with the master PEIMS database. It was anticipated that a much lower than 100 percent match would occur due to errors from at least three sources:

- Incorrect SSNs submitted by ESCs (teachers submitted incorrect SSNs, transcription errors, random errors).
- Incorrect SSNs submitted to TEA from districts into the PEIMS database, random errors.
- Incorrectly transcribed SSNs from paper copies to electronic files.

These mismatches likely result in an under-identification error. That is, some teachers who actually participated in academies were not identified as such. Thus, the impact of the academies will be conservatively estimated.

A problem also arises when matching databases by teacher name. At least the following problems are possible.

- The teacher changes name (marriage, divorce, other).
- There are multiple spellings for the same name (e.g., Jane, Janey, Janie).
- There is more than one teacher with the same first and last name.

The first two of these possibilities results in under-identification, while the last one has the potential to over-identify. To minimize these possibilities, the evaluation team matched on teacher first and last name, and also used the district number (when available) or, if not, the ESC number. In addition, the grade level included in PEIMS (when available) was also used to match to the grade level of the training. Based on estimates derived from the merger programs, the percentage of under-identifications based on name alone is about 40 percent, while the over-identification is in the range of about 2 percent.

Several efforts were made to ensure that the databases provided by ESCs were as valid as possible (removing duplicates and teachers not completing the training, etc.). The final number of individual teachers who were matched to PEIMS and who received any academy training in any year or subject area was 73,850. The actual number of *training events* submitted by ESCs was over 90,000. A training event is defined as “count of every time a teacher participated in an academy training.” This list, however, includes teachers who did not complete the training – not all ESCs had a completion indicator. In other

cases, the same teacher was listed multiple times for the same academy grade level and subject area in the same year. In addition, some teachers attended academies and were reported by different ESCs. The largest source of error (as defined by non-matching) occurred because for some ESCs, teacher names were used to match teacher to the PEIMS data base. When SSNs were used, there was a match rate of about 98 percent when comparing SSNs to PEIMS; using teacher names only yielded a 60 percent rate when matching names from 1999.

One important consideration is the percentage error rate compared to the size of the unit of analysis. For example if 1,000 teachers are misidentified out of 100,000, this results in a one percent error. In an analysis at the school level, however, a misidentification of only one teacher out of ten results in a 10 percent error. Many schools may not even employ ten teachers in grades one through three.

### Percent of Trained Teachers at Campus and Districts

Academy Trained Density. We have adopted this term in order to describe the amount of teacher training that may have impacted the student cohort. The percentage of teachers trained on a campus is quite dynamic. Not only are teachers continuing to be trained, but some who have been trained leave while others come to the campus. There may be different percentages of trained teachers at different grade levels as well. In addition, the smaller the campus or district, the more sensitive the percentage is to one teacher changing status. To better understand the rationale for construction of *Academy Trained Density* (ATD), three scenarios for the percentage of teachers trained on a campus as of 2004 are presented in Exhibit C1. Each campus is assumed to have two teachers at each grade level.

**Exhibit C1**  
**Number of Trained Teachers at Three Example Campuses in 2004**

Grade Level Trained N	Number Trained at Each Grade Level		
	Campus A	Campus B	Campus C
K	1	1	1
1	1	1	1
2	1	1	1
3	1	1	1

In 2004, at Campus A, there is one teacher in each grade level who was trained in an Academy. With two teachers at each grade level, this equates to 50 percent of teachers in these grade levels trained. However, each trained teacher might have been trained at a different grade level in a prior year and has now moved to the current campus. A density rating of .5 is used for Campus A. At Campus B, there were also four



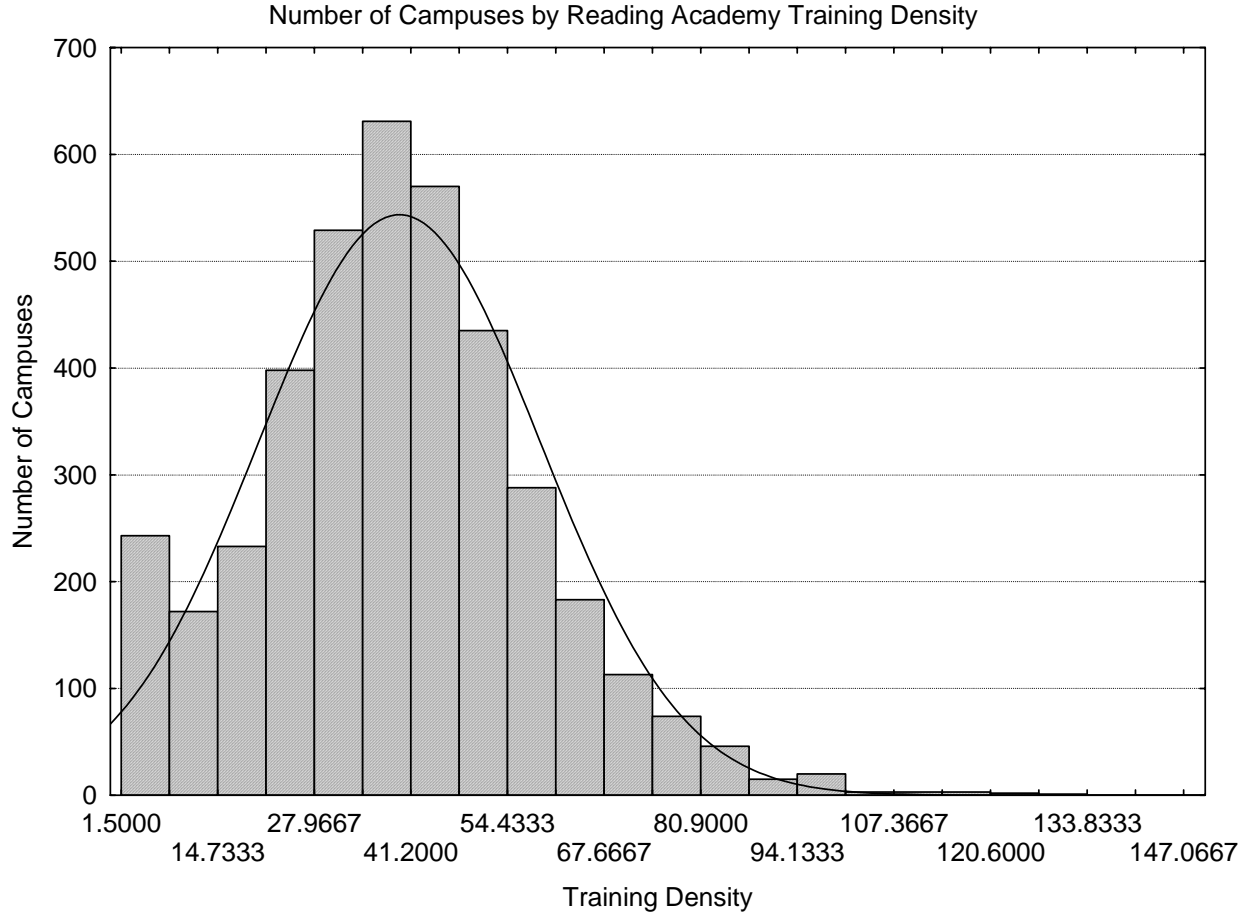
teachers who had been trained, but each has now departed leaving no trained teachers at this campus. However, for the cohort of students being measured, a trained teacher was there at each grade level. In other words, the Kindergarten class had a trained teacher, when they moved to Grade 1, there was also a Grade 1 trained teacher, etc. The ATD will still be computed at 50 percent. This campus also receives a density rating of .5.

Campus C appears to be just like Campuses A and B, but there is only one teacher who received training, it just happened to be at each grade level. This teacher moved with the cohort of students from Kindergarten through Grade 3. Is this a better situation than found on Campus A? There is no definitive answer to this question, but an ATD of .5 will be computed for this cohort of students. Using counts remaining in 2004 may totally disregard the potential impact of training based on earlier years. It must be noted that the density of training is not limited to 100 percent. It is very possible to have all teachers trained with some trained at more than one grade level plus trained teachers who did serve on the campus who are now gone. The ATD could, of course, be different every year.

There is no one best way to measure the amount of trained teachers, and the subsequent impact of training on any particular campus, or district. This approach is clearly a compromise that was adopted given the constraints of the study timeline. To fully investigate the relationship between training and student performance, a direct student to teacher link would be needed – this was not available for this study. One other note is that the training density is calculated using all teachers on a campus in the denominator, not just those in the targeted grade levels because teachers do change grade levels and the grade level assignment is not always available for a teacher.

Exhibit C2 contains the distribution of the Academy Trained Densities (ATD) across the schools involved in the study. Fortunately, this distribution is normal and within the ranges expected by the study team. This means that examining student performance while considering this variable is reasonable. The next discussion regarding TAKS at various performance standards also impacts this issue.

**Exhibit C2**

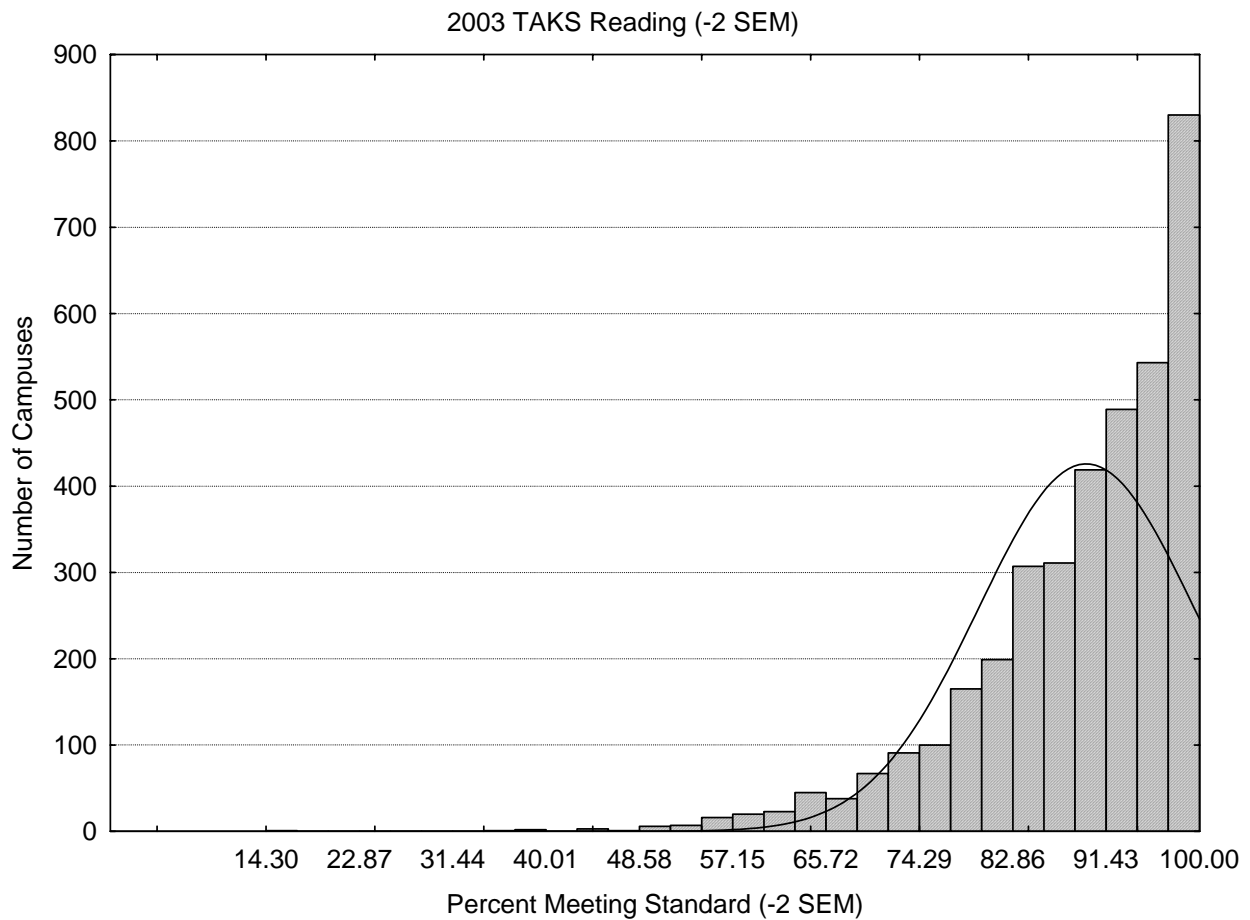


**Discussion of TAAS and TAKS**

While a lengthy discussion of the characteristics of these two assessments is outside the scope of this study, it is generally accepted that there are major differences. For teachers participating in training at the beginning of the SSI Academies (1999), the Texas Assessment of Academic Skills (TAAS) was administered. In 2003, the Texas Assessment of Knowledge and Skills (TAKS) was administered for the first time. For TAKS, students must pass the Grade 3 test to be promoted to the next grade level. This new requirement has consequences for this study. The training provided by the academies builds from one grade level to the next. The training begins with Kindergarten teachers trained by the Kindergarten academies, followed the next year by training provided to Grade 1 teacher, followed, in turn, by Grade 2 teachers trained the following year. Using this approach, Kindergarten teachers trained in 1999 would teach student in Kindergarten in 2000 who would take the Grade 3 TAKS in 2003. This group of students was subject to the promotion requirements of the new test.

It is generally accepted that TAKS is a more difficult test than TAAS. However, the State Board of Education set passing standards that provided a phase in period to arrive at the recommended passing standard in 2005. This final recommended level is referred as “at the panel recommendation” or simply, Panel. For 2003, the passing standard was set at 2 standard errors of measurement (SEM) below Panel and in 2004, at 1 SEM below Panel. It is anticipated that the Panel standard will be used for spring 2005 tests. For simplicity, we will also use the term *passing* to mean “met the applicable standard.” With this phase in, one of the issues surrounding TAKS (like TAAS before) is the score distribution. The distribution of campus percentage passing TAKS, grade 3, -2SEM is presented in Exhibit C3.

**Exhibit C3**

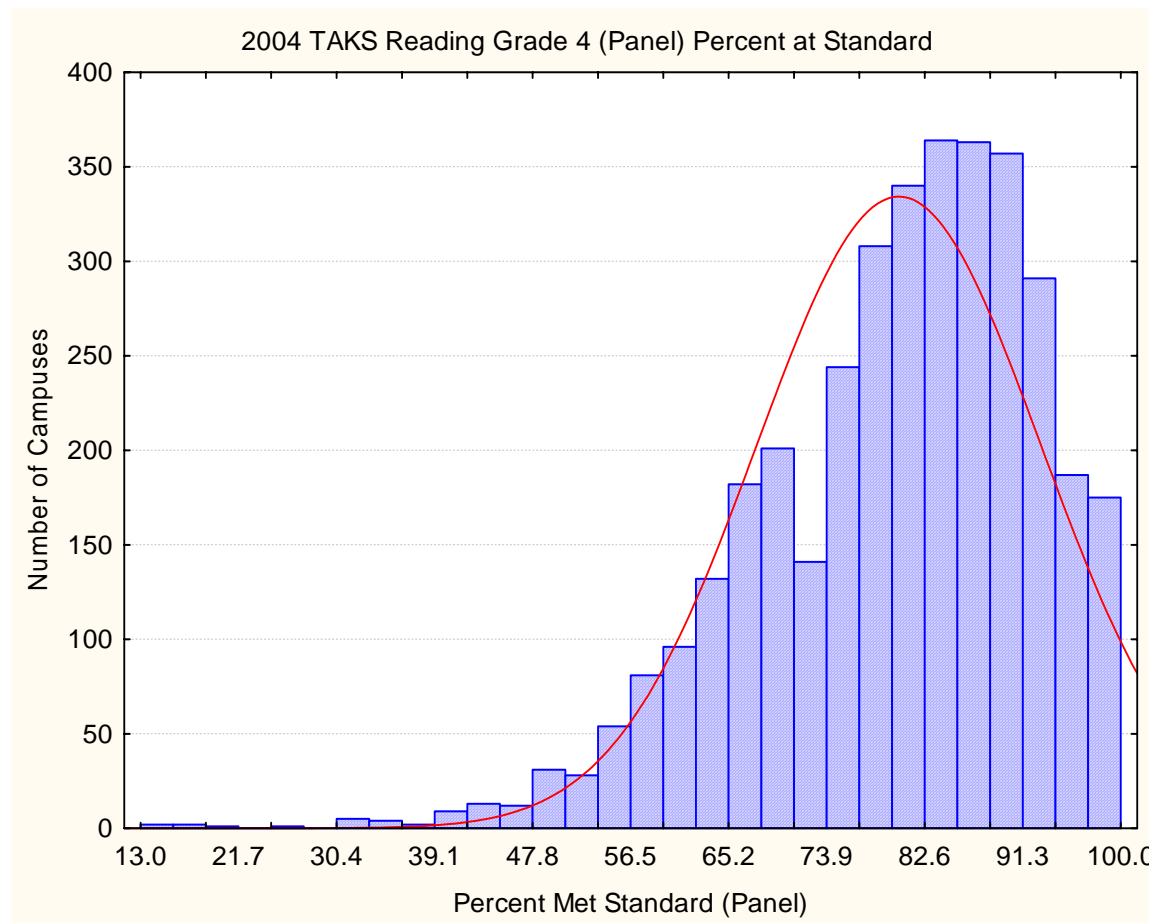


Examination of this graph shows that many campuses had high passing rates for Grade 3 students. Since the percent passing at the campus level is the primary measure available to the study team, this compression of range (that is, most campuses are in a narrow percent passing range), makes finding the

impact of training, or indeed any variable that might impact training, more difficult. In other words, no matter how strong the variable might be that is influencing TAKS percent passing, even a major contribution (statistically speaking) might mean only one or two tenths of a point increase in percent passing.

One strategy that the evaluation team used was to use the percent passing at Panel. This more difficult standard (requiring a higher percent correct passing) would, in theory, spread the scores allowing for a better analysis. As seen in Exhibit 4, this approach spreads out the distribution. Another strategy was to restrict certain analysis to only economically disadvantaged students. Again, these students historically perform at a lower level than those not-economically disadvantaged leading to lower passing rates, spreading the distribution out somewhat.

**Exhibit C4**



## Regression Analysis

This discussion is included to help the reader understand data presented in Exhibit C5 and other similar exhibits in the report. The variable entered as the dependent variable is listed on the right side of the table. This is the value that is being “predicted” from the values of the independent variables. For this table, the two independent variables are the percent economically disadvantaged students and the teacher density training in reading academies.

**Exhibit C5**  
**Results of Regression Analysis for All Students, TAKS, Campus Level Analysis**

Outcome (Dependent Variable)	Overall Model		Percent Trained in Reading Academy			
	Mult. R	(df)	Beta	T	p-value	B Weight
2003 TAKS Gr 3 (-2 SEM)	0.591	2,3631	0.118	8.77	0.00000	0.067
2004 TAKS Gr3 (Panel)	0.546	2,3643	0.114	8.19	0.00000	0.065
2004 TAKS Gr4 (Panel)	0.579	2,3565	0.081	5.93	0.00000	0.058
2004 TAKS Gr 3 (commend)	0.585	2,3626	0.046	3.42	0.00006	0.036
2003 TAKS Gr 3 (need accelerated instruction)	0.595	2,3380	-0.147	-10.59	0.00000	-0.081

*Source. Multiple Linear Regression, Statistica, StatSoft*

*Note1: All overall models were significant ( $p < 0.00000$ ) unless otherwise noted.*

*Note2: All models include the intercept*

*Note 3. Pairwise deletion of cases (campuses) with missing data (including less than 5 students)*

The Mult(iple) R is the overall correlation among all of the variables and provides an idea of how good the overall model is in predicting the selected dependent variables. In Exhibit C5, because percent economically disadvantaged students is a strong predictor, the multiple R values will generally be in the same range. The (df) column contains the degrees of freedom for the model. With the intercept (the unrefined average value) included, the value to the left of the comma will always be 2. The values on the left side of the comma relates to the number of predictors; the number on the right of the comma refers to the number of campuses included in the results. This number will vary slightly depending on how many campuses had non-missing data.

The right side portion of the table contains information about the specific independent variable of interest (percent trained). Beta is the statistical term that relates to the degree of statistical significance, relayed by the T value. The higher the T (in absolute terms) the more likely that the relationship is not one by chance. The p-value tells how likely the relationship is. A p-value of .05 means that the relationship would only be one of change one time in 20.

The final column is of special interest. The B Weight is the component of the equation that helps quantify the “impact” of changing the values of the independent variable. This is probably best illustrated by providing an example of predicting values for a campus. Remember that this is for this particular model, other models might have many variables, each of which with a B weight. The intercept is basically the dependent variable average *before* consideration of the impact of the other variables, not the actual simple average.

**Exhibit C6**  
**Example of Calculating Predicted Values for Dependent Variable**

Site	Intercept	% Eco Disadvantaged	% SSI Trained	Predict
		B Weight * %Eco = Economic	B Weight * % Trained = Trained	
A	90 +	(-0.185 * 80 = -14.4) +	(0.065 * 80 = 4.8) =	80.4
B	90 +	(-0.185 * 95 = -17.1) +	(0.065 * 10 = 0.6) =	73.5
C	90 +	(-0.185 * 10 = 1.8) +	(0.065 * 90 = 5.4) =	93.6

*Source. Regression Analysis Weights*

In this example using actual B weights from a regression run for Grade 3 TAKS all student 2004 reading, it is easy to see the relative impact of differing values of the independent variables. Remember that these are averages and predictions, it does not guarantee performance. For Site A, with 80 percent economically disadvantaged and 80 percent of teachers trained, the combination of these two variables combined with the intercept value of 90 means a value just large enough to raise the campus from acceptable to recognized. Site B has a large percentage of economically disadvantaged students and low participation in training with a result just above 70 percent meeting the standard. Under the requirements of NCLB Adequate Yearly Progress (AYP), this campus will not meet AYP requirements. Finally, Site C with very few economically disadvantaged students manages to move into the exemplary range with a high concentration of trained teachers (90 percent in this example). Again, past performance is no guarantee of future results.

### **Regression Analysis Model for This Study**

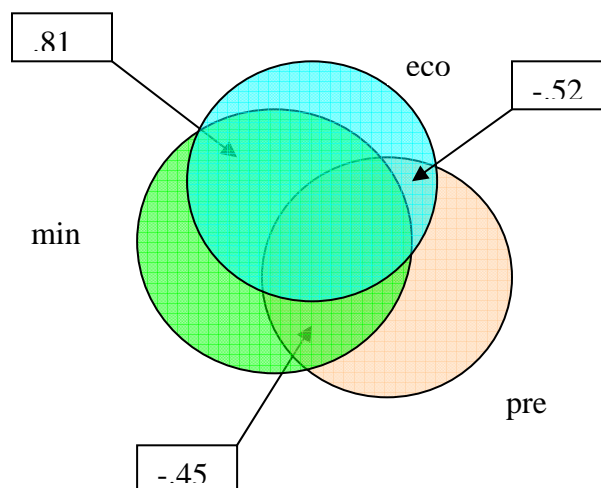
The evaluation team used multiple correlation / linear regression to examine the relationship between teacher training and student performance. In general, this approach relates one or more independent

variables to a single dependent variable. This relationship can be tested to determine statistical significance and to form an equation that “predicts” values of the dependent variable.

One example of a relationship between independent variables with one dependent variable is the relationship between weight (dependent) and two independent variables (height and calories consumed). The relationship might logically be “the taller you are and the more calories you consume, the heavier you will be.” Of course, other variables such as activity level, age, and gender may all be important considerations. On the other hand, if a useful relationship is found between height and calories consumed, the addition of other variables may only confuse the important question of consumption. This is not to say that a more complex model is without use, it can be very important. A more complex model that is used in the primary analysis is presented at the end of the reading section for comparison purposes.

A factor in selecting independent variables, and thus the analysis model, is the degree to which the independent variables correlate with each other. Entering multiple variables that are basically measuring an underlying construct can actually suppress statistical relationships. In the best of all worlds, the independent variables are selected that reflect different qualities or constructs, but, at the same time, each of the independent variables is logically related to the dependent variable. To illustrate how we selected the independent variables for the analysis model, consider Exhibit C7.

**Exhibit C7**  
**Relationship Among Percent Minority, Economically Disadvantaged and Pretest**



These three variables are percent minority, percent economically disadvantaged, and the pretest and are often associated with performance on achievement tests. As seen in this illustration, there is a high correlation between percent minority and percent economically disadvantaged ( $R_{xy}=0.81$ ). At the same time, there is also a strong correlation (-.45) between percent minority and the pretest (in this case, TAAS performance on Grade 3 reading percent passing). Similarly, there is a strong correlation between percent economically disadvantaged and the pretest of -0.51. Because the correlations with the pretest are negative, a higher percentage of minority or economically disadvantaged relates to a lower TAAS performance. These data are from correlations derived from campus level data. The correlation of these variables with one of the student outcome selected to be the dependent variable in analyses relating to the reading academies (TAKS percent meeting reading standard at the Panel, Grade 3 in 2004, March administration only) is presented in Exhibit C8.

**Exhibit C8**  
**Correlation of Potential Independent Variables with Dependent Variable**

Variable	Rxy
Percent Economically Disadvantaged	-0.54
Percent Minority	-0.51
Pretest (TAAS 1999)	0.44

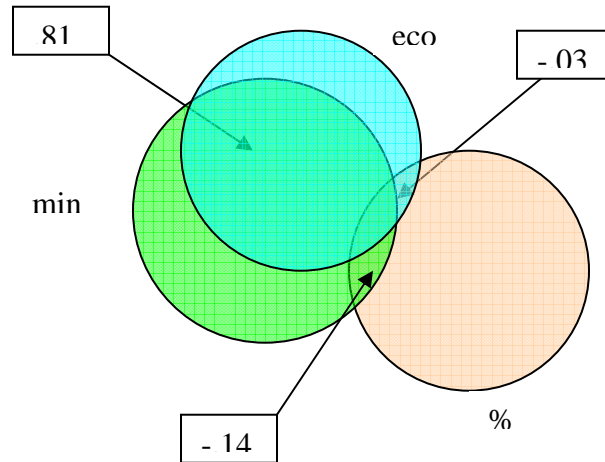
*Source. Analysis of campus level data from AEIS reports*

The strongest correlation is with percent economically disadvantaged and is significant for all three. Again, a positive correlation means that, in this case, the higher the pretest, the higher the posttest (dependent variable), while negatives mean an opposite relationship. To have a model that explains a significant part of the relationship (as measured by multiple R in the linear regressions), the percentage economically disadvantaged will be included in all models (except as noted). This variable has the strongest relationship with the outcome measure in this example, and can be measured on all campuses.

As discussed previously, from an analytic point of view, it is best if the actual variable of interest (in this study density of training) is relatively independent from the other dependent variable. Exhibit C9 shows this relationship.



**Exhibit C9**  
**Relationship Among Percent Minority, Economically Disadvantaged and Reading Academy Training Density**



As in Exhibit C9, there is the high correlation between percent minority and percent economically disadvantaged. However, this illustration shows that the relationship between both of these variables and the teacher reading academy training density is quite low (-.14 and -.03 respectively). The correlation with percent economically disadvantaged is not statistically significant, while the relationship with percent minority is just significant ( $P < .05$ ).

The model that will be used in the analysis then becomes as follows

$$Y_{12} = I_0 + aX_1 + bX_2 + e_{12}$$

Where:

$Y_{12}$  are values of the outcome (TAKS at Panel)

$I_0$  is the intercept (or grand mean of all TAKS passing rates)

a and b are the beta values

$X_1$  are values of percentage economically disadvantaged

$X_2$  are values of ATD

$E_{12}$  is the general error term

## **Appendix D: Teacher Survey Sampling Design, Description of Survey Respondents, and Open Ended Responses**

### **Survey Design**

One of the evaluation approaches used in this study was to select a sample of teachers to respond to a survey regarding the training and instructional approaches used. It is understood that teachers regularly attend training and staff development sessions. Therefore there is not a clean distinction between “trained” and “not-trained”. However, for this study, a partition was drawn between teachers who had received training in the SSI academies and those who did not.

A target of approximately 4,000 surveys to be distributed between reading and mathematics teachers was selected. In order to provide the best coverage among the various geographic regions, years of training, grade levels, and, of course reading and mathematics responsibility, a stratified random approach was utilized. Four clusters of ESCs were used. One cluster (ESC 1, 2, 3, 19, and 20) represented the border region ranging from El Paso through the Corpus Christi area and included Brownsville and San Antonio. A second was concentrated in the eastern part of Texas (ESC 4, 5, 6, 7, and 8) and included Houston through Mount Pleasant in the far north-eastern part of the state. The third cluster (ESC 9, 10, 11, 12, 13) represented the central corridor and ranged from Wichita Falls to Austin, including Ft. Worth, Dallas, and Waco. The final cluster was comprised of the middle-western through the Panhandle areas (ESC 14,15,16,17, 18). These four groupings form one of the strata for the survey sample.

As seen in Exhibit D1, the number (and percentage) of teachers to be included in the survey were based on the total number of teachers in that cluster. For example, as of 2003, about 23 percent of all teachers were employed in the first cluster of ESCs. Note that the latest data regarding teacher placement is from the fall 2003 PEIMS snapshot, data from the 2004-05 school year will not be available until at least February 2005, too late for this study. Thus some teachers will have moved on to other campuses and/or districts. According to the 2003 AEIS report, teacher turnover (across districts) is approximately 20 percent.

**Exhibit D1**  
**Sampling Framework for Teachers Participating in SSI Training at ESCs**

ESC Cluster	% Teacher	K	1	2	3	K-3	ESC Total
		1999	2000	2001	2002	2003	
		24%	22%	20%	18%	16%	
1,2,3,19,20	23.1%	103	95	86	77	69	431
4,5,6,7,8	31.5%	141	129	117	106	94	586
9,10,11,12,13	36.8%	164	151	137	123	110	685
14,15,16,17,18	8.6%	38	35	32	29	26	160
<b>Grade, Year Total</b>		<b>447</b>	<b>410</b>	<b>372</b>	<b>335</b>	<b>298</b>	<b>1,862</b>

The second stratum was a compound of grade level and year of training. For example, Kindergarten teachers were the target for 1999, Grade 1 for 2000, and so forth. Over time, earlier grade level training was also included in subsequent years. In 2002, although the target was Grade 3, some teachers were also trained at the Kindergarten level. The target years/grade level was used as the primary determiner with teachers from all grade levels selected for 2003. Given the gradual loss of teachers over time, the sample was weighted with a higher percentage selected from 1999, thus somewhat compensating for this attrition. As seen in Exhibit D1 above, a declining percentage was used over time.

Similar to Exhibit D1, teachers were selected for the survey who had not attended a SSI academy, and teachers who did, and who did not attend a mathematics academy. One adjustment was made to the sample of teachers in Grades 7 and 8 who did not attend a SSI academy. Because grade level is only reported through the sixth grade, a larger number of teachers were selected for the Grade 7 and 8 sample of teachers who had not been trained. This was done in an effort to include as many teachers as possible with mathematics responsibility. Given that mathematics was only given in two years versus five for reading (in the time span of this study), the number of mathematics teachers sampled is proportionately less than for reading. A sample of the summary is included in Exhibit D2. The total number of teachers included in the sample was 4,014.

**Exhibit D2**  
**Summary of Sampled Teachers**

ESC Cluster	Reading		Mathematics	
	SSI Trained	Not SSI Trained	SSI Trained	Not SSI Trained
1,2,3,19,20	431	210	177	113
4,5,6,7,8	586	286	241	154
9,10,11,12,13	685	334	282	180
14,15,16,17,18	160	78	66	42
<b>Totals</b>	<b>1,862</b>	<b>907</b>	<b>767</b>	<b>490</b>

## Description of Survey Respondents: TRA, OTRA, TMA, and Administrator Surveys

### TRA Survey

#### Teacher Background

The TRA survey included several items on teachers' background information, including the number of years of teaching experience, education level, ethnicity, and grade levels taught. A summary of teacher background information is presented in Exhibit D3. Survey responses indicate that the teachers, both TRA trained and not trained, have a range of years teaching experience. Over one-half have 10 or more years teaching experience, and less than a quarter have four or fewer years teaching experience. In terms of education level, most respondents have a bachelor's degree (77 percent) and roughly one-fourth have master's degrees. Survey responses also indicate that the majority of respondents are Caucasian (60 percent of trained and 77 percent of non-trained). Responses also indicate that roughly one-third are Hispanic, and even fewer are African American (9 percent) or other ethnicity (2 percent).

**Exhibit D3  
Description of Teacher Background  
TRA Trained and Not Trained**

<b>Training Status</b>	<b>Trained</b>	<b>(%)</b>	<b>Not Trained</b>	<b>(%)</b>	<b>Total</b>	<b>(%)</b>
Years teaching experience						
0-1 years	11	1%	2	1%	13	1%
2-4 years	79	16%	22	9%	101	10%
5-9 years	202	22%	30	23%	232	23%
10-20 years	354	35%	49	40%	403	40%
21 or more years	232	26%	36	26%	268	26%
<b>Total</b>	<b>878</b>	<b>100%</b>	<b>139</b>	<b>100%</b>	<b>1017</b>	<b>100%</b>
Education						
Associate	1	0%	0	0%	1	0%
Bachelor's	653	77%	106	75%	759	75%
Master's	223	23%	32	25%	255	25%
<b>Total</b>	<b>877</b>	<b>100%</b>	<b>138</b>	<b>100%</b>	<b>1015</b>	<b>100%</b>
Ethnicity						
African American	35	9%	12	4%	47	5%
Hispanic	156	29%	39	18%	195	20%
White	659	60%	81	77%	740	74%
Other	11	2%	3	1%	14	1%
<b>Total</b>	<b>861</b>	<b>100%</b>	<b>135</b>	<b>100%</b>	<b>996</b>	<b>100%</b>

Source: Survey of Teachers Regarding TRA Training, 2004.

Attendance in the academies among respondents spread fairly evenly among the K-3 Academies with 32 percent of teachers reporting attendance in the Kindergarten level academy, 29 percent in the Grade 1

Academy, 27 percent in Grade 2, and 22 percent reporting attendance in the Grade 3 TRA. Three percent of the respondents reported attending the recently released Grade 4 Academy.

**Exhibit D4**  
**Participation in K-4 TRA and other Reading Trainings**

Training	Number	(%)	Total
Kindergarten	278	32%	772
First Grade	254	29%	770
Second Grade	236	27%	770
Third Grade	193	22%	759
Fourth Grade	22	3%	727

Source: Survey of Teachers Regarding TRA Training, 2004.

### OTRA Teacher Respondents

NOTE: A total of 70 OTRA surveys had been returned with a response rate of 18 percent. This section presents a summary of preliminary findings from the 70 OTRA surveys that had been entered for analyses as of October 25, 2004.

#### Teacher Background

The OTRA survey included several items on teachers' background information, including the number of years of teaching experience, education level, ethnicity, and grade levels taught. A summary of the OTRA, TRA, and Not Trained teachers' background information is presented in Exhibit D5. Survey responses indicate that the OTRA trained teachers have a range of years teaching experience with the majority (67 percent) reporting 10 or more years experience teaching. In terms of education level, most respondents have a bachelor's degree (59 percent) and 41 percent have master's degrees. Like the TRA trained teachers, the majority of OTRA teacher respondents are Caucasian (64 percent). Responses also indicate that 21 percent are Hispanic, and even fewer are African American (9 percent) or other ethnicity (6 percent). While OTRA teachers share similar distribution of ethnicities with the TRA trained teachers and not trained teachers, a larger percent of the OTRA teacher respondents have master's degrees.

**Exhibit D5**  
**Description of Teacher Background**  
**OTRA Trained, TRA Trained, and Not Trained**

<b>Training Status</b>	<b>OTRA Trained (%)</b>		<b>TRA Trained (%)</b>		<b>Not Trained (%)</b>		<b>Total (%)</b>	
Years teaching experience								
0-1 years	3	9%	11	1%	2	1%	16	2%
2-4 years	3	9%	79	9%	31	17%	113	10%
5-9 years	5	15%	202	23%	35	19%	242	22%
10-20 years	13	38%	354	40%	66	35%	433	39%
21 or more years	10	29%	232	26%	53	28%	295	27%
<b>Total</b>	<b>34</b>	<b>100%</b>	<b>878</b>	<b>100%</b>	<b>187</b>	<b>100%</b>	<b>1099</b>	<b>100%</b>
Education								
Associate			1	0%			1	0%
Bachelor's	20	59%	653	75%	139	76%	812	74%
Master's	14	41%	223	25%	45	25%	282	26%
<b>Total</b>	<b>34</b>	<b>100%</b>	<b>877</b>	<b>100%</b>	<b>184</b>	<b>100%</b>	<b>1095</b>	<b>100%</b>
Ethnicity								
African American	3	9%	35	4%	13	7%	51	5%
Hispanic	7	21%	156	18%	51	28%	214	20%
White	21	64%	659	77%	113	63%	793	74%
Other	2	6%	11	1%	3	2%	16	2%
<b>Total</b>	<b>33</b>	<b>100%</b>	<b>861</b>	<b>100%</b>	<b>180</b>	<b>100%</b>	<b>1074</b>	<b>100%</b>

Source: Survey of Teachers Regarding TRA Training, 2004.

Over half of the OTRA respondents indicated participating in the Grade 1 academy. Equal percentage of respondents participated in the Kindergarten and the Grade 2 Academy. A relatively small percentage of the respondents participated in the Grade 3 and the Grade 4 academies.

**Exhibit D6**  
**Participation in K-3 OTRA**

<b>Training</b>	<b>Number</b>	<b>(%)</b>	<b>Total</b>
Kindergarten	11	31%	35
First Grade	19	54%	35
Second Grade	11	31%	35
Third Grade	3	9%	35
Fourth Grade	1	3%	35

Source: Survey of Teachers Regarding TRA Training, 2004.

## TMA Survey

### Teacher Background

The TMA survey included several items on teachers' background information, including the number of years of teaching experience, education level, and ethnicity, and grade level they teach. A summary of teacher background information is presented in Exhibit D7. Survey responses indicate that the teachers, both TMA trained and not trained, have a range of years teaching experience. Slightly over 50 percent of the teachers have 10 or more years teaching experience, and roughly half have 9 or fewer years teaching experience. In terms of education level, most respondents have a bachelor's degree (79 percent) and nearly a fourth have Master's degrees. Survey responses also indicate that the majority of respondents are Caucasian (77 percent). Responses also indicate that 17 percent are Hispanic, and even fewer are African American (5 percent) or other ethnicity (2 percent). Exhibit D7 indicates that there were more Grade 5-6 respondents than Grade 7-8 respondents who participated in the training.

**Exhibit D7**  
**Description of Teacher Background**  
**TMA Trained and Not Trained**

<b>Training Status</b>	<b>Trained</b>	<b>(%)</b>	<b>Not Trained</b>	<b>(%)</b>	<b>Total</b>	<b>(%)</b>
Years teaching experience						
0-1 years	1	1%			1	0%
2-4 years	50	23%	18	20%	68	22%
5-9 years	53	24%	17	19%	70	22%
10-20 years	90	41%	38	42%	128	41%
21 or more years	28	13%	17	19%	45	14%
<b>Total</b>	<b>222</b>	<b>100%</b>	<b>90</b>	<b>100%</b>	<b>312</b>	<b>100%</b>
Education						
Bachelor's	175	79%	69	77%	244	78%
Master's	47	21%	21	23%	68	22%
<b>Total</b>	<b>222</b>	<b>100%</b>	<b>90</b>	<b>100%</b>	<b>312</b>	<b>100%</b>
Ethnicity						
African American	11	5%	7	8%	18	6%
Hispanic	36	17%	15	17%	51	17%
White	166	77%	66	74%	232	76%
Other	4	2%	1	1%	5	2%
<b>Total</b>	<b>217</b>	<b>100%</b>	<b>89</b>	<b>100%</b>	<b>306</b>	<b>100%</b>
Grade Level						
5th & 6th Grade	162	79%	44	21%	206	100%
7th & 8th Grade	62	33%	126	67%	188	100%

Source: Survey of Teachers Regarding TMA Training, 2004.

## Administrator Survey

The survey asked administrators to report their primary occupation and whether they recommended or required teachers to attend the Teacher Reading Academy (TRA) or Teacher Mathematics Academy (TMA) between 1999 and 2003 (Academy Recommendation Status). This question allows us to examine the administrators' understanding of and role in teachers' participation in the academies. Exhibit D8 presents administrators reports of occupation and time held in their current occupation.

**Exhibit D8**  
**Description of Administrator Background**  
**By Academy Recommendation Status**

Status	Recommended TRA or TMA	(%)	Did Not Recommend	(%)	Total	(%)
Primary Occupation						
Principal	868	96%	191	90%	1059	95%
Assistant Principal	30	3%	16	8%	46	4%
Department Chair	0	0%	3	1%	3	0%
Other	10	1%	3	1%	13	1%
<b>Total</b>	<b>908</b>	<b>100%</b>	<b>213</b>	<b>100%</b>	<b>1121</b>	<b>100%</b>
Time held the position						
0-1 years	21	2%	38	18%	59	5%
2-4 years	176	19%	54	25%	230	21%
5-9 years	315	35%	49	23%	364	33%
10-15 years	238	26%	41	19%	279	25%
16-20 years	85	9%	19	9%	104	9%
21 or more years	71	8%	12	6%	83	7%
<b>Total</b>	<b>906</b>	<b>100%</b>	<b>213</b>	<b>100%</b>	<b>1119</b>	<b>100%</b>

Source: Survey of Administrators Regarding TRA, 2004.

Overall, most (96 percent) of the administrators who responded to the survey were Principals, followed by Assistant Principals (3 percent), and Department Chairs (less than 1 percent). "Other" types of occupations included Curriculum Specialist, Instructional Coordinator, Literacy Leader, and Academic Dean.

The majority of administrators who responded to this survey have held their current position for 5-15 years (see Exhibit D8). However, more administrators who did not recommend training have been in their positions for shorter periods of time, which suggests that the reason they did not recommend training is that they were only recently assigned to the current position.



## Quality and Impact of TRAs—Responses to Open-Ended Teacher Survey Items

**Exhibit D9**  
**TRA Teacher Survey Open-Ended Responses Summary**

<b>TRA Open-Ended Survey Items</b>	<b>Total Number of Responses</b>	<b>Percent of Respondents Providing Open-Ended Comments</b>
What components of the Texas Reading Academy most enabled you to assist struggling learners in reading?	550	53%
What factors at your campus do you feel supported your efforts to implement what you learned at the Texas Reading Academy?	547	53%
What factors at your campus do you feel hindered your efforts to effectively implement what you learned at the Texas Reading Academy?	517	50%
What alternatives to financial stipends do you feel would increase participation in the Texas Reading Academy?	539	52%

*Source: Survey of Teachers Regarding TRA Training, 2004.*

**Exhibit D10**  
**Teachers' Perceptions of TRA Components That Helped Teachers**  
**Assist Struggling Readers**

<b><i>What components of the Texas Reading Academy most enabled you to assist struggling learners in reading?</i></b>		
<b>Category of Open-Ended Responses</b>	<b>N</b>	<b>%</b>
Instructional strategies that promote the 5 components: comprehension, fluency, vocabulary, phonics, or phonemic awareness	119	22%
Grouping students for reading work, stations, literacy centers	87	16%
Diagnostic tools / methods for identifying students who struggle with reading and addressing their needs	81	15%
Specific reading practices (scaffolding, think sheets, alphabetic principle, word study, notebooking, graphic organizers)	74	13%
General instructional strategies/activities and ideas for teaching reading	72	13%
None, not helpful to struggling learners, I didn't learn new strategies	27	5%
Miscellaneous	26	5%
Materials distributed during TRA, lessons provided to participants	22	4%
Hands-on activities, videos shown during academy	14	3%
Don't remember, it was too long ago, don't know	11	2%
No comment, no opinion	7	1%
Alignment work, standardized test (TEKS & TAKS) help	6	1%
Collaborating with fellow teachers, learning from them	4	1%
<b>Total</b>	<b>550</b>	<b>100%</b>

*Source: Survey of Teachers Regarding TRA Training, 2004.*

**Exhibit D11**  
**Teachers' Perceptions of Factors that Supported TRA Implementation**

<i>What factors at your campus do you feel <u>supported</u> your efforts to implement what you learned at the Texas Reading Academy?</i>		
<b>Categories of Open-Ended Comments</b>	<b>N</b>	<b>(%)</b>
My principal is very supportive	156	29%
Other teachers were supportive, collaborative, were trained together	94	17%
General district or school administration supported my efforts to implement through staff development, curriculum specialists, etc.	63	12%
I received supplies from TRA or elsewhere as needed	63	12%
Other school-wide or district wide reading programs in place, district requirements	45	8%
Miscellaneous	38	7%
I was given autonomy, freedom to do what was necessary	37	7%
I was already implementing the TRA content, just added some new ideas	13	2%
I was able to arrange class, schedule, students, curriculum in order to implement TRA strategies	12	2%
No comment, no opinion, N/A, didn't attend	11	2%
None, no support	9	2%
I didn't implement what I learned at TRA (didn't find it useful, moved to a new district that doesn't support)	6	1%
<b>Total</b>	<b>547</b>	<b>100%</b>

*Source: Survey of Teachers Regarding TRA Training, 2004.*

**Exhibit D12**  
**Teachers' Perceptions of Factors that Hindered TRA Implementation**

<b>What factors at your campus do you feel <u>hindered</u> your efforts to effectively implement what you learned at the Texas Reading Academy?</b>		
<b>Category of Open-Ended Comments</b>	<b>N</b>	<b>%</b>
None, nothing hindered my implementation	212	41%
Not enough time, other priorities take up the time,	95	18%
Not enough resources (financial, equipment for testing, etc.)	51	10%
N/A, no comment, no opinion, don't teach reading	39	8%
School implementing another reading curriculum or focus on testing	30	6%
Entrenchment of veteran teachers unwilling to change or who didn't attend TRA	24	5%
Class size makes it difficult to implement, need time for individual students	18	4%
Miscellaneous	15	3%
District guidelines/requirements	11	2%
Lack of administrator support	8	2%
TRA training itself was inadequate	5	1%
Students deficient in necessary skills, students are not prepared	5	1%
Lack of parental support	2	0.40%
Lack of follow-up, refresher course from TRA	2	0.40%
<b>Total</b>	<b>517</b>	<b>100%</b>

Source: Survey of Teachers Regarding TRA Training, 2004..

**Exhibit D13**  
**Teachers' Perceptions of Alternatives to Stipends to Increase Participation in TRA**

<i>What alternatives to financial stipends do you feel would increase participation in the Texas Reading Academy?</i>		
<b>Category of Open-Ended Responses</b>	<b>N</b>	<b>%</b>
Stipends are best – keep those, increase stipends	103	19%
Comp time, choice time, substitutes, PD hours, summer time pay	96	18%
Providing useful materials for teachers to use in class, resources, technology	78	14%
Logistics and timing – consider variety of locations and times of the year to hold the academy, schedule during school year	43	8%
Miscellaneous	32	6%
None	27	5%
Make TRA mandatory, require teachers to attend	27	5%
Don't know, “?”, not sure,	26	5%
College level credit, continuing ed credit for attending	24	4%
N/A, no comment, no opinion,	19	4%
Improve the academy so it is worthwhile for teachers, they give it word-of-mouth PR	19	4%
Teachers need to want to go to the academy to improve their skills and to help their students	11	2%
Shorten the academy	10	2%
Promoting TRA to raise awareness of help to teachers, benefit to students	9	2%
I would have attended without stipend/ did attend without knowing about stipend	9	2%
Assist teachers in classroom to implement	3	1%
District support the academy financially	3	1%
<b>Total</b>	<b>539</b>	<b>100%</b>

Source: Survey of Teachers Regarding TRA Training, 2004.

## Quality and Impact of Academies—Responses to Open-Ended Administrator Survey Items

**Exhibit D14**  
**Administrator Open-Ended Responses Summary**

Administrator Open-Ended Survey Items	Total Number of Responses	Percent of Respondents Providing Open-Ended Comments
What alternatives to stipends do you feel would increase teacher participation in the Texas Reading and Mathematics Academies?	472	41%
What factors within your district do you feel supported the teachers efforts to implement what they learned from the Texas Reading and Mathematics Academies?	495	43%
What factors within your district do you feel hindered the teachers efforts to implement what they learned from the Texas Reading and Mathematics Academies?	443	39%

Source: Survey of Administrators Regarding TRA, 2004.

**Exhibit D15**  
**Administrators' Perceptions of Factors that Supported Implementation**

<i>What factors within your district supported teachers' efforts to implement what they learned from the Texas Reading and Mathematics Academies?</i>		
Categories of Open-Ended Comments	N	(%)
Follow-up training and support provided by district or campus	146	19%
Resources: materials, time, and personnel	102	14%
District and campus support (general statements)	74	10%
Academies consistent with existing district initiatives and improvement efforts	60	8%
District required or strongly recommended training for all teachers	54	7%
Teacher collaboration through school and district teams	53	7%
Perceived need to better meet state or district expectations of student achievement	47	6%
Quality of academy strategies and materials as well as the reputation (e.g., word of mouth)	37	5%
Teachers allowed flexibility to adapt strategies and encouraged to try new ones	31	4%
Provision of stipends as well as convenient training locations and times	31	4%
Administrator participation in training	31	4%
Math not available, did not know about math, or district did not support math	23	3%
None, not applicable, not sure, didn't know about academies	21	3%
Previous efforts to alignment curriculum to state standards	15	2%
Assessments and computer software to diagnose student performance	12	2%
Academy and ESC follow-up through communications and more training	11	1%
Miscellaneous comments about factors contributing to support for teachers	6	1%
<b>Total</b>	<b>754</b>	<b>100%</b>

Source: Survey of Administrators Regarding TRA, 2004.

**Exhibit D16**  
**Administrators' Perceptions of Factors that Hindered Implementation**

<b>What factors within your district do you feel hindered the teachers efforts to implement what they learned from the Texas Reading and Mathematics Academies?</b>		
<b>Category</b>	<b>N</b>	<b>%</b>
None, nothing hindered implementation	115	24%
Not enough time, too many other priorities/demands on teachers for instructional time	60	12%
Not enough resources (financial, equipment for testing, etc.)	44	9%
Academies were inadequate, need improvement, took too long, not offered at good times	34	7%
N/A, no comment, no opinion, Don't know, "?", not sure	34	7%
Lack of follow-up, refresher courses	33	7%
District / school implementing other initiatives or focus on achievement testing	32	7%
Miscellaneous comments about hindering factors	31	6%
Some teachers unwilling to change tried and true methods, not convinced of benefit of academy training	21	4%
District needs to do more to promote, support Academy and implementation, and provide support staff, training at schools	19	4%
Teachers who have not attended academies, not all grades able to be trained	19	4%
Lack of collaboration time for teachers to plan together, team	13	3%
Administrators who have not attended academies	12	2%
Class size makes it difficult to implement, need time for individual students	7	1%
Trained teachers have left the district, too much turnover	6	1%
Late or lack of notice / information about academies, especially TMA	6	1%
Students deficient in necessary skills, students are not prepared	1	0%
<b>Total</b>	<b>487</b>	<b>100%</b>

Source: Survey of Administrators Regarding TRA, 2004.

**Exhibit D17**  
**Administrators' Perceptions of Alternatives to Stipends to Increase Teacher Participation**

<i>What alternatives to stipends do you feel would increase teacher participation in the Texas Reading and Mathematics Academies?</i>		
<b>Category of Open-Ended Comments</b>	<b>N</b>	<b>%</b>
Stipends are best (keep stipends, increase stipends)	169	30%
Comp time, choice time, substitutes, summer time pay	91	16%
Provide useful materials (resources, technology) for teachers to use in class	78	14%
Logistics and timing – consider variety of locations and times, schedule during school year	34	6%
College level credit, PD hours, continuing education credits for attending	29	5%
None	28	5%
Require the academies, make it mandatory	27	5%
N/A, no comment, no opinion, Don't know, “?”, not sure	20	4%
Assisting teachers in classroom to implement, follow-up training	20	4%
Miscellaneous items	19	3%
Improve the academy so it is worthwhile for teachers: they promote it through word-of-mouth	11	2%
Teachers need to want to go to the academy to improve their skills and to help their students	11	2%
Teacher recognition or awards	8	1%
Promote the academies to raise awareness of benefit to teachers, benefit to students	4	1%
Shorten the academy	3	1%
Provide lodging, transportation and meals for those who have to travel longer distances	2	0%
District support the academy financially, get funds to support teachers	2	0%
<b>Total</b>	<b>557</b>	<b>118%</b>

Source: Survey of Administrators Regarding TRA, 2004



## Quality and Impact of Mathematics Academies—Responses to Open-Ended Teacher Survey Items

**Exhibit D18**  
**TMA Teacher Survey Open-Ended Responses Summary**

<b>TMA Open-Ended Survey Items</b>	<b>Total Number of Responses</b>	<b>Percent of Respondents Providing Open-Ended Comments</b>
What components of the Texas Mathematics Academy most enabled you to assist struggling learners in mathematics?	162	52%
What factors at your campus do you feel supported your efforts to implement what you learned at the Texas Mathematics Academy?	153	49%
What factors at your campus do you feel hindered your efforts to effectively implement what you learned at the Texas Mathematics Academy?	155	49%
What alternatives to financial stipends do you feel would increase participation in the Texas Mathematics Academy?	157	50%

*Source: Survey of Teachers Regarding TMA Training, 2004.*

**Exhibit D19**  
**Teachers' Perceptions of TMA Components That Helped Teachers**  
**Assist Struggling Learners in Mathematics**

<i>What components of the Texas Mathematics Academy most enabled you to assist struggling learners in mathematics?</i>		
<b>Category</b>	<b>N</b>	<b>%</b>
Instructional strategies, ideas for teaching, adapting to student learning styles	40	25%
Grouping strategies	19	12%
None, not helpful to struggling learners, I didn't learn new strategies	18	11%
Diagnostic tools	15	9%
Hands-on activities	13	8%
Analyzing errors, analyzing student work	10	6%
Miscellaneous	10	6%
Specific mathematical topics (algebra, percent bars, diagrams, etc.)	9	6%
No comment, no opinion	7	4%
Identify areas students struggle in, student weaknesses, student needs	7	4%
Don't remember, it was too long ago, don't know	5	3%
Information to help with state tests, TMDS, pre-post tests	5	3%
Collaborating with fellow teachers, learning from them	4	3%
<b>Total</b>	<b>162</b>	<b>100%</b>

Source: Survey of Teachers Regarding TMA Training, 2004.

**Exhibit D20**  
**Teachers' Perceptions of Factors that Supported TMA Implementation**

<i>What factors at your campus do you feel <u>supported</u> your efforts to implement what you learned at the Texas Mathematics Academy?</i>		
<b>Categories of Open-Ended Comments</b>	<b>N</b>	<b>(%)</b>
None, no support	8	5%
No comment, no opinion, N/A	8	5%
I didn't implement what I learned at TMA (either didn't find it useful or was already implementing it)	7	5%
My principal is very supportive	20	13%
General district or school administration supported my efforts to implement.	43	29%
I received supplies (math manipulatives, resources) needed	12	8%
Other teachers were supportive, collaborative	9	6%
Entire school adopted Math Investigations, coaches provided	5	3%
Allowed to arrange class, schedule, students, curriculum in order to implement TMA	11	7%
I was given autonomy, freedom to do what was necessary	11	7%
Miscellaneous	19	12%
	<b>153</b>	<b>100%</b>

Source: Survey of Teachers Regarding TMA Training, 2004.

**Exhibit D21**  
**Teachers' Perceptions of Factors that Hindered TMA Implementation**

<i>What factors at your campus do you feel <u>hindered</u> your efforts to effectively implement what you learned at the Texas Mathematics Academy?</i>		
Category	N	%
None, nothing hindered my implementation	49	32%
N/A, no comment, no opinion, don't teach math	17	11%
Not enough time, other priorities take up the time,	34	21%
Not enough resources (financial, equipment for testing, etc.)	13	8%
School implementing another math curriculum or focus on testing	12	8%
Entrenchment of veteran teachers unwilling to change or who didn't attend academy	7	5%
Students deficient in necessary skills, students are not prepared	6	4%
Class size makes it difficult to implement	8	5%
Lack of parental support	2	1%
TMA was not helpful to me	2	1%
Miscellaneous	6	3%
<b>Total</b>	<b>155</b>	<b>100%</b>

Source: Survey of Teachers Regarding TMA Training, 2004.

**Exhibit D22**  
**Teachers' Perceptions of Alternatives to Stipends to Increase Participation in TMA**

<i>What alternatives to financial stipends do you feel would increase participation in the Texas Mathematics Academy?</i>		
Category	N	%
None	13	8%
N/A, no comment, no opinion,	13	8%
Don't know, "?", not sure,	9	6%
Promoting TMA to raise awareness of help to teachers, benefit to students	5	3%
Providing useful materials for teachers to use in class, resources, technology	26	17%
Assist teachers in classroom to implement	3	2%
Comp time, choice time, substitutes, PD hours, summer time pay	20	13%
College level credit, continuing ed credit, for attending	5	3%
Improve the academy so it is worthwhile for teachers, they give it word-of-mouth PR	11	7%
Shorten the academy	2	1%
Provide lodging, transportation and meals for those who have to travel far	3	2%
Logistics and timing – consider variety of locations and times of the year to hold the academy	5	3%
Stipends are best – keep those, increase stipends	26	17%
I would have attended without stipend/ did attend without knowing about stipend	2	1%
Miscellaneous	10	6%
Make it mandatory, require teachers to attend	4	3%
<b>Total</b>	<b>157</b>	<b>100%</b>

Source: Survey of Teachers Regarding TMA Training, 2004.

## Appendix E: Expert Reviews

### Scott G. Paris Brief Vita 1-04

Department of Psychology	2611 Hawthorn Road, Ann Arbor, Michigan 48104
525 East University Avenue	(734) 995-5920
University of Michigan	Birthdate: December 28, 1946
Ann Arbor, Michigan 48109	Married: three children
(734) 764-7472	sparis@umich.edu

#### Academic Background:

B.A. University of Michigan, Psychology major, 1968  
Ph.D. Indiana University, 1972

#### Professional Appointments

George Peabody College for Teachers, 1972-1973  
Purdue University, 1973-1979  
University of Michigan, 1979-present  
Professor, Department of Psychology and School of Education, 1983-present  
Chair, Graduate Program in Psychology, 2001-present

#### Editorial Board Memberships (current)

*Educational Psychologist* (1988-present)  
*Reading Research Quarterly* (1986-present)  
*Cognition and Instruction* (2002 - present)

#### Teaching Awards

*Dean's Award for Excellence in Teaching, UM, 1993, 1997*  
Amoco Foundation Award for Outstanding Undergraduate Teaching, UM, 1995

#### Recent Grant Support

National Center on Adult Literacy, "Family Literacy Programs in Michigan," 1994-1995  
Henry Ford Museum & Greenfield Village, "Assessing Visitors' Learning", 1995-1996  
American Psychological Association conference grant "Festschrift for Harold Stevenson" (with Henry Wellman), 1995-1996.  
Office of Educational Research and Improvement, U.S. Dept. of Education, "Center for the Improvement of Early Reading Achievement" with others, 1997-2003  
Michigan Department of Education, "Goals 2000: Evaluation of Summer Reading Programs", with Ingham County Intermediate School District and Michigan State University, 1998-2002. (five separate grants in annual cycles)  
National Science Foundation, "Children's Object-Centered Learning" with the Ann Arbor Hands-On Museum, 1999-2000.  
University of Michigan, "Free Choice Learning Environments: Teaching Outside the Box". Innovative course design, 2002-2003.

#### Representative Books

- Paris, S.G., Olson, G., & Stevenson, H. (1983). *Learning and motivation in the classroom*. Hillsdale, NJ: Erlbaum.
- Hoffman, L. Paris, S. & Hall, E. (1994). *Developmental psychology today*, 6th ed. New York: McGraw Hill.
- Paris, S.G., & Ayres, L.J. (1994). *Becoming reflective students and teachers with portfolios and authentic assessment*. Washington, DC: American Psychological Association.
- Roediger, H., Capaldi, E, Paris, S., Polivy, J., & Herman, J. (1996). *Psychology* (4th edition). Agoura Hills, CA: West.
- Paris, S.G., & Wellman, H.M. (1998). *Global prospects for education: Development, culture, and schooling*. Washington, DC: American Psychological Association.
- Paris, S.G. (2002). *Perspectives on object-centered learning in museums*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Paris, S.G., & Stahl, S. (in preparation). *New directions in the assessment of reading comprehension*. Mahwah, NJ: Lawrence Erlbaum Associates.

### Representative Book Chapters

- Paris, S.G., & Lindauer, B.K. (1977). Constructive aspects of children's comprehension and memory. In R.V. Kail & J.W. Hagen (Eds.), *Perspectives on the development of memory and cognition* (pp.35-60). Hillsdale, NJ: Erlbaum.
- Paris, S.G., Wixson, K.K., & Palincsar, A.M. (1986). Instructional approaches to reading comprehension. In E. Rothkopf (Ed.), *Review of research in education* (pp. 91-128). Washington, DC: American Educational Research Association.
- Paris, S.G., & Byrnes, J.P. (1989). The constructivist approach to self-regulation and learning in the classroom. In B. Zimmerman & D. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice*, (pp.169-200). New York: Springer-Verlag.
- Paris, S.G., & Winograd, P.W. (1990). How metacognition can promote academic learning and instruction. In B.J. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction* (pp.15-51). Hillsdale, NJ: Erlbaum.
- Saarnio, D.A., Oka, E.R., & Paris, S.G. (1990). Developmental predictors of children's reading comprehension. In T.H. Carr & B.A. Levy (Eds.), *Reading and its development: Component skills approaches* (pp. 57-79). Hillsdale, NJ: Erlbaum.
- Paris, S.G., Wasik, B. A., & Turner, J.C. (1991). The development of strategic readers. In R. Barr, M. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research*, 2nd ed., (pp.609-640). New York: Longman.
- Paris, S.G., Lawton, T.A., & Turner, J. C. (1992). Reforming achievement testing to promote students' learning. In C. Collins & J. Mangieri (Eds.) *Teaching thinking: An agenda for the twenty-first century* (pp.223-241). Hillsdale, NJ: Erlbaum.
- Paris, S.G., & Turner, J.C. (1994). Situated motivation. In P. Pintrich, D. Brown, & C. Weinstein (Eds.), *Student motivation, cognition, and learning: Essays in honor of Wilbert J. McKeachie* (pp.213-237). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Paris, S.G. & Cunningham, A. (1996) Children becoming students. In D. Berliner & R. Calfee (Eds.) *Handbook of educational psychology* (pp.117-147). New York: Macmillan.
- Paris, S.G. (1998). Why learner-centered assessment is better than high-stakes testing. In N. Lambert & B. McCombs (Eds.), *Issues in school reform: A sampler of psychological perspectives on learner-centered schools* (pp.189-209). Washington, DC: American Psychological Association.
- Paris, S.G., & van Kraayenoord, C.E. (1998). Assessing young children's literacy strategies and development. In S. Paris & H. Wellman (Eds.), *Global prospects for education: Development, culture, and schooling* (pp. 193-227). Washington, DC: American Psychological Association.
- Paris, S.G., Byrnes, J.P., & Paris, A.H. (2001). Constructing theories, identities, and actions of self-regulated learners. In B. Zimmerman & D. Schunk (Eds.), *Self-regulated learning and academic*

*achievement: Theoretical perspectives, 2nd Ed.* (pp.253-287). Mahwah, NJ: Lawrence Erlbaum Associates.

Paris, S.G., Paris, A.H., & Carpenter, R. D. (2002). Effective practices for assessing young readers. In B. Taylor & P.D. Pearson (Eds.), *Teaching reading: Effective schools, accomplished teachers* (pp.141-160). Mahwah, NJ: Erlbaum.

Paris, S.G., & Mercer, M.J. (2002). Finding self in objects: Identity exploration in museums. In G. Leinhardt, K. Crowley, & K. Knutson (Eds.), *Learning conversations: Explanation and identity in museums* (pp.401-423). Mahwah, NJ: Lawrence Erlbaum Associates.

Paris, S.G. (2002). Linking reading assessment and instruction in elementary grades. In C. Roller (Ed.), *Comprehensive reading instruction across the grade levels* (pp. 55-69). Newark, DE: International Reading Association.

Paris, S.G., Pearson, P.D., Cervetti, G., Carpenter, R., Paris, A.H., DeGroot, J., Mercer, M., Schnabel, K., Martineau, J., Papanastasiou, E., Flukes, J., Humphrey, K., & Bashore-Berg, T. (in press). Assessing the effectiveness of summer reading programs. In G. Borman & M. Boulay (Eds.), *Summer learning: Research, policies, and programs*. Mahwah, NJ: Lawrence Erlbaum Associates.

Paris, S.G., & Carpenter, R.D. (in press). Children's motivation to read. In J. Hoffman & D. Schallert (Eds.), *The texts in elementary classrooms*. Mahwah, NJ: Erlbaum.

Paris, S.G., Carpenter, R.D., Paris, A.H., & Hamilton, E.E. (in press). Spurious and genuine correlates of children's reading comprehension. In S.G. Paris & S.A. Stahl (Eds.), *Current issues in reading comprehension and assessment*. Mahwah, NJ: Lawrence Erlbaum Associates.

### Representative Journal Articles

Paris, S.G., & Carter, A.Y. (1973). Semantic and constructive aspects of sentence memory in children. *Developmental Psychology*, 9, 109- 113.

Paris, S.G., & Lindauer, B.K. (1976). The role of inference in children's comprehension and memory for sentences. *Cognitive Psychology*, 8, 217-227.

Paris, S.G., & Upton, L.R. (1976). Children's memory for inferential relationships in prose. *Child Development*, 47, 660-668.

Myers, M., & Paris, S.G. (1978). Children's metacognitive knowledge about reading. *Journal of Educational Psychology*, 70, 680-690.

Paris, S.G., & Myers, M. (1981). Comprehension monitoring, memory, and study strategies of good and poor readers. *Journal of Reading Behavior*, 23, 5-22.

Paris, S.G., Lipson, M.Y., & Wixson, K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology*, 8, 293-316.

Paris, S.G., Cross, D.R., & Lipson, M.Y. (1984). Informed strategies for learning: A program to improve children's reading awareness and comprehension. *Journal of Educational Psychology*, 76, 1239-1252.

Jacobs, J. E., & Paris, S. G. (1987). Children's metacognition about reading: Issues in definition, measurement, and instruction. *Educational Psychologist*, 22, 255-278.

Cross, D.R., & Paris, S. G. (1988). Developmental and instructional analyses of children's metacognition and comprehension. *Journal of Educational Psychology*, 80, 131-142.

Wagner, D.A., Spratt, J.E., Gal, I., & Paris, S.G. (1989). Reading and believing: Beliefs, attributions, and reading achievement among Moroccan school children. *Journal of Educational Psychology*, 81, 283-293.

Paris, S.G., Lawton, T.A., Turner, J.C., & Roth, J. L. (1991). A developmental perspective on standardized achievement testing. *Educational Researcher*, 20, 12-20.

Winograd, P., Paris, S.G., & Bridge, C.A. (1991). Improving the assessment of reading. *The Reading Teacher*, 45, 108-116.

Paris, S.G., Calfee, R.C., Filby, N., Hiebert, E.H., Pearson, P.D., Valencia, S.W., & Wolf, K. (1992). A framework for authentic literacy assessment. *The Reading Teacher*, 46, 88-98

van Kraayenoord, C.E., & Paris, S.G. (1997). Children's self-appraisal of their work samples and academic progress. *Elementary School Journal*, 97 (5) 523-537.

Paris, S.G. (2000). Trojan horse in the schoolyard: The hidden threats in high-stakes testing. *Issues in Education*, 6(1,2), 1-16. (and 5 empirical co-authored papers in the same special issue)

Paris, S.G., & Paris, A.H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36(2), 89-101.

Paris, S.G. (2002). Measuring children's reading development using leveled texts. *The Reading Teacher*, 56(2), 168-170.

Paris, A.H., & Paris, S.G. (2003). Assessing narrative comprehension in young children. *Reading Research Quarterly*, 38(1), 36-76.

**Judith B. Harris**

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 757-221-2334 judi.harris@wm.edu

**Professional Preparation**

University of Pennsylvania	Elementary Education	B.A. 1980
Beaver College	Gifted Education	M.Ed. 1983
University of Virginia	Instructional Technology	Ph.D. 1990

**Appointments**

- Professor and Pavey Family Chair in Educational Technology: College of William & Mary, School of Education, 9/02 – present.
- Associate Professor and Instructional Technology Area Coordinator: University of Texas at Austin, Department of Curriculum and Instruction, Instructional Technology Area, 9/98 – 6/02.
- Assistant Professor: University of Texas at Austin, Department of Curriculum and Instruction, 8/92 - 8/98; University of Nebraska at Omaha, Department of Teacher Education, 8/90 - 7/92.
- Graduate Course Instructor (9/86 - 5/9); Field and Training Coordinator, Teacher-LINK Project (8/87-12/89): University of Virginia, 8/87 - 12/89.
- Graduate Course Instructor: Beaver College, 9/83 - 8/86; University of Pennsylvania, 7/84 - 8/86; Bank Street College of Education, 8/84 and 1/85; Penn State University, Great Valley Campus, 9/85 - 5/86.
- Computer Use Facilitator (9/81-6/86); Elementary Mathematics Specialist (9/83-6/85); Gifted & Talented Program Coordinator: Project S.P.E.C.I.A.L. (9/82-6/84); Classroom Teacher (9/80-6/83): Solomon Schechter Day Schools of Philadelphia.

**Selected Publications**

- Harris, J., & Swan, K. (2003). An educational open source development model: Helping cooperative synchronicity to become intentional collaboration. *Learning and Leading With Technology*, 30(8), 22-24.
- Harris, J. (2003). Generative connections: An Internet-supported response to standards schizophrenia. *Learning and Leading With Technology*, 30(7), 46-49, 59.
- Harris, J. (2005; 1998). *Virtual architecture: Designing and directing curriculum-based telecomputing*. (1<sup>st</sup> and 2<sup>nd</sup> editions.) Eugene, OR: International Society for Technology in Education (ISTE).
- Harris, J., & Grandgenett, N. (2002). Teachers' authentic e-learning. *Learning and Leading With Technology*, 30 (3), 54-58.
- Harris, J. (2001). Structuring Internet-enriched learning spaces. *Learning and Leading With Technology*, 28 (4), 50-55.
- Harris, J. (2000-2001). An illusory dilemma: Online to learn or in line with standards? *Learning and Leading With Technology*, 28 (3), 10-15.

**Synergistic Activities**

Dr. Harris' research and service focus upon K-12 curriculum-based educational computing and teacher professional development. During the past 21 years of her work in educational computing, she has



authored *Way of the Ferret: Finding and Using Educational Resources on the Internet* (1994 & 1995, ISTE), one of the very first books about K-12 educational use of the Internet; *Teaching and Learning with the Internet Facilitator's Guide* (1996, ASCD), ASCD's first Internet-related title; *Virtual Architecture: Designing and Directing Curriculum-Based Telecomputing* (1998 & 2005, ISTE), used in many graduate educational technology and teacher preparation courses; *Design Tools for the Internet-Supported Classroom* (1998, ASCD), ASCD's first Internet-focused book; and more than 165 articles on curriculum-based applications of educational technologies. Her work is widely recognized and used by teachers, school technology specialists, and teacher educators, especially her "activity structures" method for designing curriculum-based learning activities that incorporate use of online tools and resources. Her nonprofit Electronic Emissary Project (<http://emissary.wm.edu/>) telementoring service and research effort, begun in 1992, is the longest-running K-12 effort of its kind, and has served students and teachers worldwide.

### Collaborators and Other Affiliations Within Last 48 Months

Ms. Janet Bell	Telus Learning Connection
Dr. Glen Bull	University of Virginia
Dr. Tom Carroll	National Commission for Teaching & America's Future
Mr. Brian Cleary	Telus Learning Connection
Dr. Kara Dawson	University of Florida
Dr. Vicki Dimock	Southwest Educational Development Lab
Dr. Kathleen Fulton	National Commission for Teaching & America's Future
Dr. Lauren Goldenberg	Center for Children & Technology, EDC
Dr. Neal Grandgenett	University of Nebraska at Omaha
Dr. Robert Hannafin	University of Connecticut
Dr. Margaret Honey	Center for Children & Technology, EDC
Dr. Greg Kearsley	George Washington University
Dr. Glenn Kleimann	Educational Development Center
Ms. Catherine Kullman	Telus Learning Connection
Ms. Belinda Lehmkuhle	University of Texas at Austin
Mr. Greg Lynn	Honeywell, Inc.
Dr. Kevin O'Neill	Simon Fraser University
Dr. Steve Rappaport	Advanced Networks & Systems
Dr. Margaret Riel	Pepperdine University
Dr. Mark Schlager	SRI International

### Graduate Advisors

Dr. Glen Bull & Dr. Carolyn Callahan University of Virginia

### Dissertation/Thesis Advisees

Dr. Lynda Abbott	University of Texas at Austin
Mr. Alan Bueller	Texas Mental Health and Mental Retardation Agency
Dr. Yonjoo Cho	KAIST Graduate School of Management (Korea)
Ms. Victoria de la Garza	University of Texas at Austin
Dr. Vicki Dimock	Southwest Educational Development Lab
Dr. Candace Figg	West Texas A&M University
Dr. Courtney Glazer	Edvance, Inc.
Dr. Greg Jones	University of North Texas

Dr. Patricia McGee	University of Texas at San Antonio
Dr. Martha Meacham	Southwest Texas State University
Ms. Shelley Nordick	Jordan Independent School District (Utah)
Dr. Patricia Ross	Texas Mental Health and Mental Retardation Agency
Dr. Meta Rousseau	Capella University.
Ms. Arati Singh	Academy for Educational Development
Dr. Laurie Williams	KIDLINK
Dr. Janey Wong	University of Texas at Austin

Total number of graduate students advised (as program coordinator): 90 (approximate)

## Jere Confrey

Dr. Jere Confrey will serve as a consultant on evaluating curricular effectiveness and the factors involved in implementation.

### i. Professional Preparation

Duke University	Philosophy / Mathematics	B.A., 1974
Cornell University	Mathematics Education	M.A., 1978
Cornell University	Mathematics Education	Ph.D., 1980

### ii. Appointments

#### WASHINGTON UNIVERSITY IN ST. LOUIS

*Professor, Mathematics Education*

*Director of Research, Center for Inquiry in Science Teaching and Learning*

2003 – Present

#### THE UNIVERSITY OF TEXAS AT AUSTIN

*Professor, Mathematics Education*

*Co-Founder, UTeach Secondary Teacher Program*

1997 – 2003

#### CORNELL UNIVERSITY (ITHACA, NY)

*Associate Professor, Mathematics Education*

1990 – 1997

*Assistant Professor, Mathematics Education*

1984 – 1990

#### MOUNT HOLYOKE COLLEGE (SOUTH HADLEY, MA)

*Assistant Professor, Mathematics Education*

1981-1984

#### MICHIGAN STATE UNIVERSITY (EAST LANSING, MI)

*Founder of SummerMath*

*Co-Founder SummerMath for Teachers*

*Assistant Professor, mathematics Education*

1979-1981

### iii. Publications

Confrey, J. *On Evaluating Curricular Effectiveness: Evaluating the K-12 Mathematics Evaluations*. National Research Council, expected release, May 2004.

Confrey, J., K. Makar and S. Kazak (2004). Undertaking Data Analysis of Student Outcomes as Professional Development for Teachers, *ZDM*, in press.

Cobb, P., Confrey, J., diCessa, A., Lehrer, R., and Schuable, L. (2003). Design Experiments in Educational Research. *Educational Researcher*, 32, (1), pp. 9-13.

Confrey, J., Sabelli, N. and Sheingold, K. (2002). A Framework for Quality in Educational Technology Programs. *Educational Technology*, 42, pp. 7-20.

**iv. Synergistic Activities**

During the last decade, Dr. Confrey has participated in a variety of activities designed to improve mathematics education in relation to curriculum and professional development. Examples of her research activities include the following:

1. Chair of the National Research Council Committee for a Review of the Evaluation Data on the Effectiveness of NSF-Supported and Commercially-Generated Mathematics Curriculum Materials – the project resulted in the publication of "On Evaluating Curricular Effectiveness: Judging the Quality of K-12 Mathematics Evaluations". This report seeks to set a new evaluation standard for determining what kinds of materials and programs are effective in improving mathematics education.

2. Co-Founder of the UTeach program at the University of Texas in Austin – this is the largest secondary teacher education program for math and science teachers at a research one university. The program required Dr. Confrey to help build relationships between the College of Natural Sciences and the College of Education that strengthened the teaching of content related issues in preparing teachers. In that program, she also designed the course "Classroom Interactions," which dealt with issues of how to include all students in one's use of pedagogy and assessment. The project was awarded both a Collaborative for Excellence in Teacher Preparation grant and a Preparing Tomorrow's Teachers for Technology grant.

3. Principal Investigator of the Center for Inquiry in Science Teaching and Learning, a Center for Learning and Teaching, in St. Louis – This is a collaborative among the Science Center, the Saint Louis Zoo, the Missouri Botanical Garden, St. Louis Community College, University of Missouri in St. Louis and Washington University in St. Louis along with five school district partners including the City of St. Louis. The program is focused on collaboration, inquiry and the development of a regional professional development. This year, Dr. Confrey directed the research component that includes research on learning sciences, professional development and a regional database on student achievement. The program's commitment is to partner in the improvement of urban science and math education.

4. Vice-Chairperson of the Mathematical Sciences Education Board of the National Academy of Sciences – During a six year term, the board undertook a variety of studies, and Dr. Confrey served on committees to produce the volume, *Scientific Research in Education* and the current volume mentioned in number one, above. The board's goal was to advise the nation on issues of importance in mathematics education including equity, technology, professional development, curricular development and early childhood.

5. Director of the Systemic Research Collaborative in Education (SYRCE) at the University of Texas – This project drew upon Dr. Confrey's research on reform in urban schools, including a five year project with a high school in Austin with a high poverty, high minority enrollment. She also worked as a technical consultant for urban school reform as a consultant for the McKenzie Group in D.C. and worked with schools in Detroit, Chicago, Philadelphia, Phoenix, San Antonio and New Orleans. She served on the technology advisory committee for Milwaukee. These projects has given her a broad set of experiences working with urban schools.

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**TRA Content Expert Review Pg. 30**

## TEA Evaluation

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August 15, 2004

This evaluation was conducted by examining the Texas Reading Academy information contained in the Presenter Guides, Participant Guides, Resource Books, Transparencies, handouts, and references that were sent to me. My charge was to focus on the content of the information in grade 3, but I also examined K-2 grade levels. The main criteria in my evaluation were (a) whether the information included a comprehensive and accurate account of children's reading development, and (b) whether the advocated practices were supported by scientific research. I believe that the information included in the TRA is excellent on both criteria. Each module provides an up-to-date summary of key features of children's reading skills and what teachers can do to support beginning and independent reading. Some activities involve teachers' direct instruction, some are based on scaffolded instruction, and some are concerned with creating effective instructional environments. The instructional techniques in the TRA have been shown to be effective and practical. I am impressed by the thoroughness and high quality of the content for every reading skill at every grade level.

**Section 1. How does the Reading Academy professional development compare to "best practices" in teacher professional development?**

The format of the TRA allows teachers to learn the information in four-day workshops or through on-line activities. The face-to-face workshops seem more beneficial to me, based on my personal experiences, because teachers often learn through conversations and interactive activities with their peers. However, learning through on-line or CD activities seems valuable to me because the information is so clearly presented in an organized manner. In fact, I shall recommend the TRA information to colleagues teaching pre-service elementary education students.

The content of the information is grounded very well in current research on reading. There are many citations to the important work done by Texas researchers such as Foorman, Fletcher, Vaughn, and Hasbrouck, but there are also many other well-respected, national researchers cited. I was slightly disappointed to see so many references to non-empirical journals, such as *The Reading Teacher*, and so many citations of obscure and esoteric journals, but these were often cited because of their practical, clinical sources of information. In general, the TRA is based on esteemed research sources including the report of the National Reading Panel, *Preventing Reading Difficulties*, and the AEYC position paper on developmentally appropriate practices. These reports, and excerpts from them, are provided to teachers so they have access to the original documents and authentic evidence. The development of reading skills is clear in the research reports and the research is the basis for the scope and sequence of TRA information across K-3 grade levels. Furthermore, the TRA makes the connections between TEKS and TAKS explicit and clear so teachers can see how instruction and assessment are linked.

My evaluation is based on numerous sources including the research documents used in TRA (e.g., the National Reading Panel report) and my experiences working in CIERA, the Center for Improvement of Early Reading Achievement. I am also familiar with the research evidence provided by colleagues at Houston, Florida State, Oregon, and Michigan who contribute to the NICHD research program. The developmental accomplishments of children by grade level in *Preventing Reading Difficulties* provide a useful set of benchmarks, and the entire volume is an excellent summary of research on beginning reading. I also rely heavily on the work summarized by Adams (1990) and Stanovich (2000) listed in the references in section 3. My evaluation is also informed by my own research during the past 30 years,

such as the 1991 chapter in the Handbook of Reading Research, but these are only some of the sources for my evaluation. A more complete list of relevant sources is provided in section 3.

Yes, the information in the TRA is consistent with frameworks for reading and language arts developed by other states. I did not match the standards at each grade level with other state standards, but am confident that the alignment of standards across states is consistent with the TRA. For example, the Michigan Language Arts Framework (<http://mtn.merit.edu/mcf/ELA.html>) provides benchmarks for skills by grade levels that are very similar to the TEKS. The Massachusetts Curriculum Framework (<http://www.doe.mass.edu/frameworks/>) also provides benchmarks for early reading success that are congruent with the TRA. Minnesota has an exemplary professional development program with their Reading First grants that follows Barbara Taylor's model that she developed at CIERA with David Pearson and others. Both the format and content, including on-line delivery of information, of TRA are consistent with the best practices identified by Taylor and her colleagues. Additional information can be found at [http://www.extension.umn.edu/distribution/familydevelopment/components/7565\\_05.html](http://www.extension.umn.edu/distribution/familydevelopment/components/7565_05.html) or in publications by Taylor such as:

Taylor, B.M. (2002). Characteristics of teachers who are effective in teaching all children to read. Washington, D.C.: National Education Association.

Taylor, B. M., Pearson, P. D., Clark, K., & Walpole, S. (2000). Effective schools and accomplished teachers: Lessons about primary grade reading instruction in low-income schools. *Elementary School Journal*, 101, 121-166.

Taylor, B.M., Pressley, M., & Pearson, P.D. (2002). Research-supported characteristics of teachers and schools that promote reading achievement. Washington, D.C.: National Education Association.

The TRA provides many opportunities for teachers to be immersed in detailed information about children's early reading skills. The organization of information at each grade level compartmentalizes the skill information so that teachers can understand the complexity of each one. Word Study and Fluency, for example, are sometimes treated superficially in some professional workshops and reduced to simple activities such as word walls and repeated reading, but that is not the case for the TRA. The TRA delves into each skill in depth so teachers identify what children need to know, how to instruct each skill, and what to do with children who struggle mastering the skills. The pedagogical knowledge about fundamental techniques such as guided reading, scaffolded instruction, explicit instruction, modeling, and differentiated instruction are explained clearly. Many of these instructional approaches are incorporated into activities during the workshops so that teachers can experience them first-hand. I think the information about each reading skill and each pedagogical technique is a succinct and scholarly summary of the key evidence of what is learned and what works in classrooms.

There is an ambiguity in this question regarding "challenging learning goals" because the goals could refer to students or teachers. Let me address students first. It seems to me that there are many places where the goals are appropriate, but in some places, they are too low. In kindergarten, the focus is on exposure to letters, words, and sounds more than interacting with text. In first grade, instruction is aimed at pre-reading skills more than encountering environmental print or joint storybook reading. There is also very little concern for comprehension beyond occasional retelling. The focus on letters and phonemes seems more like kindergarten instruction than first grade to me. Other English speaking countries, from Great Britain to Australia to Singapore, expect children to begin reading from 5-6 years of age. I was disappointed that so little reading was expected of first graders in the TRA. In third grade, there seems to be more emphasis on skills such as fluency than comprehension and responding to text. Fluency norms are provided from Hasbrouck and Tindal with the suggestion that they may be too high. The focus on reading rate seems unduly narrow and ignores miscue analyses and comprehension. In general, the focus in third grade is too much on word recognition rather than reading for authentic purposes. Likewise, writing instruction in third grade is more focused on technical than conceptual aspects of composition.

Decoding text and writing sentences seem to be the goals of third grade instruction and they do not seem challenging to me.

The learning goals for teachers must be inferred from the materials and the general objectives for each module. If the goals are defined as identical to the content, then they are high because the content is rich. However, if the goals are defined according to what teachers are responsible for learning and doing, then the goals may be lower because there is no accountability for what teachers are learning. This is an important point because I think the TRA is didactic in both positive and negative senses. The negative sense here is that teachers are told what to learn and told what to do, but they are not accountable for meeting those goals. It is not clear to me or to any outside evaluator that the teachers who attended the workshops actually learned the content and incorporated the teaching practices in their classrooms. The same problem could exist for students if they are told rather than taught how to read. The learning goals for teachers could be explicit and could be reflected in assessments during the workshops or at the end of each module. There also could be follow-up observations or checklists to see if teachers use the information in the TRA.

Yes, I think the activities allow teachers to “grow” with the presentation of information. The activities allow some conversations, interactive instructional techniques, examination of research documents and handouts, and time for reflections. Of course, these are more successful in workshops than during on-line learning. As mentioned above, I think periodic assessments of what teachers are learning and how well they can implement the teaching techniques would strengthen their learning. The content of information is “deep” but whether the received curriculum is as deep as the intended curriculum is not clear to me. I have observed too many teachers misunderstand or ignore good information in PD activities to trust that they will have a depth of understanding from attending workshops or reading the TRA information alone. It is ironic that the accountability advocated for students to learn is missing from the PD for teachers. Perhaps districts can provide some follow-up workshops or peer in-services to maintain the knowledge provided in the compact workshops.

I think the TRA materials are weakest on assessment, for students as well as teachers. The assessments included in the TRA are standard and adequate, but they are not as helpful as they might be. For example, fluency assessments depend too much on reading speed and do not provide enough information to analyze miscue patterns or prosody. Teachers are not told how to use assessment data to identify and address students’ problems. Informal reading inventories could be used for these assessments and retellings and comprehension questions could be added. This is a problem in grade 3 because the TPRI is only a K-2 instrument and third grade teachers need better assessments of reading strategies and comprehension. They could be given more information, for example, about using informal reading inventories and other assessments to diagnose students’ strengths and weaknesses. Even the TPRI is inadequate in my view because it does a poor job of assessing comprehension. The passages are short, there are only 5 questions for each of the nine passages, and the questions are relatively easy. In my research, students who are average readers reach ceiling levels on the TPRI questions at every grade. Because the TPRI provides much more detailed evidence about decoding skills, phonological awareness, and word recognition, the diagnostic use of the TPRI and the implications for instruction are strongest for these basic skills. I think the TPRI would be better if comprehension and vocabulary were assessed as thoroughly as the other skills.

The materials could also do a better job connecting assessment to instruction. For example, in the module on differentiated instruction, it is not clear how to use fluency data to form groups. It seems to me that the groups will be formed on the basis of fast readers and, in grades 1-3, it will be equivalent to ability-based reading groups. The diagnostic use of assessments is most clear for simple skills such as letter-sound correspondence and least clear for vocabulary and comprehension. When to use scaffolded



instruction with struggling readers and ESL students, and what they need to be taught, could be made more evident with better assessments and clearer diagnostic links.

Yes, the TRA information across grades has a good scope and sequence. Each grade level provides developmentally appropriate information, although I think the accomplishments and instruction expected at the beginning of the year are often not differentiated from those expected at the end of the year. For example, most of the grade 3 reading behaviors should be evident early in third grade. Across grades, the TRA provides consistent labels, consistent use of terminology, similar graphic organizers, some, but not too much, redundancy in the description of pedagogical techniques, and good repeated citations of similar sources. I found no contradictions of information, goals, or methods across K-3. I think that a teacher could benefit from attending a TRA workshop every year for a different grade level, and it would consolidate and reinforce the same broad knowledge about reading skills and instructional techniques.

## **Section 2. Final Comments**

My overall evaluation of the TRA materials is very positive. The information provides clear summaries of key research on reading development, instruction, and assessment in ways that make it easy for teachers to learn. It is comparable to information in the best textbooks on reading education, and it is presented in a manner that allows teachers to implement the suggestions in their own curricula and with their own teaching styles.

As I read my notes on each module, I discovered several similar observations so I'll offer them as suggestions for the future or for extra attention by workshop leaders. They are not criticisms of the TRA; instead, I would like to see some additional information to supplement a few key topics.

First, I think the general pedagogical style of the TRA is based on a componential skill model in which children learn and refine multiple skills involved in reading. The scope is broad and comprehensive but the sequence is more "bottom up" than necessary. The instructional model is also based on teaching separate skills and runs the same risk of emphasizing basic skills over comprehending and using text, especially in kindergarten and grade 1. Another potential danger that needs to be identified and avoided is teaching skills in isolation. Teaching fluency, vocabulary, comprehension, and even phonological awareness should be done with actual texts that children read for various purposes. The vocabulary module, for example, can and should embed learning of new words in conceptually related texts and activities. The same theme should be evident in word study too. Comprehension strategies should be taught with text and not in isolation.

Second, more instructional strategies could be provided for the vocabulary and comprehension modules. New words can be learned through journal writing activities, discussions in Book Clubs, and writing in response to text. Comprehension strategies should be taught while reading various genres of text for a wide variety of reasons. I worry that graphic organizers and text structure, for example, will be taught in isolation rather than as aids for learning, studying, and composing.

Third, there could be a sharper distinction made between the strategies learned and applied by students and the instructional strategies used by teachers. Sometimes they are very similar, such as QAR or question levels, but sometimes they are very different, such as Reciprocal Teaching. Teachers often confuse the two when discussing reading strategies. For example, the Click and Clunk method is a good instructional strategy to help students develop their own strategies for monitoring comprehension. Teachers need to identify explicitly a list of instructional strategies that they can use.

Fourth, there should be assessments of teachers' learning embedded in the TRA activities. This can reinforce learning and enhance accountability. It can also show TRA presenters what teachers do not understand.

Fifth, the module on "putting it all together" can be strengthened. I like the 5 star lesson plan and the intent of the module but teachers will need more information and more practice to design classroom activities that integrate reading with other language arts. They need information on 4 Block instruction, for example, or similar methods to integrate reading, writing, small groups, etc. every day. There should also be more information about using basals effectively, teaching Guided Reading, and coordinating tutoring and special services with the regular curriculum. I would also like to see more information on instruction that extends for multiple days, such as inquiry-guided reading or problem-based learning.

Sixth, there are many minor points that I think need attention. This level of detail was not requested but some things need revising such as:

- Delete QuickWrites in the Writing module because of the lack of research evidence.
- In the Fluency scoring section, I would NOT count hesitations over 5 seconds as errors but I would count inserted words as errors.
- Word Study should begin in kindergarten and be evident at all grades.
- More comprehension strategies can be added because even the NRP report included more than the TRA.
- Self-monitoring on page 22 of the Writing module is a checklist for "Fix" or "OK" and this is not very good. Here (and other places) is a good opportunity to teach students to create and use rubrics to evaluate their own work.
- The diagnostic use of assessments needs to examine miscues patterns and comprehension in more detail.

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## OTRA Content Expert Review

## TEA Evaluation

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**Section 1: How does the Online TRA professional development compare to “best practices” in teacher professional development delivered through online mechanisms?**

In a recent meta-analysis of 155 empirical research studies of online learning (published since 1997) that focused upon student and instructor attitudes and perceptions, comparisons with traditional face-to-face learning, and instructional design, Sunal, Sunal, Odell, and Sundberg (2003) found that overall, “online learning is neither better nor worse than face-to-face classroom instruction” (p. 16). Yet though the authors acknowledged that research about online learning is too nascent at the present time to be conclusive, taken together, the examined studies do have strong potential to “inform us in regard to variables and best practices that may form the basis of future research” (p. 16).

The authors therefore created a 51-item “Checklist for Online Interactive Learning (COIL)” from the results of the meta-analysis, suggesting that it “could form the basis for evaluation of courses and modules used in online learning environments “ (p.17). As such, it is the only research-based evaluative instrument that focuses upon attributes of online learning environments as they are characterized by a large number of empirical studies. The instrument is currently being tested for reliability and validity. It is divided into four sections: student behaviors (8 items), faculty-student interaction (16 items), technology support (2 items), and learning environment (25 items). The final two sections can be used in this review because responses to their items are discernible from examination of online materials without observing student and instructor behavior in the Online Reading Academies. I respond to the items from these two sections of the COIL that apply to the TRA materials below.

Technology Support**Insure a low level of technological difficulties in accessing Web site and communication.**

The “user friendliness” of the Online Texas Reading Academy (OTRA) materials is nothing short of exemplary. The clarity and ease of use of the interface, the thorough and accessible documentation (presented in both text and video forms), and the well-conceptualized “details” of software design (e.g., showing how many minutes remain on a video that’s playing and automatically pausing a video when the user selects the “Menu” feature) should ensure a minimum of difficulty and a maximum of comfort for users at all levels of computer facility.

**Provide adequate, friendly, easy, continuous technical support.**

Though I didn’t test the response system by requesting technical information, the way in which it is designed – especially the continual building of searchable Frequently Asked Questions with accompanying responses – is impressive without being too complex for less experienced users.

Learning Environment**Use structured activities to provide an effective framework for online learning.**

The activities in the OTRA are clearly – and rather firmly – structured. One of my concerns here is that the activities may be *too* firmly structured to encourage higher-level and more deeply reflective thinking.

**Create social interaction through group collaboration to facilitate high achievement.**

This points to one of my primary concerns about the design of the OTRAs. Though participants can see randomly-selected responses to some activities written by other Academy participants, these are viewable in fewer than 30% of the activities offered, and – more importantly – there is no real group collaboration possible in the way in which the materials are now designed. Without opportunities for the building of an online professional community, learning from the OTRAs may be shallow, inflexible, and not productively reflective and reflexive (Collison, Elbaum, Haavind & Tinker, 2000; Conrad & Donaldson, 2004; Gillani, 2003; Palloff & Pratt, 1999 & 2001).

**Uses streaming audio for reading online.**

The OTRAs make good use of high-quality audio and video that are not bandwidth-intensive.

**Present course content in a manner that hierarchically structures the sequence of information.**

The sections and individual lessons in the OTRAs are very clearly and predictably sequenced and hierarchically structured. The common elements that appear in each section make the structure quite apparent, and therefore the sequence should be easy for students to follow.

**Organize Web site to enable student to interact with the content, other students, and instructor.**

As mentioned above, opportunities for interaction with other students is minimal and somewhat superficial, in that *interaction* per se doesn't happen; instead, some responses posted by other OTRA students can be viewed as a function of participant choice. Interaction with Academy instructors in a one-turn question-and-answer format is provided, but this seems to be presented more as a way to get help than to enter into professional dialogue. Interaction with content appears to be mostly unidirectional; content is communicated mostly in an online version of a frontal instructor lecture, adding the considerable advantages of random access and possibilities for review, pause-and-resume. The ways in which most of the activities are written, however, do not promote deeper-level interaction with and application of content presented.

**Create welcoming, safe, nurturing online environment.**

The aesthetics of the interface and the items displayed within it are pleasing, welcoming, and cohesive. Readily available assistance, the anonymous nature of reflections and questions shared, and the high degree of user control over the pace and sequence of learning within the OTRA should help learners to feel "safe." "Nurturing" is typically used to describe online environments in which a virtual community is built, so since this is not part of the OTRA's design, the term probably should not be used to describe it.

**Present problem-solving situations in a realistic context.**

The activities that require viewing a classroom-based video and using one or more handouts to analyze and/or respond to what is observed (e.g., the "Quick Phonics Screener" activity, in which the teacher-learner scores the responses of the student in the video, then checks her scores afterwards and compares her suggested instructional strategies with others' ideas) *do* present relevant problem-solving situations in a realistic context. Unfortunately, there are relatively few of these kinds of activities included in the OTRAs, and many more "activities" that require learners only to read material in a downloaded handout. Without structured, engaging ways to *apply* that information on higher levels, we cannot be sure that OTRA learners are truly mastering the concepts and ideas that the materials present.

**Provide opportunities for students to question instructor to insure accuracy of understanding.**

This is provided in an innovative way that allows many students to receive answers to their questions within a day or so. Allowing users to view others' questions and trainers' responses to those questions, displayed in conjunction with relevant segments of Academy material, is a particularly effective design aspect. Unfortunately, though, this personalized interaction probably does not lead to the sense of being part of anything but an amorphous professional community – and the sense of "online presence" deemed

important to the success of online teaching that encourages higher-level, reflective learning (Elbaum, McIntyre, & Smith, 2002; Harasim, Hiltz, Teles, & Turoff, 1995; Meyer, 2003; Palloff & Pratt, 1999) cannot be built with this minimal amount of online interaction.

**Create opportunities for students to communicate with each other to share understanding of course content.**

**Provide opportunities to collaboratively construct knowledge based on multiple perspectives, discussion and reflection.**

As addressed above, the design of the OTRA materials precludes the opportunities for students afforded by these important features of successful online learning.

**Provide opportunities for students to articulate and revise their thinking to insure accuracy of knowledge construction.**

Opportunities for these types of learning activities are largely missing from the OTRA materials. Several of the activities required provide students with opportunities to check their work (e.g., “Administering the Third-Grade Reading Screen”), but many do not (e.g., “Vocabulary Instruction & Lesson Design”). Even within the activities that provide opportunities for students to compare their responses with others’, there are no real opportunities for students to “articulate and revise their thinking.” Again, this makes the probable level of learning most often achieved with these materials rather shallow and binary.

**Include cooperative and collaborative learning to distribute workload through group and support female students’ preferred method of connected learning.**

**Allow time for reflection at end of course.**

This is provided in a small-scale way, but without response from other learners and/or instructors, I doubt that participating teacher-learners will devote much time, thought, or effort to this particular aspect of the program.

**Include “warm-up” period with lighthearted exercises aimed to help students get to *know one another*.**

The structure of the introduction to the OTRA reflects the overall structure and implied emphasis of the materials: presenting pedagogical content and corresponding instructional techniques in a top-down, hierarchical format. The OTRA introduction can’t help students to get to know each other because the building of an online learning community is not an aspect of these materials’ apparent intent.

**Provide opportunities for students to control online learning and structure it for *themselves*.**

There is quite a bit of user control built into the design of the OTRA in terms of its random access, use of bookmarks and sticky notes, and the possibility of posing questions to trainers and seeing others’ questions and answers. This type of control doesn’t, however, permit students to truly “structure” their online learning. The hierarchical nature of the materials provides the only structure that can be used by learners in the OTRAs.

**Provide discussion forums encouraging open and honest dialog.**

**Conduct a teleconference during and at the end of the course to discuss successes and problems.**

As mentioned above, these participatory elements are not part of the design of the OTRA materials. Though user feedback was probably solicited in the development of the online version of the Academies, I could not observe the mechanisms that were used to do so.

**Use computer conferencing to develop overall critical thinking skills.**

The lack of opportunity for students to interact with each other and one or more instructors *as a cohesive learning community* is the aspect of the OTRA materials that is of primary concern. Without opportunities – either online or on-site – for teachers to reflect, discuss, apply, and offer and receive constructive criticism as part of a professional community, the best that can be achieved with these materials is learning at the Bloom’s knowledge and comprehension levels. Opportunities for authentic application, synthesis, and evaluation of the important ideas and techniques presented in the OTRAs should be added as soon as possible.

Graham, Cagiltay, Lim, Craner & Duffy (2001) identified “seven principles of effective teaching” online as a pragmatic way to evaluate online courses. These principles have been used in many online evaluation efforts, which serves as a testament to their general acceptance by evaluation practitioners. Though some of these concepts overlap with the COIL items presented above, considering the design of the OTRA materials briefly in light of these principles may be helpful in summarizing the perceived strengths and weaknesses of the Online Academies.

*Principle 1: Good practice encourages student-faculty contact.*

As mentioned above, there is some opportunity for this in a question-and-answer format in the OTRAs, but this format precludes sustained and personalized student-faculty contact.

*Principle 2: Good practice encourages cooperation among students.*

This aspect is absent from the OTRAs design and materials.

*Principle 3: Good practice encourages active learning.*

Most of the learning encouraged in the OTRAs is passive. The activities that encourage learners to reflect, view others’ reflections, and especially those that ask teacher-learners to apply specific reading instructional techniques while viewing authentic classroom interactions, then check the accuracy of their responses afterwards, are the most active of the OTRA elements.

*Principle 4: Good practice gives prompt feedback.*

Most of the activities included in the OTRAs provide no feedback (in an instructional sense) at all.

*Principle 5: Good practice emphasizes time on task.*

Graham et al. (2001) use the following anecdote to illustrate this important principle.

One course we evaluated allowed students to work at their own pace throughout the semester, without intermediate deadlines. The rationale was that many students needed flexibility because of full-time jobs. However, regularly-distributed deadlines encourage students to spend time on tasks and help students with busy schedules avoid procrastination. They also provide a context for regular contact with the instructor and peers. Lesson for online instruction: Online courses need deadlines.”

According to this definition of how to encourage better time on task, the OTRAs are not structured to do so.

*Principle 6: Good practice communicates high expectations.*

Graham et al. suggest using “challenging tasks, sample cases, and praise for quality work” to communicate high expectations for learners. Though there are several sample cases presented in a most compelling way (i.e., with voice-overs by and for the teachers who are demonstrating reading instruction techniques in their classrooms) in the OTRA materials, the activities provided for students to do are not challenging, and no opportunity for external feedback is built into the system’s design. This could make one wonder about the level of true engagement experienced by OTRA learners.



*Principle 7: Good practice respects diverse talents and ways of learning.*

Ironically, though the OTRA materials very clearly and emphatically communicate the necessity for teachers to accommodate their students' diverse talents and ways of learning in reading instruction, there are few similar accommodations (e.g., multiple ways to respond to OTRA content through several differently-structured activities from which learners could choose) for the online learners themselves built into the Academies.

National standards for staff development online that were released by the National Staff Development Council (NSDC) in 2001 echo most – perhaps all -- of the precepts presented above. The NSDC addresses both context and process in their standards, asserting in summation that “if the learning processes involve learners only as receptacles for deposited information, learning will be shallow.” They suggest that “ongoing teamwork, discussions, product and project development, research, reflection, demonstrations, and modeling are just some of the ways technology facilitates active engagement of the learner,” and they strongly encourage the use of these and similar techniques in online staff development. Such features—with the notable exceptions of some demonstrations and modeling opportunities accessible through the classroom-based video segments—are either absent or only superficially available (i.e., reflection opportunities) in the OTRAs.

**Section 2: Final Comments: Does the Online TRA professional development meet your standards of high quality professional development?**

Unfortunately, in ways that were explained in some detail above, the OTRAs do not seem to be designed to encourage teachers' active and higher-level learning as strongly and consistently as they might be. Though user feedback and the successful pedagogical *application* (resulting in improved student learning) of what is presented in OTRA materials in participating teachers' classrooms will provide the most important and definitive evaluation of the efficacy of the OTRAs, based upon comparison of the OTRA materials to the research-based ideas above, the Online Academies appear to provide only minimally adequate professional development in reading instruction for teachers of students in grades K through 3.

If there is adequate time, support, and willingness on the part of the OTRA development team, though, there are a number of additions and changes to the OTRA materials that could significantly improve their efficacy, bringing them more into line with the standards and research-based evidence cited earlier in this evaluation. Specific ideas for these changes include:

- Expanding the reflections sections so that they appear in many more of the activities, and especially so that learners can engage in *ongoing and interactive* discussion of what they are learning, both with other learners and with instructors. In these discussions, classroom-based observations and experiences should be shared so that effective *application* of the content and techniques becomes probable.
- Encouraging teacher-learners to participate in the OTRAs *in school-based or geographically proximate groups*, with ideas for learning activities that specify what teachers should do within these local professional learning communities to deepen their understanding, application, synthesis, and evaluation of the pedagogical content and techniques presented. (For an example of how this can be done effectively with video-based and online materials, please see Canter Online's WebED courses (<http://www.webed.com/>), especially their later selections that help teachers learn to use the Internet in curriculum-based ways in their classrooms.
- Including *many* more examples of authentic student work in the OTRA materials, along with engaging learning activities that help teachers to analyze and make follow-up instructional decisions about how to respond pedagogically to these student work samples.

- Adding *many* more activities that ask teachers to do something in response to what they're learning in the OTRAs *with their own students in the classroom*. The first – and one of the very few times that this is suggested in the current version of the OTRA materials is in the “Collaborative Story Mapping” activity in section 5 (of 8). Without direct and authentic application of content and process that teachers are learning in the OTRAs, there is little chance of effective transfer of their learning into effective pedagogy.
- Differentiating (with names and icons) between activities that require active learning/application of content and process information presented and more passive activities that require only the review of downloaded information. Many more of the active learning activities should be present in the OTRAs than the passive learning activities.
- Providing at least one corresponding learning activity for *each* set of concepts covered. Merely reviewing information online (e.g., relevant TEKS) will not ensure that teacher-learners can effectively *apply* that information using higher-level professional decision-making skills.
- Including *even more* classroom-based demonstrations of concepts and techniques presented in the OTRAs, and following *each* with at least one active learning opportunity for teacher-learners that has some sort of feedback mechanism built into it, so that misunderstandings cannot persist. The classroom footage will probably emerge as the most powerful aspect of the OTRA materials, and as such, it should be emphasized even more than it now appears to be.
- Repositioning the lists of references so that they *end* each section, rather than begin it, and removing the requirements for learners to review the references. It was unclear what the benefit to the learner is to review a reference list, the contents of which may be unfamiliar and/or unavailable.
- Adding a module that helps teachers learn about the specifics of copyright and fair use as it can apply to reading instruction. The OTRA instruction to “...please check for a copyright notice on each handout. Many of the reprinted articles are copyrighted and cannot be reproduced, while many of the handouts can be reproduced as long as they are done so for educational purposes and not sold for profit...” is vague and will not help teachers in a concrete way to use OTRA materials –or, more importantly, materials that they choose to use with their students beyond what is included in their basal reading series -- in accordance with copyright laws.

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## TRA & OTRA Delivery Expert Review

### Section 1. How does the Texas Reading Academy (TRA) professional development compare to “best practices” in teacher professional development?

1. *Is the TRA professional development grounded in research and clinical knowledge? Please describe how you reached your conclusion and identify specific research you used to make your decision.*

The TRA professional development design contains many of the characteristics of effective professional development for principals and teachers. It is grounded in research and clinical knowledge. Primary resources that contributed to this conclusion were National Staff Development Council’s Standards for Staff Development (2001), *Designing Powerful Professional Development* (2002), and *Powerful Designs for Professional Learning* (2004).

The National Staff Development Council’s (NSDC) Standards are research-based and document the connection between staff development and students’ learning. “Context, process, and content standards are all necessary to ensure that staff development improves student learning. If one dimension is ignored, the intended results are far less likely to be achieved” (NSDC 2001, p. 2). While the Standards, NCLB Definition of Professional Development, or Texas-adopted Professional Development Imperative are not mentioned specifically, or included as references, the TRA did incorporate elements of a majority of the Standards. There are however references to research grounded in pedagogical content knowledge in the field of reading.

In *Designing Powerful Professional Development* (2002), Dennis Sparks writes effective professional development that produces high levels of learning and performance for all students and staff members:

- Surround teachers with a culture and supports them with structures that encourage professional learning;
- Engage teachers in professional learning that is standards-focused, intellectually rigorous, part of their daily work, and continuous;
- Deepen teachers’ knowledge of the content they teach;
- Expand teachers’ repertoire of research-based instructional skills to teach that content;
- Provide ongoing classroom assistance in implementing new skills;
- Create small teams of teachers who meet several times a week to plan lessons, critique student work, and assist in problem solving, among other tasks;
- Provide teachers with the classroom assessment skills that allow them to regularly monitor gains in student learning resulting from improved classroom practice.

The TRA professional development incorporates some of these criteria. For example, two of the Academy goals (Participant’s Guide, p. 7):

- To enhance your knowledge of instructional practices that promote reading success for all students
- To share research-proven strategies that you can implement easily to increase reading achievement for all students

are threaded throughout the four-day workshop (e.g. Vocabulary: Concept Word Map, Participant’s Guide p. 35; Word Study: Grouping Work Study Instruction, Participant’s Guide p. 35; Differentiated Instruction: Grouping, Presenter’s Guide p. 14 cites the research and history; Writing: Presenter’s Guide p. 7 talks about the research support). The trainers emphasize the importance of the application of research-based practices by teachers (see additional background information that references this goal.) And while it appears substantive reading research was used to guide the development of TRA, this

reviewer anticipates the content reviewers to have more specific knowledge on the quality of the research referenced and applied. It also seems important to note in the Introduction (p.2), the Texas Third Grade Teacher Reading Academy (Revised) was developed by researchers at the Center for Academic and Reading Skills in conjunction with the Texas Education Agency and Education Service Centers IV and XII.

Within the limitations of a workshop design, the TRA designers work to create a clear, engaging and meaningful learning experience for participants. The four-day workshop focus is on reading so one would conclude teachers' content knowledge and understanding are enhanced. However, without a pre-assessment and post-assessment of reading knowledge, skills, and application, it would be difficult to determine the depth of learning.

As stated previously, several NSDC standards are identifiable in the training. For example, Standard #11 Teaching Quality calls for teachers to develop classroom assessment literacy skills. This content is addressed in the following lessons: the Quick Phonics Screener (Word Study: Presenter's Guide p. 8a); Monitoring Student Progress (Word Study: Presenter's Guide p 32); and Fluency Probes (Fluency: Presenter's Guide p. 11a).

In conclusion, the reviewer finds evidence of professional development standards embedded into the design of the reading academy.

2. *Is the TRA professional development grounded in national and/or state professional development standards? Please describe how you reached your conclusion and identify specific standards you used to make your decision.*

The *National Staff Development Council's Standards for Staff Development* (2001), the Texas Professional Development Imperative, and the NCLB definition of effective professional development are consulted in the analysis. The NSDC Standards provide the framework for the response. A review of the TRA instructor and participant's manual indicates some alignment with the following National Staff Development Council's (NSCD) Standards:

**Resources:** *Staff development that improves the learning of all students requires resources to support adult learning and collaboration (NSDC, p. 12).*

"While the vast majority of educators' professional learning should occur during the day in collaboration with colleagues, it is also important that they acquire knowledge from sources outside the school by attending workshops and state and national conferences," (p. 12). The TRA is a four-day workshop. "The Academy's development was funded as part of the Texas Reading Initiative, which began in 1996 and continues today." (Introduction: Presenter's Guide: Goals of the Texas Reading Initiative p. 2).

"Professional development resources may fund trainers and provide stipends for lead teachers," (NSDC, p. 12). While not directly stated in the documents, the conclusion is drawn that TEA professional development resources are used to fund the workshop trainers. Furthermore, the participants receive a variety of materials (Introduction: Presenter's Guide: Participant Materials p. 4) such as a Teacher's Guide, Reading Academy Resource Book, and a set of sixteen books.

**Data-Driven:** *Staff development that improves the learning of all students uses disaggregated student data to determine adult leaning priorities, monitor progress, and help sustain continuous improvement (NSDC, p. 16).*

"Data from various sources can serve a number of important staff development purposes. First data on student learning gathered from standardized tests, district-made tests, student work samples,

portfolios, and other sources provide important input to the selection of school or district improvement goals and provide focus for staff development efforts,” (NSDC p. 16). TRA incorporates the use of data in several activities: Using Assessment to Plan (Word Study: Presenter’s Guide p. 9) Reco’s Story (Word Study: Handout 11); and Differentiated Instruction: Model for Success (Differentiated Instruction: Presenter’s Guide p. 11). The References section in the Presenter and Participant’s Guides list sources to validate the value of data analysis (e.g. *Effects of long- and short-term goal assessment on student achievement* (Fuchs, p. 3).

“A second use of data is in the design and evaluation of staff development efforts” (NSDC, p. 16). The reviewer was unable to locate any plan to collect data from participants to contribute to a program evaluation.

**Evaluation:** *Staff development that improves the learning of all students uses multiple sources of information to guide improvement and demonstrate its impact* (NSDC, p. 18).

“Evaluation design is determined by the purpose for the evaluation to improve something or to judge its worth” (NSDC, p.18). The reviewer infers from the scope of this evaluation that TEA is interested in assessing the impact of the TRA on teacher practice and student learning in the state and intends to use this report to strengthen its efforts.

“Good evaluation design gathers information beyond an assessment of participants’ immediate reactions to workshops” (NSDC, p. 18). Unfortunately the reviewer is unable to determine how the state intends to ensure teachers use the materials, teachers receive the support required to make changes in classroom instruction, and that student learning increases as a result of Academy participation.

**Research-Based:** *Staff development that improves the learning of all students prepares educators to apply research to decision making* (NSDC, p. 20).

“A problem in the use of the term “research-based” is that it is applied equally to practices that vary considerably in the scientific rigor used in their investigation” (NSDC, p. 20). The use of educational research contributes to sound instructional decisions. The introduction of the Reading Academy offers the following goal: “To share research-proven strategies that you can implement easily to increase reading achievement for all students.” (Introduction: Presenter Guide p. 3). “Weighing the Evidence” in the Introduction (Presenter’s Guide p. 5), describes research-based resources (*National Reading Panel* and *Presenting Reading Difficulties in Young Children*). Participants receive a resource book *Put Reading First* and scan the research in another exercise. Many sections of the TRA cite research as part of the justification for the inclusion of a topic. (e.g. Word Study: Presenter Guide, What’s Works, p. 14 refers to the scientific evidence from the National Institute for Literacy; Fluency: Presenter Guide p. 3, 4, Why is Fluency Important; and Writing: Presenter Guide: Research Supports Writing p. 7).

The TRA emerged from the work of a statewide group of educators representing the Texas Education Agency, the University of Texas Center for Academic and Reading Skills, The University of Texas Center for Reading and Language Arts, Education Service Centers, and schools districts throughout the state of Texas (Acknowledgements, Participant Guide). Slides for the presentation offer references when appropriate. (e.g. What is Vocabulary? P. 1 – Reference: National Institute for Literacy; Using Context Clues, p. 17 – References: Vaughn & Klingner) An extensive list of References included in the Presenter and Participant’s Guides and a set of books given to the participants provide supporting evidence for the reading practices. Much attention is paid to discussing the research behind the content and pedagogy taught in the Academy, as contrasted to no research cited as the basis for the TRA professional learning design.

**Design:** *Staff development that improves the learning of all students uses learning strategies appropriate to the intended goal* (NSDC, p. 22).

The NSDC design standard emphasizes several aspects of professional development necessary to enable adults to acquire new knowledge and skills and transfer that knowledge to classroom practice. Set

within a workshop setting the TRA is limited in addressing the diverse strategies offered in the Design standard. However, within the workshop setting the designers have the opportunity to address many important aspects of professional learning. Some examples follow of where the designers align practice and where opportunities for alignment were missed.

A variety of activities to support each of the six reading components are included in the workshop design. (e.g. Vocabulary: Concept Map, Presenter Guide p. 16 – participants complete a concept map as a group; Word Study: Making Analogies: Basic Steps, Presenter Guide p. 18- participants practice using dry-erase boards; Comprehension: Story Maps, Presenter Guide p. 27 – groups of 4 complete a story map). Several activities use samples of student work (e.g. Word Study: Monitoring Student Progress, Presenter Guide p. 32 – a third grade writing sample and Writing: Snapshot of Student Writing p. 25 and Handout 9 in Presenter’s Guide – ask participants to analyze Jerry’s writing).

Workshop designs must be supported by “numerous live or video models of new instructional strategies, demonstrations in teachers’ classrooms, and coaching or other forms of follow-up if those strategies are to become a routine part of teachers’ instructional repertoire” (NSDC, p. 22). Video models of new instructional strategies are included in the design (e.g. Vocabulary: Context Clues, Presenter’s Guide p. 20 – participants watch a video in which a teacher models the use of context clues; Comprehension: Story Maps, Presenter’s Guide p. 27 – participants view a video as a follow up; Comprehension: Get the Gist, Presenter’s Guide p. 14 – the presenter defines the strategy, participants watch it in action and follow up with a table discussion). While videos are used to demonstrate practices described, there are few opportunities to practice and receive feedback from presenters.

**Learning:** *Staff development that improves the learning of all students applies knowledge about human learning and change (NSDC, p. 24).*

“It is important that the learning methods used in professional development mirror as closely as possible the methods teachers are expected to use with their students” (NSDC, p. 24). The TRA staff development utilizes learning experiences representative of strategies included for teachers to use with their students. For example, in the Word Study section the lesson on Chunking Multisyllabic Words (Presenter’s Guide p. 24) a video shows teachers how to teach the strategy and models it with students. Presenter slides describe basic steps for use with students. Handout 10 is a Multisyllabic Words List. Next, teachers discuss how to help students apply scaffolded practice (Presenter’s Guide, p. 26). During the session on comprehension, a Content Web strategy (Presenter Guide p. 26) is introduced and participants practice completing a web using one of the subject areas in the Teacher’s Edition. The final session, Putting It Together, teachers plan a 5 Star Lesson (Presenter’s Guide p. 6). They plan the lesson with a partner using a Teacher's Edition of their choice. Teachers also look at a reading lesson in their Teacher’s Edition and evaluate the effectiveness of the strategies.

“To improve student achievement, adult learning under most circumstances must promote deep understanding of a topic and provide many opportunities for teachers and administrators to practice new skills with feedback on their performance until those skills become automatic and habitual. Such deeper understanding typically requires a number of opportunities to interact with the idea or procedure through active learning processes that promote reflection such as discussion and dialogue, writing, demonstrations, practice with feedback, and group problem solving” (NSDC, p. 24). Ambitious goals such as the “ultimate goal of the Texas Reading Initiative is to ensure that all students will read on grade level or higher by the end of third grade and continue reading on or above grade level throughout their schooling.” (Introduction: Goal of the Texas Reading Initiative, Presenter Guide p. 2) require deep learning and deep changes from many. The four-day workshop provides teachers opportunities to practice strategies following direct instruction by the presenter. (e.g. Vocabulary: Vocabulary Instruction and Lesson Design: Presenter’s Guide p. 25 – After learning about strategies such as Word Consciousness, Concept Word Map, and Using Context Clues, participants apply what they know about effective vocabulary instruction by working with a partner using either a Science or Social Studies Teacher’s Edition. They discuss how to teach a strategy and select one way to visually represent it. Teachers share

lessons with the group.) This example is also indicative of active learning processes incorporated into the TRA professional learning. Nevertheless, while deep understanding of reading is emphasized, results are limited within the confines of a four-day workshop.

**Collaboration:** *Staff development that improves the learning of all students provides educators with the knowledge and skills to collaborate (NSDC, p. 26).*

The structure of the TRA indicates the designers recognize the value of collaborative learning among participants, however, it is disappointing that the same value is not addressed in follow up expectations and provisions of support for attendees. “Organized groups provide the social interaction that often deepens learning and in the interpersonal support and synergy necessary for creatively solving the complex problems of teaching and learning” (NSDC, p. 26). The TRA design affords teachers opportunities to dialogue in partner settings, table groups, and the whole group. Responses are written on handouts, dry-erase boards and sticky notes (e.g. Comprehension: After Reading – Summarizing p. 18 – the trainer explains the strategy, participants summarize the “Water Cycle” with a partner, write answers on sticky notes and share with the group. Word Study: Spelling p. 28 – participants find a partner at another table and discuss ways they teach spelling). Collaborative activities contribute to individual and group learning.

**Equity:** *Staff development that improves the learning of all students prepares educators to understand and appreciate all students, create safe, orderly, and supportive learning environments, and hold high expectations for their academic achievement (NSDC, p. 30).*

“Teachers’ knowledge of their students is an essential ingredient of successful teaching” (NSDC p. 38). “It is important that staff development equip them with ways of providing various types of instruction based on individual differences” (NSDC p. 38). TRA goals align clearly with this standard. The Academy’s “ultimate goal... is to ensure that all students will read on grade level or higher by the end of third grade and continue reading on or above grade level throughout their schooling”(Introduction: Presenter’s Guide, Goal of the Texas Reading Initiative, p. 2). The presenter in the Introduction p. 2 tells participants that they will leave the four days of training with “many more tools for helping all students strengthen their reading skills and for accelerating the progress of struggling readers.” The introduction includes a video illustrating the ethnic cultural diversity found in Texas classrooms and how to understand and meet the needs of English Language Learners (See Introduction: p. 7b and 10). The teacher’s role in helping dyslexic students become better readers is illustrated via a video (Introduction: p12) and references *The Dyslexia Handbook*. Another video is shown (Introduction: p. 13) that depicts the characteristics and needs of the advanced or gifted learners. Participants are involved in activities that look at teaching the same concept to English and Spanish learners (e.g. Vocabulary: Presenter’s Manual p. 22 – teachers work with a partner, compare the Spanish and English versions of using cognates and list words with the same Latin or Greek root. Comprehension: Using Letter-Sound Correspondence, Presenter’s Manual p.12 – participants look at a “Sound Pronunciation Guide” for English and Spanish).

The Academy includes a session on Differentiated Instruction that provides assessment tools (e.g. Determining the Student’s Fluency – Participant’s Guide p. 21 and Comprehension p. 23; Flexible Groups – Participant’s Guide p. 39), Flexible Groups (Participant’s Guide p. 39), and strategies for extending learning for all students through literacy-related centers (Participant’s Guide 47 and 49).

**Quality Teaching:** *Staff development that improves the learning of all students deepens educators’ content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately (NSDC, p. 32).*

“Successful teachers have a deep understanding of the subjects they teach, use appropriate instructional methods, and apply various classroom assessment strategies” (NSDC p. 32). With an ambitious goal to ensure that “all students will read on grade level or higher by the end of third grade and



continue reading on or above grade level throughout their schooling” (Presenter’s Guide p.2), the four-day Academy provides teachers with instructional practices developed by researchers at the Center for Academic and Reading Skills in conjunction with other educational institutions. The teaching strategies are varied and engage the participant in activities that are aligned with the content. (e.g. Word Study: Assessing Phonic Skills, Presenter’s Guide p. 8a – teachers learn about the Quick Phonics Screener as a monitoring tool. They practice it and view a video. Fluency: Reading Levels – Presenter’s Guide p. 13 – the presenter refers the group to a handout and explains the strategy. Teachers practice calculating reading levels and write their answers on a group chart.) TRA content aligns with the expectations of this standard.

Professional Development Imperative Standards are incorporated in the TRA as follows:

- Results-driven learning (see NSDC Standard: Data Driven, Evaluation)
- Student-centered learning (see NSDC Standards: Learning, Equity, Quality Teaching)
- Flexible groups (See Differential Instruction: Participant’s Manual p. 39, 41, 45)
- Collaboration (See NSDC Standards: Collaboration)

### *3. Does the TRA professional development provide teachers with strategies for monitoring and assessing student progress and using those data to adapt instruction?*

Monitoring and assessing student progress is essential to ensuring success in reading. It is critical if teachers are to meet the goal of this workshop. " All students will read on grade level or higher by the end of third grade and continue reading on or above grade level throughout their schooling.” In order to accelerate the progress of struggling readers, teachers must be equipped with a variety of monitoring strategies. Consequently, throughout the workshop, participants experience strategies for monitoring and assessing student progress and using data to adapt instruction. Some of these opportunities follow:

Word Study, Instructor Guide

p. 8a Assessing Phonic Skills: Quick Phonics Screener

p. 32 Monitoring Student Progress

Fluency, Instructor Guide

p. 11a Fluency Probes

p. 13 Reading Levels

Comprehension, Instructor Guide

p. 31 Monitoring Progress

Differentiated Instruction, Instructor Guide

p. 4 Third Grade Reading Screen

Writing, Instructor Guide

p. 24 Monitoring Writing Progress

Note: There is little evidence of the same expectation applied to adults and their abilities to use the strategies presented in the Academy.

## **Section 2: Final Comments: Does the TRA Professional Development Meet Your Standards of High Quality Professional Development?**

My standards for professional development are grounded in the standards championed by the National Staff Development Council and developed in collaboration with 18 national professional associations. NSDC’s Standards are “grounded in research that documents the connection between staff development and student learning” (NSDC, p. 2). Context, process, and content standards are necessary to ensure that staff development improves student learning and must function simultaneously. The limitations of a four-day academy model are evident when one examines the alignment of the Academy with the NSDC Standards for Staff Development. Certain standards cannot be addressed within this design.

**Context:**

**Learning Communities:** (NSDC, p. 8) “Staff development that has as its goal high levels of learning for all students, teachers, and administrators requires a form of professional learning that is quite different from the workshop-driven approach. The most powerful forms of staff development occur in ongoing teams that meet on a regular basis, preferably several times a week, for the purpose of learning, joint lesson planning, and problem solving” (NSDC, p. 8). The Learning Community structure is essential to ensuring that teachers have the ongoing support necessary to successfully achieve the goals of the Academy. While TRA can ask that teachers work collaboratively during the Academy, it does not appear designed to support the learning community format necessary in the school to support school-wide implementation of the practices addressed.

**Leadership:** (NSDC, p. 10) In addition, “quality teaching in all classrooms necessitates skillful leadership at the community, district, school, and classroom levels” (NSDC, p. 10). Without participation in the Academy or another institute designed for school leaders, it is less likely that principals will be able to provide the necessary support and follow up to ensure successful implementation. Convening principals and teachers together develops a shared language for teaching and learning, clear expectations, and instills the accountability necessary for results. In addition, creating a context supportive of professional development requires advocacy at every level.

**Content:**

**Family Involvement:** (NSDC, p. 34) Education is a partnership between the school, home, and the community. To maximize student achievement, teachers must be knowledgeable about various ways in which families and community members can be involved meaningfully in school. TRA can take advantage of this research by providing teachers with strategies for engendering support at home.

Because there were not specific references to any Standards for Staff Development by the trainers or in the training materials, it became necessary for the reviewer to infer from and search for the alignment of actions with research-based standards. This contrasts with the more deliberate effort on the part of the trainers to familiarize the participants with the research base for content and pedagogy as it relates to reading. While the reviewer was able to pinpoint some alignment with nine of the twelve standards, there are aspects of all standards that were not addressed by the TRA and the lack of attention to these issues may again limit the impact of the TRA on the goals desired.

Other questions/comments that surfaced in the assessment of TRA’s professional development were:

**Resources:** Research tells us that when most teachers’ learning occurs away from the school, it can lead to fragmentation and incoherent improvement efforts. What resources are going to be provided by the state to support the follow up necessary to ensure statewide implementation? Is there a role for technology to play in this plan? How are teachers expected to work with their colleagues to prevent this from occurring? How are teachers to access the time necessary to develop new lessons consistent with the strategies presented in the workshop, and access support to implement a more challenging new strategy?

**Data-Driven:** What formative and summative data are being gathered to assess and impact the effectiveness of the Academy on teacher practice and student learning?

**Evaluation:** While this study is one example of the state’s interest in the impact of the TRA, what other data is being collected to measure the impact of the TRA on participants, their teaching, and their students?

**Design:** How does the TRA design consider the intended outcomes when it provides opportunities for participants to experience different designs? How will the TRA support long-term and in-depth professional learning, engagement in collaborative learning teams, and professional learning that involves extensive support for the implementation of new practices over a two-to-three-year period?

**Learning:** How do the trainers use “Change” research specifically CBAM and Stages of Concern to modify training in progress? Every adult is treated as if they begin with the same level of expertise and experience. This “one design for all” contradicts the principles of adult learning and respect

for adult life and teaching experiences. How can the design be adjusted to allow for some modifications at the beginning and as appropriate throughout the Academy?

**Collaboration:** Are there opportunities to create an online component to foster support for teachers in their implementation of the TRA strategies and practices? Will school system leaders be taught the importance of collaboration to supporting complete implementation? Will teachers be given opportunities to continue networking with teachers they meet at the TRA?

Because Context, Process, and Content Standards are equally important in ensuring impact from investments in professional development it is disconcerting when specific standards and or key issues of other standards essential to promoting staff development results are not addressed. Concerns with design center in the areas of learning communities, leadership, resources, data-driven, evaluation, design, learning, collaboration, and family involvement. These concerns directly correlate to the limitations of comparing a four-day workshop to comprehensive standards for professional development that produces improvement in learning.

In conclusion, even though the TRA professional development was not explicitly Standards-based, elements of nine of the twelve NSDC Standards and the PDI were incorporated into the four-day Academy. The strongest aspects of the Academy were its alignment with aspects of the Standards on design, learning, equity, and teaching quality. Activities and strategies supported the goals and reflected what teachers should replicate with their students. A four-day focus on reading expanded teachers' repertoire of research-based instructional skills and deepened their content knowledge. Opportunities to dialogue and reflect with colleagues were embedded in the design.

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## TMA Content Expert Review

TEA Evaluation  
Jere Confrey  
August 21, 2004

### Section 1: How does the Texas Mathematics Academy professional development compare to “best practices” in teacher professional development?

*1. Is the TMA professional development grounded in research and clinical knowledge of teaching and learning in the field of mathematics education? Please describe how you reached your conclusion and identify specific research you used to make your decision.*

The materials are based on current thinking in research in mathematics education. However, it should be recognized that they draw on three specific areas. Other points of view are not as well represented, if at all. This question is responded to for each of the three specific areas of research with additional points of view suggested.

#### Standards-Based Instruction

The materials make proper use of the research on implementation of standards-based approaches with accountability (Elmore, 1990; Smith and O’Day, 1991; Fuhman, 2001). According to this research, it is important to carefully link professional development to the state’s standards and accountability system and to tie these into the instructional core of curriculum, instruction and assessment. The TMA materials repeatedly link to the state’s TEKS, reference to the TAKS exam, and link to the state’s diagnostic system. Using curricular webs, the concept of vertical alignment, and careful sequencing of content, the materials are closely related to the state’s choice of directions for mathematics instruction. In general, this is a wise choice, as it ensures relevance of the professional development to the demands and pressures of schools.

One major technical issue is ignored: the results of a TEKS test cannot be interpreted at the level of individual strands, because difficulty is only equated at the whole test score, and from one test to the next, and items may vary in difficulty from year to year (Confrey and Carrejo, 2002a, b). Similarly, the use of the diagnostic testing system at the level of concept strands should not be interpreted in absolute terms, but only in relation to the specific skills and their difficulty tested, which cannot be directly linked to the TEKS scores. Summary scores may mask the necessary specificity of teacher feedback needed to guide instructional decision-making. This deserves explicit discussion in the materials.

A caveat is noted: it has been well demonstrated that too-strict adherence to the state’s testing system is likely to lead to curricular narrowing (McNeil and Valenzuela, 2001). Two weaknesses of the professional development materials may be attributed to this: more interesting applications with multi-step problems are missing, and the materials are insufficiently challenging for stronger groups of teachers, suggesting that the targets for performance may be too low.

#### Research on At-Risk Learners

The second dominant area is one particular slice of the research on teaching of at-risk learners, drawn from special education (pg. 16, Day 1, 5-6). According to one school of thought, the way to meet the needs of slow learners is to take a diagnosis and prescription approach. This is based in the four-point

model articulated as clear demonstration, guided student practice, peer practice, and independent practice. This is an adaptation of direct instruction or active mathematics teaching (Good and Grouws, 1983). It should be noted that direct instruction produced both the strongest and the weakest results in these studies.

The positive aspect of the materials is the way they are connected to the research on student errors. The listing that consists of wrong operations, defective algorithms, computational errors, random responses, and overgeneralizing or overspecializing is an interesting set of categories. A criticism of this list is that it fails to draw deeply on an interesting literature on understanding the source of these errors in relation to alternative conceptions and misconceptions. For instance, the literature on “multiplication makes bigger and division makes smaller” is alluded to, but how it connects to “conservation of operations” (Greer, 1988 or intuitive primitives (Fischbein, 1985) is missing. Treating these errors leads one to attempt efficient means of elimination or eradication. Treating them as misconceptions requires one to tap into the larger conceptions and related ideas, to determine what is powerful in these ideas, and be more explicit why other choices are made mathematically.

A second positive aspect is the discussion of procedural fluency and mental arithmetic. It is nicely linked to the work on “Adding it Up,” and contains an appropriate acknowledgment of the importance of students’ gaining proficiency in multiplication and division facts. Again, it would be advisable to be sure that interesting methods for doing this are included, such as, for example, considering all possible integral side lengths for a box of area 48--which builds procedural fluency--but not based solely on speed of solving the problem. Also, it should have been pointed out more clearly how various properties (associative, distributive) contribute to procedural fluency.

Tied to this is the treatment of the calculator. The materials should be commended for bringing forth the perspective that there is controversy on the appropriate use of calculators (Day 3, pg. 5). The treatment is fair, explicitly linking it to the TEKS, PSSM, and “Adding It Up.” The opening statement “While calculators are appropriate for many other learning activities, students should have a good foundation in fact and algorithmic fluency prior to allowing the m to do this kind of calculation on the calculator,” (Day 3, page 5) is close however to making an overstatement. It would be better to say that they should avoid permitting them to rely on calculators, and use that reliance to deter fluency; however, problem solving activities which demonstrate the need for the skill even with calculators may also motivate that learning and help encourage proficiency to develop.

There is, however, a contrasting literature on the use of standards-based, constructivist approaches with at risk students. One set of studies by Woodrow and Baxter (1997, 2001) showed that 1) approaches that use more open-ended, contextually based and student-centered tasks showed significantly stronger results overall, for all quartiles of students and 2) while the effects were less strong for at risk students, the approaches could be adapted to meet their needs with certain pedagogical strategies. Furthermore, other research, including work on critical race theory (Tate, 2002 ), show that students who are at risk can find school alienating, dull, and culturally insensitive. For these students, more authentic tasks showing interesting complexity and challenge are needed to circumscribe the instruction and make the work relevant and meaningful. This literature seems to be ignored. The assumption is that all issues of equity and gaps will be solved by solid but traditional instruction. There is little doubt that this would contribute significantly, but interest, motivation, and mentoring on setting goals and expectations would provide a more advisable approach to addressing gaps. Professional development materials designed to reduce the gap must include direct discussions of racism, sexism, and classism, and how these are detrimental to school practices in mathematics.

### **Research on Multiplicative Reasoning and Rational Number**

The third area of research that is used extensively and generally competently is the research on multiplicative reasoning. The decision to focus on this area and its relationship to learning algebra is wise. The ways in which a careful and precise sequencing of topics facilitates student entry into the complex arena of rational number is also a positive quality of the TMA materials. The materials move through discussions in the first set of materials of multiples, equivalent fractions (using fraction bars), ratio, and then (in the second set), rates, percents, and scaling. Evidence of links to research is evident in the use of tables of data to describe equivalent ratios, the use of graphical representation, and the use of fraction bars in ways consistent with Cuisenaire rods. Emphasis on the unit ratio and its consistent use to link to percentage is quite extensively documented in research.

There are places where one might critique the use of the research. In general, the materials are not mathematically challenging enough. Three examples illustrate this concern. 1) There is no discussion of prime numbers in the multiples lesson, where teachers are asked to find common multiples (Day one pg 20). The algebra connection here is weak ( $y = mx$  where  $m$  is the number being multiplied). Prime numbers need to be used in finding LCM and GCF. 2) Similarity is introduced using rectangles. (A much better way is to use triangles as they demonstrate the importance of congruence of angles; an issue that is confusing in rectangles since all rectangles are composed of 90 degree angles but all rectangles are not similar). 3) The definitions and connections among ratio, rate, and percent lack consistency. A ratio is not ever defined but is described as “ratios describe relationships between quantities”(p. 10) and then, “ratios show multiplicative relationships” p. 12. Then rate is later defined as “A rate is a comparison of two quantities by division”. And finally “a percent is a rate per hundred.” These varied statements can be made formally consistent, but the materials do not do that explicitly.

All in all, it is surely correct to say that these materials are grounded in the research and clinical knowledge of teaching and learning mathematics. There are, however, ways in which that use of the research base is limited, and alternative perspectives need more careful inclusion. Furthermore, overall the materials need more mathematical challenge and careful attention to how formal ideas are presented with consistency and strength.

*2. Is the TMA professional development grounded in national and state mathematics content and teaching standards? Please describe how you reached your conclusion and identify specific standards you used to make your decision?*

The answer to this question is a resounding yes. This was largely addressed in question one under the first set of research. Throughout the document, there are references and exercises with the TEKS and the questions used in the training are closely like those in the TAKS exams—especially around rational numbers and their applications. The use of curriculum webs focused on TEKS is another example.

*3. Does the TMA professional development offer opportunities for teachers to become deeply immersed in mathematics content and pedagogical content knowledge?*

The materials do a solid job linking content knowledge with pedagogical content knowledge. This is evident, for instance, in the materials in which teachers examine student work to diagnose errors. The immersion in mathematics content is weaker, however. As stated in response to question one, the failure to explore prime numbers and to link these to LCM and GCF is an example of a tendency to be somewhat superficial in the mathematical treatment. Another example lies in the way they link to the two-dimensional graph, making a statement such as the graph of  $.75x$  is always lower than the graph of  $.80x$ . In what sense is one graph lower than another? For this idea (showing a representation of 75% of  $x$  vs. 80% of  $x$ ), there is a rotation way to view this (as associated with the tangent of a small angle) or a way to

compare the vertical height of any two values of  $x$  or perhaps to compare any two values of  $y$ . This weakness is also shown in the lack of treatment of the comparison of ratios in the materials using multiple strategies.

*4. Does the TMA focus on challenging learning goals in mathematics? Please describe how you reached your conclusion and provide examples that illustrate your point?*

This question has been addressed in question 1 and 3 with numerous examples. The mathematics in the materials will be challenging to many teachers, because so many teachers are not adequately prepared in relation to content and pedagogical content. The materials present a coherent and sequenced approach to complex topics in rational number. However, the mathematics could be approached with more strength, and overall over the three days, too much time is spent on general pedagogical topics and too little on challenging mathematics.

*5. Does the TMA professional development encourage depth of understanding, allowing students to “grow with it” according to their level of prior expertise in mathematics?*

The materials do take teachers at lower levels of competence and present the mathematical material systematically in developmentally appropriate sequences. Teacher with weaker preparation will benefit from this treatment the most. Many teachers do not have a clear understanding of the ideas or a way to teach them. The materials should permit them to engage more deeply with the content. It is important to determine if more prepared teachers find the experiences as beneficial. It can be persuasively argued that the weaker teachers will pose a more serious threat to the education of children, so that targeting their improvement may be a greater priority. Over time, efforts should be made to supplement the materials more to provide challenge to more advanced teachers.

*6. Does the TMA professional development provide teachers with strategies for monitoring and assessing student progress and using those data to adapt instruction?*

This question is addressed in part in the second part of the response to question one. The materials are clear in indicating the need to monitor performance and, when necessary, to actively implement strategies to remediate and address student needs. This is done through the emphasis on careful examination of student work and patterns of errors, the use of systems of monitoring, the emphasis on the four-point model for reteaching missing content, and the links to formative assessment systems.

*7. Does the TMA professional development provide teachers with grade specific opportunities to build students mathematical knowledge from grade level to grade level?*

This question has been addressed repeatedly in comments on the use of TEKS in curricular webs, the emphasis on vertical alignment, and the selection of rational number reasoning and links to algebraic reasoning.

## **Section 2: Final comments**

### **Does the TMA Professional Development Meet Your Standards of High Quality Professional Development?**

Yes, the TMA Professional Development is better than most examples I have seen. Its strengths are in its connections to the state standards and its use of well -documented strategies such as analyzing errors or building in formative assessment approaches. Its choice of emphasis on multiplicative reasoning and



rational number attests to the expertise of the staff and their knowledge of national trends in research. The careful sequencing of topics invites entry by weaker teachers; this support is essential at the elementary level where preparation in mathematics can be so weak. Nonetheless it is important to find way to address its weaknesses. It relies too extensively on direct instruction approaches and lacks attention to the use of small groups, development of representations by students, and the use of complex problem solving. The materials show evidence of a restricted emphasis on addressing issues of inequity as social and cultural roots. Finally, there is too little time devoted to sufficiently challenging mathematical content and to the careful introduction of formal terms, properties, definitions, and examples from geometry, probability, and statistics. The balance of time in the training sessions is too heavy on pedagogy to the detriment of content development. Three days overall is too short a time period to make substantial change.

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## TMA Delivery Expert Review

### Section I. How does the Texas Mathematics Academy (TMA) professional development compare to “best practices” in teacher professional development?

1. *Is the TMA professional development grounded in research and clinical knowledge? Please describe how you reached your conclusion and identify specific research you used to make your decision.*

The *National Staff Development Council’s (NSDC) Standards for Staff Development* are grounded in research that documents the connection between staff development and students’ learning. “Context, process, and content standards are all necessary to ensure that staff development improves student learning. If one dimension is ignored, the intended results are far less likely to be achieved” (NSDC, 2001, p. 2). An analysis of the TMA professional development did not reveal any direct reference to the NSDC Standards. There also was no mention of the Standards publication in the Research and References section of the presenter or participant manual. There were however references to research grounded in pedagogical content knowledge in the field of mathematics. While the Standards, NCLB Definition of Professional Development, or Texas-adopted Professional Development Imperative, were not mentioned specifically, the TMA did incorporate elements of each. The reviewer chose to use the NSDC Standards as the basis for reviewing the Academy. The Standards encompass both the NCLB definition of quality professional development and the Texas PDI elements.

Within the limitations of the three-day workshop format, the TMA designers work to create a clear, engaging, and meaningful learning experience for participants. The TMA professional development focuses on content knowledge and instructional practices (See introduction “The purpose of the initiative is to use research to guide what we teach in middle grade (5-8) mathematics” p. 2). The trainers emphasize the importance of the application of research-based practices by teachers (“...to introduce a set of research-based practices that have been shown to improve all students’ success with middle grade mathematics, particularly the students who lack sufficient understanding to be successful in algebra and later mathematics courses,” Introduction p. 2). Participants are provided a document “Effective Instructional Approaches for Struggling Learners” that is a synthesis of the research cited in developing the math academy. The *Research and References* page addresses three categories: Research Studies, General Reference, and References for Grouping. Three to four sources are cited in each category. The Research Studies focus on teaching math to low-achieving students, pedagogy of middle school math teachers, and number sense. And while it appears substantive math research guides the development of TMA, this reviewer anticipates the content reviewers to have more specific knowledge on the quality of the research referenced and applied. It also seems important to note that the *Acknowledgments* p. i recognize contributions from individuals at the Texas Education Agency, the Texas Math Advisory Committee, and the Mathematics Content Focus Group. Finally, the use of focus and pilot groups to advise the Development Team adds credibility to the practicality and “best practice” goal of the Initiative.

2. *Is the TMA professional development grounded in national and/or state professional development standards? Please describe how you reached your conclusion and identify specific standards you used to make your decision.*

The *National Staff Development Council’s Standards for Staff Development* (2001), the Texas Professional Development Imperative, and the NCLB definition of effective professional development are used in the analysis. The NSDC Standards provide the framework for the report. A review of the

instructor and participant's manual indicates some alignment with the following National Staff Development Council's (NSDC) Standards.

**Resources:** *Staff development that improves the learning of all students requires resources to support adult learning and collaboration (NSDC, p. 12).*

TEA recognizes and provides the resources necessary to deliver the three-day workshop. Resources include time, trainer stipends, participants' stipends, and resources. "While the vast majority of educators' professional learning should occur during the day in collaboration with colleagues, it is also important that they acquire knowledge from sources outside the school by attending workshops and state and national conferences" (NSDC, p.12). The TMA is a three-day workshop. (Day One, Instructor Manual p.2) "Professional development resources may fund trainers and provide stipends for lead teachers" (NSDC, p.12). TMA participants receive a stipend of \$150 per day (Day One, Instructor Manual p. 2).

**Data-Driven:** *Staff development that improves the learning of all students uses disaggregated student data to determine adult learning priorities, monitor progress, and help sustain continuous improvement (NSDC, p.16).*

TMA design demonstrates the importance placed on ensuring teachers use data to inform decisions regarding classroom instruction. Examples of such commitment follow. "Data from various sources can serve a number of important staff development purposes. First data on student learning gathered from standardized tests, district-made tests, student work samples, portfolios, and other sources provide important input to the selection of school or district improvement goals and provide focus for staff development efforts" (NSDC, p.16). See TMA lessons Thinking from a Diagnostic Point of View (Day One, Instructor Manual p. 5) and Where and When We Get Diagnostic Information (Day One, Instructor Manual p.6, 7). "A second use of data is in the design and evaluation of staff development efforts, both for formative and summative purposes" (NSDC, p. 16). Unfortunately, the reviewer was unable to locate any plans related to this purpose. "A third use of data occurs at the classroom level as teachers gather evidence of improvement in student learning to determine the effects of their professional learning on their own students" (NSDC, p. 16). See Analyzing Errors in Student Work (Day Two, Instructor Manual p. 2-4) as an example of starting with what students know and building on that information.

**Evaluation:** *Staff development that improves the learning of all students uses multiple sources of information to guide improvement and demonstrate its impact (NSDC, p. 18).*

"Evaluation design is determined by the purpose for the evaluation-to improve something or to judge its worth" (NSDC, p.18). The reviewer inferred from the scope of the evaluation that TEA is interested in assessing the impact of the TMA on teacher practice and student learning in the state and intends to use this report to strengthen its efforts.

"Good evaluation design gathers information beyond an assessment of participants' immediate reactions to workshops" (NSDC, p. 18). Participants were invited to write questions on index cards and place them in the baskets on the materials table. (Day One, Instructor Manual p. 3) The inclusion of this strategy appears to demonstrate the design team's interest in ensuring that teacher questions and concerns are addressed throughout the workshop. Unfortunately, while skilled trainers know what to do with the questions, there is no reference to the return to the questions by the trainers throughout the academy. No additional activities solicit teachers reactions and/or needs at the end of each day or the entire academy. This would have provided monitoring and adjusting feedback to the trainers. Even more significant, little information suggests how the state intends to ensure teachers use the materials, provide teachers support to make required changes, and measure student learning increases as a result of Academy participation. There is the recommendation that teachers complete an action research project that enables them to gather immediate feedback from their students on the impact of their application of their

new strategies. This individualized form of assessment will assist those teachers who commit to using it with implementation.

**Research-Based:** *Staff development that improves the learning of all students prepares educators to apply research to decision making (NSDC, p. 20).*

TMA is strong in its commitment to ground the content and pedagogy for teachers in research. The Academy outcomes include “The purpose of the initiative is to use research to guide what we teach in middle grade (5-8) mathematics” (Instructor Manual p. 2). Later instructors are directed to state: “Educational research should be used when making instructional decisions” (Day One, Instructor Manual p. 2). Prior to presenting the Four Point Instructional Model, participants spend time looking at the research behind the design. (Day One, Instructor Manual p. 10; Also see Fact Fluency Day One, Instructor Manual p. 23; Continuum of Learners activity on Day Two Instructor Manual p. 5 ).

The Math Academy Research Project (Day Three, Instructor Manual p. 8) asks participants to engage in their own form of research: “Action research is a process through which participants examine their own educational practice, systematically and carefully, using research techniques.” (*Powerful Designs for Professional Learning*, p. 54)

An extensive Research and References section is included in the manuals. And while attention is paid to discussing the research behind the content and pedagogy taught in the Academy, no research is cited as the basis for the TMA design.

**Design:** *Staff development that improves the learning of all students uses learning strategies appropriate to the intended goal (NSDC, p. 22).*

The NSDC design standard emphasizes several aspects of professional development necessary to enable adults to acquire new knowledge and skills and transfer that knowledge to classroom practice. Set within a workshop setting the TMA is limited in addressing the diverse strategies offered in the Design standard. However, within the workshop setting the designers have the opportunity to address many important aspects of professional learning. Some examples follow of where the designers align practice and where opportunities for alignment were missed.

“The most powerful forms of professional development often combine learning strategies” (NSDC, p. 22). The professional development designs in TMA include The Four Point Instructional Model (Day One, Instructor Manual p. 10), Journaling (Day One, Instructor Manual p. 4), a case study (How Are We Alike activity based on a video - Day Two, Instructor Manual p. 6), and the Math Academy Research Project (action research). However workshop designs must be supported by “numerous live or video models of new instructional strategies, demonstrations in teachers’ classrooms, and coaching or other forms of follow-up if those strategies are to become a routine part of teachers’ instructional repertoire” (NSDC, p. 22).

**Learning:** *Staff development that improves the learning of all students applies knowledge about human learning and change (NSDC, p. 24).*

“It is important that the learning methods used in professional development mirror as closely as possible the methods teachers are expected to use with their students” (NSDC, p. 24). TMA asks that teachers use the Four Point Instructional Model (Day One, Instructor Manual p. 10), Model Lessons: Multiples (Day one, Instructor Manual p. 16), consistent with this standard the Four Point Model is used throughout the Academy. Participants have numerous opportunities to experience the lesson framework they are expected to use in their classrooms. .

“To improve student achievement, adult learning under most circumstances must promote deep understanding of a topic and provide many opportunities for teachers and administrators to practice new skills with feedback on their performance until those skills become automatic and habitual. Such deeper understanding typically requires a number of opportunities to interact with the idea or procedure through active learning processes that promote reflection such as discussion and dialogue, writing, demonstrations, practice with feedback, and group problem solving” (NSDC, p. 24). Deep understanding of the “algebra” curriculum was emphasized, but results are limited within the confines of a three-day workshop.

**Collaboration:** *Staff development that improves the learning of all students provides educators with the knowledge and skills to collaborate (NSDC, p. 26).*

The structure of the TMA indicates the designers recognize the value of collaborative learning among participants, however it is disappointing that that same value is not addressed in follow up expectations and provisions of support for attendees. “Organized groups provide the social interaction that often deepens learning and in the interpersonal support and synergy necessary for creatively solving the complex problems of teaching and learning” (NSDC, p. 26). The TMA provides opportunities for teachers to dialogue in partner settings, table groups, and the whole group. Additional examples of this standard are found in the Introductions activity (Day One Instructor Manual p. 3); working in groups of four during the Where and When We Get Diagnostic Information lesson (Day One, Instructor Manual p. 6); and working in pairs – Instructional Intervention Decision Making (Day Two, Instructor Manual p. 6). Collaborative activities contribute to individual and group learning.

**Equity:** *Staff development that improves the learning of all students prepares educators to understand and appreciate all students, create safe, orderly, and supportive learning environments, and hold high expectations for their academic achievement (NSDC, p. 30).*

“Teachers’ knowledge of their students is an essential ingredient of successful teaching” (NSDC, p. 38). “It is important that staff development equip them with ways of providing various types of instruction based on individual differences” (NSDC, p. 38). TMA goals and objectives align clearly with this standard. The Academy exists to ensure that all students are “ready for algebra, particularly the students who lack sufficient understanding to be successful in algebra and later mathematics courses” (Introduction: Instructor Manual p. 2). The instructional strategies are chosen on the basis of their alignment with the objectives. Equity of results is clearly a focus of the Academy. A reflection activity for Extending Thinking beyond the Multiples Lesson (Day One, Instructor Manual p. 22) offers one example of a strategy to assist teachers to identify beneficial strategies for struggling students. The Continuum of Learners lesson (Day Two, Instructor Manual p. 5) made reference to a document in the resource section that outlined additional strategies for struggling students.

**Quality Teaching:** *Staff development that improves the learning of all students deepens educators’ content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately (NSDC, p. 32).*

“Successful teachers have a deep understanding of the subjects they teach, use appropriate instructional methods, and apply various classroom assessment strategies” (NSDC, p. 32). “Effective staff development integrates content with appropriate instructional strategies” (NSDC, p. 32). Teachers participate in learning experiences that they are encouraged to use with their students including The Four Point Instructional Model (Day One, Instructor Manual p. 10); Model Lessons: Fractions (Day Two, Instructor Manual p. 11); and Model Lessons; Proportions (Day Three, Instructor Manual p. 10). They view a video that shows how a school used instructional interventions to improve their mathematics program (Day Two, Instructor Manual p. 6 – 8). TMA also provides a number of samples of classroom-based assessments (Analyzing Errors in Student Work – Day Two, Instructor Manual p. 2,3 and

Participant Manual p. 8, 10, and 11). Presented as research-based strategies, graphic organizers such as a Curriculum Web – Fractions (Day Two, Participant Manual p. 20) are offered. The Math Academy Project (Day Three Instructor Manual p. 8, 9) during the fall semester helps guide participant implementation and link the learning experiences from the summer workshop. TMA content aligns with the expectations of this standard.

Professional Development Imperative (PDI) Standards are reflected in the TMA as follows:

- Results-driven learning (see NSDC Standards: Data Driven, Evaluation)
- Student-centered learning (see NSDC Standards: Learning, Equity, Quality Teaching)
- Flexible groups (See Instructional Intervention Strategies: Group 1 – Day Two, Participant Manual p. 14a)
- Collaboration (See NSDC Standard: Collaboration)
- Follow-up (The Math Academy Project - Day Three Instructor Manual p. 8, 9)

3. *Does the TMA professional development provide teachers with strategies for monitoring and assessing student progress and using those data to adapt instruction?*

Monitoring and assessing student progress is essential to ensuring success in mathematics. The TMA acknowledges the importance of this instructional approach through its workshop objective: Provide tools for analyzing and using diagnostic information to improve instruction particularly for students struggling to learn critical algebra readiness content. Throughout the workshop participants experience strategies for monitoring and assessing student progress and using data to adapt instruction. Some of these opportunities follow:

Day One, Instructor Manual:

- p. 5 Thinking from a Diagnostic Point of View
- p. 6, 7 Where and When We Get Diagnostic Information

Day Two, Instructor Manual:

- p. 2-4 Analyzing Errors in Student Work
- p. 4 Analyzing Student Errors in a Pretest

Day Three, Instructor Manual:

- p. 6, 7 Diagnostic Teaching Using Student Information from More Formal Tools: Texas Mathematics Diagnostic Assessment System (TMDS), TAKS, district benchmark tests)

Note: There is little evidence of the same expectation applied to adults and their abilities to use the strategies presented in the Academy.

### Section 3: Reference List

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