# Technology for Learning Disabilities Project

*2005–2007 Evaluation Report*

Prepared for

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**July 2007**

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*Prepared for*

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# Evaluation Description

This report describes the results of RMC Research Corporation's evaluation of the Technology for Learning Disabilities project for the school years 2005–2006 and 2006–2007. Project implementation and funding were administered through the Special Education Technology Center (SETC) at Central Washington University (with Kittitas School District acting as the fiscal agent). The Technology for Learning Disabilities project provided teachers with technology to use with their learning disabled students in grades 6 through 12. Prior evaluations conducted by RMC Research have shown this approach to be effective in terms of helping learning disabled students improve their academic skills. The Technology for Learning Disabilities project identified the following goals and objectives for the evaluation period addressed in this report:

**Goal 1:** To provide teachers with support, resources, and strategies to improve the writing (Years 1 and 2) and math (Year 2) skills of learning disabled students through the use of technology.

**Goal 2:** To provide teachers with support, resources, and strategies to improve students' attitude toward writing (Years 1 and 2) and math (Year 2).

**Objective 1:** The Technology for Learning Disabilities project will provide teachers with hardware and software for their classrooms.

**Objective 2:** SETC will provide teachers with professional development that shows teachers how to use the hardware and software in their classrooms.

**Objective 3:** Teachers will fully integrate the use of technology in their classroom by using the hardware (i.e., teacher laptop or desktop computer, multimedia projector with document camera, and the ACTIVboard) in their teaching a minimum of 3 times a week.

**Objective 4:** Teachers will fully integrate the use of technology in their classroom by ensuring students use the assistive softwares Texthelp Read&Write GOLD 2

times a week and FASTT Math 3 times a week and conduct a Math Trail project a minimum of 2 times during the school year.

**Goal 3:** To inspire other educators to use the project technology and teaching strategies.

**Goal 4:** To foster parent and community support for programs that provide assistive technology to classrooms by demonstrating the impact the technology has on learning disabled students' writing (Years 1 and 2) and math skills (Year 2).

**Objective 5:** SETC will encourage teachers to disseminate information that promotes parent and community support for the Technology for Learning Disabilities project.

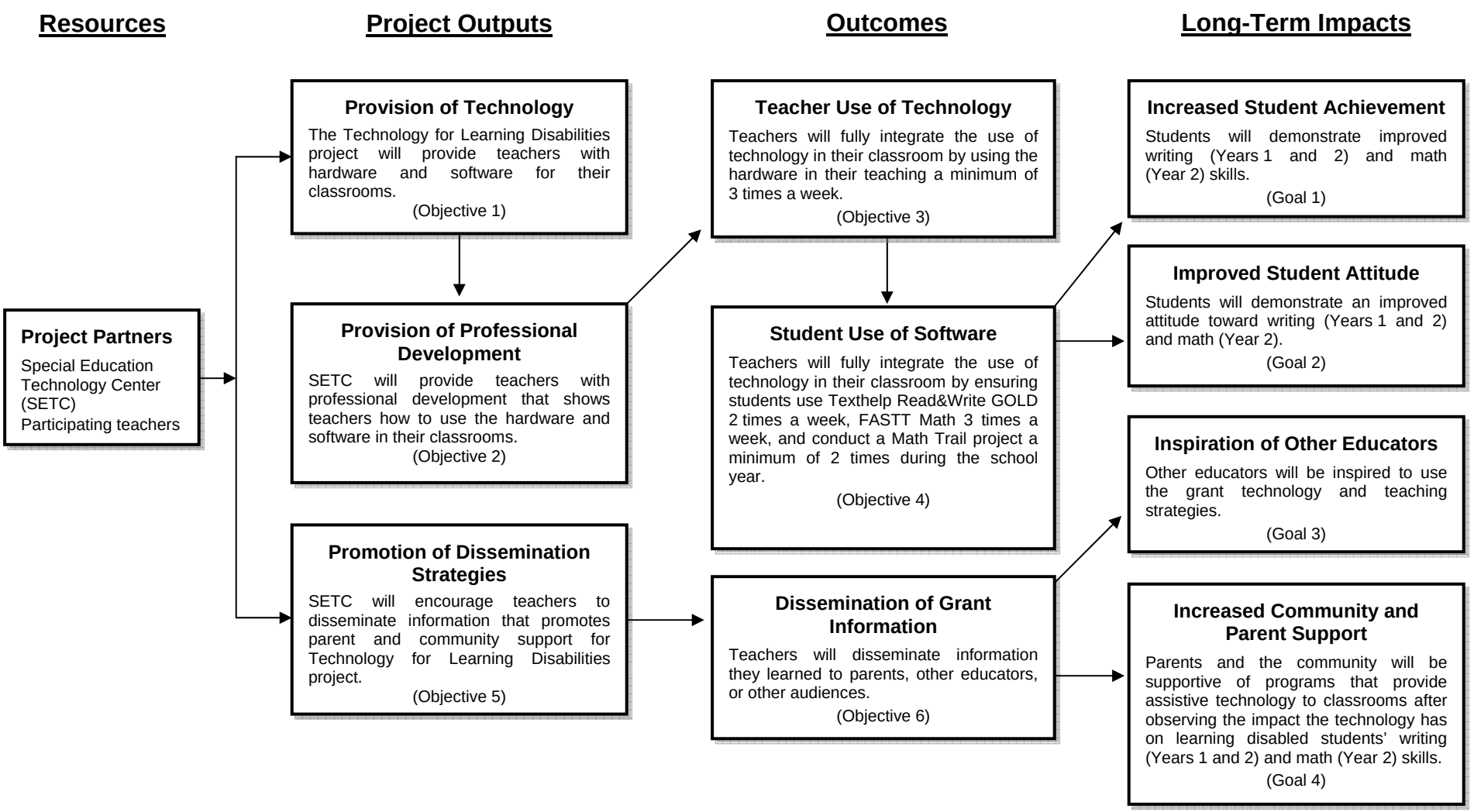
**Objective 6:** Teachers will disseminate information they learned to parents, other educators, or other audiences. Teachers will be required to hold an event at the end of each school year for students to demonstrate what they learned.

The following evaluation questions related to the logic model in Exhibit 1 addressed these goals and objectives:

- **Provision of Technology**—How successful was the project at providing teachers with technology?
- **Provision of Professional Development**—How successful was the project at providing teachers with professional development on the use of the technology?
- **Teacher Use of Technology**—Did teachers use the hardware in their classroom a minimum of 3 times a week?
- **Student Use of Software and Programs**—Did students use Texthelp Read&Write GOLD a minimum of 2 times a week? Did students use FASTT Math a minimum of 3 times a week? Did students participate in a minimum of 2 Math Trail projects during the school year?

- **Increased Student Achievement**—To what extent did the project improve the writing skills of learning disabled students through the use of technology (Years 1 and 2)? To what extent did the project improve the math skills of learning disabled students through the use of technology (Year 2)?
- **Improved Student Attitude**—To what extent did the project improve students' attitude toward writing (Years 1 and 2)? To what extent did the project improve students' attitude toward math (Year 2)?
- **Promotion of Dissemination Strategies**—How successful was the project in encouraging teachers to disseminate information that promoted parent and community support for the Technology for Learning Disabilities project?
- **Dissemination of Project Information**—To what extent did teachers disseminate the information they learned to other educators and audiences?
- **Inspiration of Other Educators**—To what extent did the project inspire other educators to use the project technology and teaching strategies?
- **Increased Community and Parent Support**—To what extent did the project increase parent and community support of programs that provide assistive technology to classrooms?

## Exhibit 1
## Technology for Learning Disabilities Logic Model



# Methods

Data for this evaluation were provided by 6 teachers who participated in the Technology for Learning Disabilities project in schools across Washington State. During Year 1 all of the teachers taught both writing and math, but during Year 2 one teacher taught math only. During Year 2 the participating teachers were responsible for recruiting a teacher in their area who taught writing to learning disabled students to serve as the comparison group for the writing portion of the research study. Additionally, the participating teachers were responsible for recruiting a teacher in their area who taught math to learning disabled students to serve as the comparison group for the math portion of the research study. The comparison group teachers, who did not receive technology or other support through the Technology for Learning Disabilities project, received $100 for their classroom for their involvement in each portion of the research study.

## Measures

RMC Research used a combination of qualitative and quantitative evaluation activities to address the key evaluation questions. This section describes the data collection activities and instruments. All of the data collection instruments appear in Appendix A.

### *Teacher Survey*

RMC Research asked the participating teachers to complete a survey in fall 2005, spring 2006, fall 2006, winter 2006, and spring 2007. SETC administered an abbreviated version of the teacher survey through My eCoach[1] (an online professional development learning community with customizable features, tools, and resources that allow organizations to provide mentoring and support) in winter 2005. The fall 2005 survey administration established a baseline regarding the teachers' comfort level with the project technology and their perceived ability to implement the project requirements.

[1]My eCoach Online. (1999–2007). My eCoach [Computer web site]. Oakland, CA: Author. (For more information see my-ecoach.com)

The subsequent survey administrations provided information regarding changes in the teachers' comfort level and ability to implement the project requirements.

### *Teacher Interview Protocol*

RMC Research interviewed the participating teachers in spring 2006 and 2007. The interview protocol solicited information on the project's impact on students, teachers, and parents of the students; teachers' and students' use of technology in the classroom; teachers' methods for disseminating project information to others; and teachers' thoughts regarding the professional development provided by the project. The interviews gave the teachers an opportunity to share their project experiences and in an open-ended context.

### *Fidelity Assessments*

Each month SETC asked the participating teachers to complete a task posted on My eCoach and use the web site's Individual Learning Profiles to report their observations, successes, and challenges. The 52 Individual Learning Profile assignments that SETC assigned to teachers throughout the 2 years of the evaluation appear in Appendix B. RMC Research reviewed the Individual Learning Profiles and discussion boards on My eCoach throughout the years of the evaluation to track the progress of project implementation and reported the findings to both SETC and the teachers.

### *Evaluation Briefs*

RMC Research distributed evaluation briefs to SETC and the participating teachers throughout the 2 years of the evaluation. The evaluation briefs provided timely feedback regarding the successes of the project implementation and areas in need of improvement. The briefs were an integral part of the project in that RMC Research, SETC, and the teachers were able to discuss strategies to achieve the desired level of project implementation. All of the evaluation briefs appear in Appendix C.

### *Community Survey*

In spring 2007 the teachers administered an anonymous survey to school staff, school administrators, parents, and students who attended the year-end presentation. The survey included questions regarding the attendees' perception of which types of technology, if any, improved the way that students learned or their attitude toward learning. RMC Research used the survey to gauge the community's and parents' support of programs that provide classrooms with assistive technology.

### *FASTT Math Reports*

Each month during Year 2 the participating teachers printed the Class Summary Report and Student Software Usage report using FASTT Math[2] (a software program that helps students develop automatic recall of basic math facts, which enables them to focus on higher order math skills such as advanced computation, problem solving, and algebra) and mailed the reports to RMC Research. The Class Summary Reports provided information on each student's performance in a given month and the Student Software Usage reports provided information on the number of days each student used FASTT Math and the duration of each session.

### *Student Writing Assessments*

During both Years 1 and 2 teachers in both the treatment group (i.e., the participating teachers) and the comparison group administered a writing pretest in the fall and a posttest in the spring to students whose parents gave permission for them to participate in the evaluation and who had writing goals on their individual education plan. The treatment group teachers were allowed to begin using the grant technology after administering all of the pretests. The writing assessment involved students providing a writing sample in response to a Washington Assessment of Student Learning prompt. In the fall students used paper and pencil. In the spring students in the treatment group used the intervention (a computer running the software program Texthelp Read&Write

[2]Hasselbring, T. & Goin, L. (n.d.). FASTT Math [Computer software]. Watertown, MA: Tom Snyder Productions/Scholastic. (For more information see tomsnyder.com)

GOLD[3]) and students in the comparison group used paper and pencil. The prompts and instructions for administering the assessment appear in Appendix D.

The rubric used to score the writing assessments was developed by staff from SETC, Texthelp Systems Inc., and RMC Research and a teacher who regularly scores Washington State's standardized writing assessments. The rubric was based on the Washington Assessment of Student Learning scoring rubric, which assesses student work as a whole with respect to writing conventions and organization. For this evaluation the rubric was modified to assess student work as a whole and to analyze specific components of the students' writing.

The independent contractor using the rubric scored the writing samples on a scale from 0 (*does not follow rule*) to 3 (*consistently follows rule*) on the following writing conventions: verb agreement, spelling, capitalization, punctuation, use of complete sentences, and use of paragraphs. To obtain the total writing convention score the individual scores were summed for a total of 18 possible points. Using the second part of the rubric the independent contractor used the same scale to score the writing samples on the following writing organization components: keeping sentences on topic; providing supporting details; writing with a beginning, middle, and end; using transitions to connect ideas; practicing sentence fluency (i.e., varying sentence lengths); writing with voice; and writing to make the audience aware of the purpose. To obtain the total writing organization score the individual scores were summed for a total of 21 possible points. To ensure the rigor of the research study, the scoring was blind (i.e., the names of the students, the students' treatment or comparison group status, and the assessment administration status [pretest or posttest] were not revealed to the contractor). The rubric used to score the writing assessments is shown in Appendix D.

### *Student Math Assessments*

During Year 2 teachers in both the treatment group and comparison groups administered a math pretest in the fall and a math posttest in the spring to students

[3]Texthelp Systems Inc. (n.d.). Texthelp Read&Write GOLD 8.1 [Computer software]. Woburn, MA: Author. (For more information see texthelp.com)

whose parents gave permission for them to participate in the evaluation and who had math goals on their individual education plan. Teachers in the treatment group were allowed to begin using the grant technology after administering all of the pretests. The math assessment consisted of math problems from the Washington Assessment of Student Learning.

The assessment, administration instructions, and scoring rubric were developed by an independent contractor familiar with the Washington Assessment of Student Learning. The contractor created 2 versions of the math assessment and teachers were randomly assigned to administer one version as the pretest and the other version as the posttest. The use of different versions serves to control for endogenous change, which occurs when the pretest and posttest are the same and the pretest influences students' scores on the posttest. For example, if the same assessment administered as the pretest in the fall were administered as the posttest in the spring, the students' familiarity with the test might inflate their posttest scores. RMC Research conducted an independent *t* test to ensure that both versions of the assessment were at the same level of difficulty. The independent contractor used the Washington Assessment of Student Learning scoring rubric to score the math assessments on using geometric sense, using probability and statistics, using algebraic sense, communicating math understanding, solving problems and reasoning logically, making math connections, using measurement, and using number sense. To ensure the rigor of the research study, the scoring was blind (i.e., the names of the students, the students' treatment or comparison group status, and the assessment administration status [pretest or posttest] were not revealed to the contractor). The instructions for administering the assessment, the assessment, and the scoring rubric appear in Appendix E.

### *Student Surveys*

Students in the treatment group completed surveys that measured teacher and student use of technology and students' attitudes toward writing and math. To reduce the burden on the students and teachers RMC Research developed 2 versions of the survey, each including 6 questions (instead of a single 12-question survey). In Year 2

the first version of the survey included 2 additional questions and the second version of the survey included 3 additional questions regarding students' attitudes toward math and writing, use of FASTT Math, and participation in Math Trail projects (an educational program for kindergarten through Grade 12 teachers and students that offers real-world math exploration opportunities; for more information see nationalmathtrail.org).

The teachers administered the student survey 9 times throughout the 2 years of the evaluation. For the first administration, which occurred in December 2005 to afford teachers adequate time to begin using all of the technology, RMC Research randomly assigned teachers to administer Version 1 or Version 2 of the survey. The next time, the teachers administered the other version of the survey. For the remainder of the administrations the teachers continued to alternate between Version 1 and Version 2 of the survey. Completion of the surveys was voluntary, though every student in the treatment classrooms was asked to participate regardless of his or her involvement in the research study because all of the students in the treatment classrooms had access to the project technology and programs. The surveys were anonymous and each required about 10 minutes to complete.

## Analysis

RMC Research conducted statistical tests to compare the sample characteristics, pretest scores, and posttest scores between groups and the pretest and posttest scores within groups. Independent *t* tests and chi-square tests assessed the comparability of the sample characteristics between groups at the beginning of the research study. Independent *t* tests assessed the comparability of the pretest scores between groups to ensure that both groups were at the same skill level in the fall. Paired *t* tests were used for within-group comparisons from pretest to posttest. An example would be determining whether the treatment group improved their own scores from pretest to posttest. Independent *t* tests were used to compare the posttests between groups. An example would be determining whether the treatment group scored higher on the posttest compared to the comparison group.

## Sample Characteristics

Exhibit 2 details the characteristics of the treatment and comparison groups in the writing portion of the research study. The groups were similar with regard to individual education plan status. The majority (approximately 75%) of the students in both groups had writing and math goals on their individual education plan and approximately 25% of the students had writing goals only on their individual education plan. The groups significantly differed with regard to grade distribution. The treatment group included students in Grades 6 through 9 (*M* = 6.5). The comparison group included students in Grades 5 through 11 (*M* = 7.4).

**Exhibit 2**
**Student Sample Characteristics: Writing Assessments**

| | Percent of Respondents | |
|---|---|---|
| **Characteristic** | **Treatment** | **Comparison** |
| Grade 5 | 0 | 19 |
| Grade 6 | 67 | 15 |
| Grade 7 | 19 | 30 |
| Grade 8 | 6 | 9 |
| Grade 9 | 8 | 8 |
| Grade 10 | 0 | 10 |
| Grade 11 | 0 | 9 |
| | | |
| IEP writing goals | 23 | 26 |
| IEP math goals | 0 | 6 |
| IEP writing and math goals | 77 | 68 |

*Note.* Treatment group *n* = 52. Comparison group *n* = 53. Grade distribution was statistically significant at $p < .01$. Grade level differences assessed using independent *t* test. IEP category differences assessed using chi-square. IEP = individual education plan.

Before comparing the writing posttest scores, RMC Research conducted tests to determine whether the treatment and comparison groups were at the same skill level at the time of the pretest. As Exhibit 3 shows, the treatment and comparison group were similar. There were no differences evident for the majority of the writing scores. Where significant differences between the groups were observed, the comparison group

scored higher than the treatment group. The comparison group received significantly ($p < .05$) higher scores with regard to total writing convention score, punctuation, use of paragraphs, purpose, and sentence fluency.

**Exhibit 3**
**Pretest Outcome Measures by Group**

| | Mean Score | |
|---|---|---|
| **Component** | **Treatment** | **Comparison** |
| **Writing Convention Components** | | |
| Verb agreement | .90 | 1.06 |
| Spelling | .54 | .81 |
| Capitalization | .58 | .77 |
| Punctuation* | .67 | 1.04 |
| Complete sentences | .62 | .72 |
| Use of paragraphs* | .13 | .47 |
| **Total*** | 3.44 | 4.87 |
| | | |
| **Writing Organization Components** | | |
| Sentences on topic | 1.56 | 1.72 |
| Supporting details | .83 | 1.06 |
| Beginning, middle, and end | .50 | .53 |
| Transitions | .40 | .58 |
| Sentence fluency* | .44 | .74 |
| Voice | .69 | .92 |
| Purpose* | .58 | .92 |
| **Total** | 5.00 | 6.47 |
| | | |
| Word count (*M)* | 78 | 96 |
| Percent of correctly spelled words (*M*) | 91% | 91% |

*Note.* Treatment group $n = 52$. Comparison group $n = 53$. Mean differences assessed using independent $t$ test. Component scale: 0 = *does not follow rule* to 3 = *consistently follows rule*. Total writing convention score = 18 possible points. Total writing organization score = 21 possible points.
*$p < .05$.

RMC Research created a variable to determine whether the students in classrooms that used Texthelp Read&Write GOLD more frequently showed greater improvement on the posttest than students in classrooms that used the program less frequently. During

Year 1 the spring teacher survey results were used to categorize the classrooms as either high use (i.e., using the software 3 or more times a week) or low use (i.e., using the software 2 days a week or less). RMC Research conducted tests to determine whether both groups were at the same skill level at the time of the pretest that is, prior to using Texthelp Read&Write GOLD. As Exhibit 4 shows, the low-use and high-use groups were similar at the time of the pretest. The only significant ($p < .05$) difference was higher word count scores for the high-use group.

**Exhibit 4**
**Year 1 Pretest Outcome Measures by Group**

| | Mean Score | |
|---|---|---|
| **Component** | **Low Use** | **High Use** |
| **Writing Convention Components** | | |
| Verb agreement | .77 | 1.00 |
| Spelling | .77 | .75 |
| Capitalization | .50 | .73 |
| Punctuation | .67 | .85 |
| Complete sentences | .61 | .90 |
| Use of paragraphs | .55 | .63 |
| **Total** | 3.88 | 4.84 |
| | | |
| **Writing Organization Components** | | |
| Sentences on topic | 1.88 | 1.88 |
| Supporting details | 1.00 | 1.13 |
| Beginning, middle, and end | .66 | .44 |
| Transitions | .66 | .44 |
| Sentence fluency | .72 | .90 |
| Voice | .77 | .82 |
| Purpose | .72 | .76 |
| **Total** | 6.44 | 6.40 |
| | | |
| Word count* (*M)* | 76 | 108 |
| Percent of correctly spelled words (*M*) | 92% | 88% |

*Note.* Low use $n = 18$. High use $n = 52$. Mean differences assessed using independent *t* test. Component scale: 0 = *does not follow rule* to 3 = *consistently follows rule*. Total writing convention score = 18 possible points. Total writing organization score = 21 possible points.
*$p < .05$.

During Year 2 RMC Research created a variable to determine whether the students in classrooms that used Texthelp Read&Write GOLD more frequently showed greater improvement on the posttest than students in classrooms that used the program less frequently. During Year 2 all of the teachers reported using the program 3 days a week or more. Therefore, classrooms were categorized as high use if at least 75% of the students reported on the student surveys for the entire school year that they used the software at least 3 times a week and classrooms were categorized as low use if fewer than 75% of the students reported using the software at least 3 times a week. RMC Research conducted tests to determine whether both groups were at the same skill level at the time of the pretest that is, prior to using Texthelp Read&Write GOLD. As Exhibit 5 shows, the low-use and high-use groups were similar at the time of the pretest. Where significant differences were observed, the low-use group scored higher than the high-use group. The low-use group scored significantly ($p < .05$) higher on verb agreement, capitalization, punctuation, use of supporting details, and percentage of correctly spelled words.

## Exhibit 5
## Year 2 Pretest Outcome Measures by Group

| | Mean Score | |
|---|---|---|
| **Component** | **Low Use** | **High Use** |
| **Writing Convention Components** | | |
| Verb agreement* | 1.24 | .70 |
| Spelling | .71 | .43 |
| Capitalization* | .90 | .37 |
| Punctuation* | .95 | .50 |
| Complete sentences | .76 | .50 |
| Use of paragraphs | .14 | .13 |
| **Total** | 4.71 | 2.63 |
| | | |
| **Writing Organization Components** | | |
| Sentences on topic | 1.76 | 1.40 |
| Supporting details* | 1.10 | .67 |
| Beginning, middle, and end | .62 | .43 |
| Transitions | .48 | .37 |
| Sentence fluency | .48 | .43 |
| Voice | .62 | .77 |
| Purpose | .52 | .63 |
| **Total** | 5.57 | 4.70 |
| | | |
| Word count (*M)* | 93 | 69 |
| Percent of correctly spelled words*** (*M*) | 91% | 80% |

*Note.* Low use *n* = 21. High use *n* = 30. Mean differences assessed using independent *t* test. Component scale: 0 = *does not follow rule* to 3 = *consistently follows rule*. Total writing convention score = 18 possible points. Total writing organization score = 21 possible points.
*$p < .05$. ***$p < .001$.

Exhibit 6 details the characteristics of the treatment and comparison groups in the math portion of the research study in Year 2. The groups were similar with regard to individual education plan status and grade distribution. The majority of the students in both groups had writing and math goals on their individual education plan. The treatment group included students in Grades 6 through 9 (*M* = 7.2) and the comparison group included students in Grades 5 through 12 (*M* = 7.5).

**Exhibit 6**
**Sample Characteristics for Math Portion of the Research Study**

| | Percent of Respondents | |
|---|---|---|
| **Characteristic** | **Treatment** | **Comparison** |
| Grade 5 | 0 | 14 |
| Grade 6 | 34 | 11 |
| Grade 7 | 32 | 29 |
| Grade 8 | 13 | 31 |
| Grade 9 | 18 | 3 |
| Grade 10 | 0 | 3 |
| Grade 11 | 0 | 3 |
| | | |
| IEP writing goals | 3 | 0 |
| IEP math goals | 10 | 7 |
| IEP writing and math goals | 87 | 93 |

*Note.* Treatment group $n = 71$. Comparison group $n = 65$. Grade level differences assessed using independent $t$ test. IEP category differences assessed using chi-square. IEP = individual education plan.

Before comparing the math posttest scores RMC Research conducted tests to determine whether the groups were at the same skill level on the pretest. Exhibit 7 shows that the comparison group scored significantly ($p < .05$) higher on the pretest than the treatment group. Additionally, RMC Research compared the pretest scores of students who used FASTT Math frequently to determine if these students showed greater improvement in their math skills than students who used the software less frequently. Students were categorized as high-use if they used the software more than 6 hours during the school year and low-use if they used the software less than 6 hours during the school year. As Exhibit 7 shows, prior to using FASTT Math, there were no differences between the high-use and low-use groups.

## Exhibit 7
## Math Pretest Outcome Measures

| Mean Score | | | |
|---|---|---|---|
| **Treatment Group** | **Comparison Group** | **High Use FASTT Math** | **Low Use FASTT Math** |
| 6.39 | 7.72 | 6.29 | 6.56 |

*Note.* Mean differences assessed using independent *t* test. Treatment: *n* = 71. Comparison: *n* = 65. High use: *n* = 47. Low use: *n* = 23. Maximum possible score = 18 points.

# Results

## Provision of Technology

*How successful was the project at providing teachers with technology?*

The Technology for Learning Disabilities project successfully provided teachers with technology. Funding from the federal Title II D Enhancing Education Through Technology program allowed the purchase of the hardware, software, and programs outlined in Exhibit 8. The project provided teachers with Microsoft Office software including Word, Excel, and PowerPoint and encouraged teachers to learn the software through classes provided by their local educational service district. (Rather than provide software training on these applications, the Technology for Learning Disabilities project focused on professional development the teachers could not obtain elsewhere.)

**Exhibit 8**
**Project-Provided Hardware and Software**

| Technology | Purpose | Requirement |
|---|---|---|
| **Hardware** | | |
| Laptop and desktop computer for teacher use | Allows teachers to learn and practice project technology. | 3 times a week |
| Multimedia projector with document camera | Projector displays the computer screen for full-class viewing and document camera projects any document (e.g., student work) or object (e.g., mathematics manipulatives) for full-class viewing. | 3 times a week |
| ACTIVboard | Whiteboard that interacts with a computer. | 3 times a week |
| Laptop and desktop computers (4–6) for student use | Allows regular, portable access to computers. | None |
| Document scanner | Scans textbooks or other document to be read aloud by Texthelp Read&Write GOLD. | None |
| Printer | Allows teachers and students to print documents. | None |
| Wireless system | Allows teachers and students to access information on the Internet. | None |
| Listening center | Allows students to work independently and quietly by using a jackbox and headphones. | None |
| Digital camera | Allows teachers and students to take digital pictures for the Math Trail projects | None |

*exhibit continues*

**Exhibit 8, cont.**

| Technology | Purpose | Requirement |
|---|---|---|
| **Software** | | |
| Texthelp Read&Write GOLD | Talking word processor that includes scan-and-read capability, spellchecker, dictionary, and other study tools and visual features. | 2 times a week |
| FASTT Math | Helps students develop automatic recall of basic math facts that enable them to focus on higher order math skills such as advanced computation, problem solving, and algebra. | 3 times a week |
| Inspiration | Provides visual learning strategies students can use to plan, research, and complete projects. With the integrated Diagram and Outline Views students create graphic organizers, develop ideas, and expand topics into writing. | None |
| UltraKey | Provides practice for students to improve their typing skills. | None |
| Visual Thesaurus | Presents animated displays of words and their meanings; builds students' skills in vocabulary, reading, and writing. | None |
| My eCoach | Online professional learning community that features customizable tools and resources and allows schools, districts, regional centers, and state and university programs to support teachers with coaching and mentoring. | Once a month |
| Zoombinis | Improves students' logic and problem solving math skills | None |
| Microsoft Office (Word, Excel, PowerPoint) | Word processing, spreadsheet, and presentation software. | None |
| **Program** | | |
| Math Trail | Math Trail is an educational program for kindergarten through Grade 12 teachers and students that offers real-world math exploration opportunities. | 2 times during the school year |
| Start-to -Finish Books | Helps students in intermediate, middle, and high school who are not proficiently reading at grade level. | None |

## Provision of Professional Development

> *How successful was the project at providing teachers with professional development on the use of the technology?*

The Technology for Learning Disabilities project succeeded at providing teachers with professional development throughout the 2 years of the evaluation. The professional development began in August 2005 with a weeklong training in Ellensburg, Washington, that introduced teachers to the project and provided training on the technology. The professional development concluded in April 2007, when teachers were offered the opportunity to arrange personalized webinars with representatives from Texthelp

Systems Inc. Exhibit 9 summarizes the wide range of conferences and trainings provided by or coordinated through SETC.

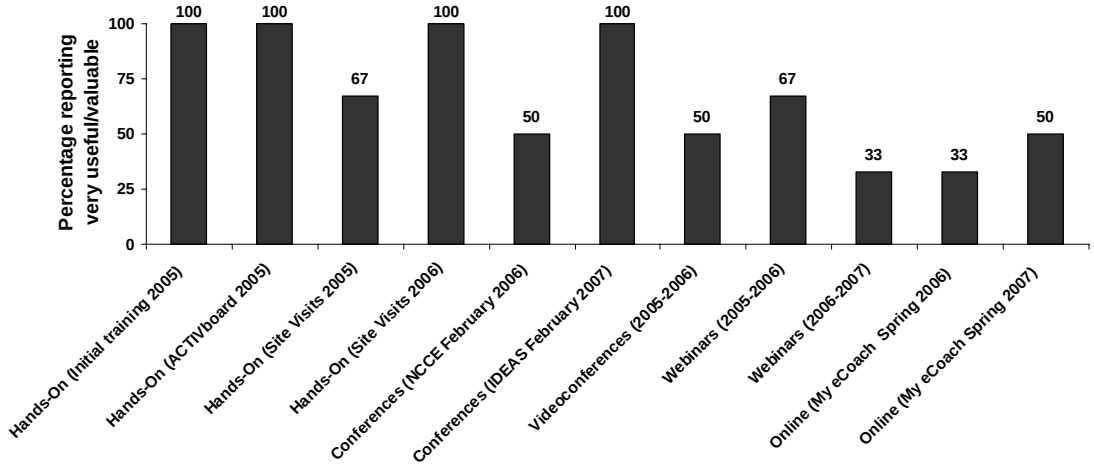
**Exhibit 9**
**Project-Provided Professional Development**

| Professional Development | Date |
|---|---|
| **Hands-On Professional Development** | |
| Initial project training: Introduction to the hardware, software, and the evaluation (Ellensburg, WA) | August 8–12, 2005 |
| Using the new ACTIVboard (Regional locations) | October 1, 2005<br>October 8, 2005<br>October 12, 2005 |
| Project training: Introduction to math software and programs (Ellensburg, WA) | August 7–11, 2006 |
| Classroom visit by SETC to provide implementation assistance | September–October 2005<br>October–November 2006 |
| **Videoconferences** | |
| Sharing of project progress and challenges | November 17, 2005 |
| Planning for the NCCE conference presentation | January 23, 2006 |
| Advanced features of the document camera | April 27, 2006 |
| Year-end sharing of project successes and challenges; planning for August 2006 training | May 25, 2006 |
| **Dinner Meetings** | |
| Evaluation results (Portland ,OR) | February 9, 2006 |
| **Conferences** | |
| NCCE Conference (Portland, OR) | February 9–10, 2006 |
| OSPI Winter Conference presentation (Seattle, WA) | January 18, 2006 |
| Interdisciplinary Educational Alternative Strategies (IDEAS) conference (Spokane, WA) | February 1–2, 2007 |
| **Online Professional Development** | |
| My eCoach online refresher course | September 29, 2005 |
| My eCoach Individual Learning Profile assignments | September 2005–April 2007 |
| **Texthelp Read&Write GOLD Webinars** | |
| Refresher | October 3, 2005<br>October 5, 2005 |
| Multiuser features | November 28, 2005<br>November 30, 2005 |
| Fact Finder, Fact Mapper, and Fact Folder tools | October 18, 2006 |
| Word Prediction tool | November 1, 2006 |
| Integrating the software into lesson plans | January 1, 2007 |
| Lesson plan follow-up | February 14, 2007 |
| Personalized webinar (optional) | April 2007 |

*Note.* NCCE = Northwest Council for Computer Education. OSPI = Washington State Office of Superintendent of Public Instruction.

The participating teachers rated the professional development on a scale from 1 (*not at all useful/valuable*) to 5 (*very useful/valuable*) on the teacher surveys. Exhibit 10 shows the percentages of teachers who rated the professional development as very useful or valuable (complete teacher survey results appear in Appendix F). The teachers considered the initial project training, the ACTIVboard training, the classroom visit conducted in 2006, and the Interdisciplinary Educational Alternative Strategies conference in February 2007 the most useful (100% described these offerings as very useful). Additionally, in the spring 2006 interviews many teachers (71%) described the webinars as very useful. The teachers appreciated being able to participate using their own computer in their own classroom, and they reported gaining a wealth of information that could be applied immediately. Due to this feedback SETC provided additional webinars during Year 2.

**Exhibit 10**
**Teacher Ratings of Usefulness or Value of Project-Provided Training**




*Note*. *n* = 6.

In spring 2006 and spring 2007 teachers were asked on the surveys and during the interviews how the professional development could have been improved. In spring 2006 most of the teachers (57%) referenced the last videoconference, which they believed lacked focus; in spring 2007 a third of the teachers (33%) noted that additional webinars would have been beneficial. During both years the teachers praised My eCoach for

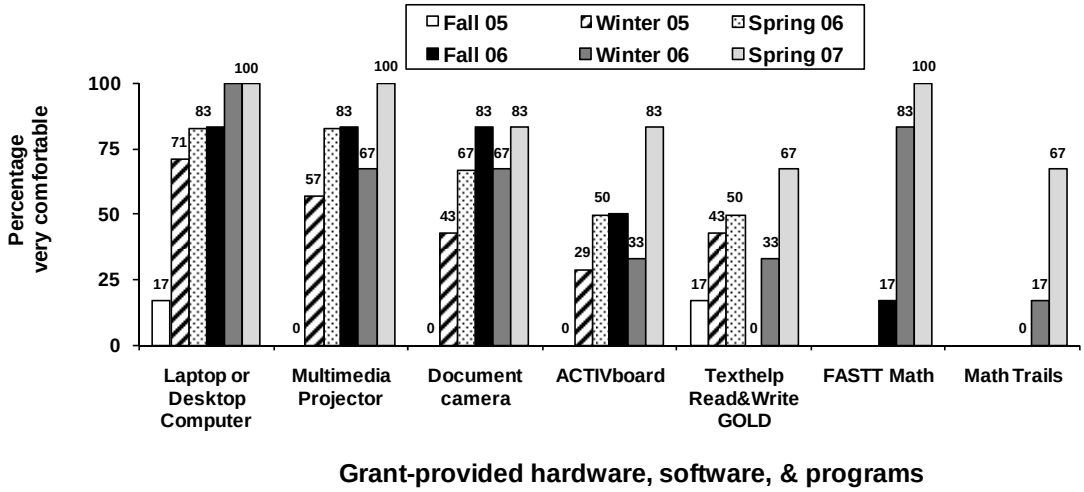
centralizing project communications, which fostered the teachers' sense of connection to the project and each other, and for offering the Individual Learning Profile assignments, which kept them accountable to the project requirements. Half of the teachers reported, however, that the interface was not user friendly.

### *Comfort Level With the Project Technology*

The participating teachers were surveyed at 6 points in time to determine whether the professional development and use of the technology over the 2-year period had effectively increased their comfort level with the technology. Teachers rated their comfort level on a scale from 1 (*not at all comfortable*) to 5 (*very comfortable*) for each technology component. Exhibit 11 shows the percentages of teachers who rated themselves as very comfortable using the project hardware and software. In fall 2005 17% or fewer of the teachers were very comfortable with the technology. This low level of comfort was most likely due to the fact that the teachers had only recently received the technology and had been exposed to professional development on the use of the technology for only a week.

As teachers participated in project-provided professional development and continued to use the technology in their classrooms, their comfort level greatly increased. By spring 2007, 100% of the teachers were very comfortable with the laptop or desktop computer, the multimedia projector, and FASTT Math. Teachers were less comfortable with Texthelp Read&Write GOLD (67%) and conducting Math Trail projects (67%). One teacher interviewed in spring 2007 suggested that the teachers were less comfortable with Texthelp Read&Write GOLD than other technology components because the software is so feature rich that the user never feels as if he or she has mastered the program. In addition, the interviewees attributed teachers' relatively low level of comfort with conducting Math Trail projects due to difficulties helping students develop higher order math inquiry skills and student behavior issues that limited the success of group work.

**Exhibit 11**
**Teacher Ratings of Comfort Level Using Required Technology by Time Period**

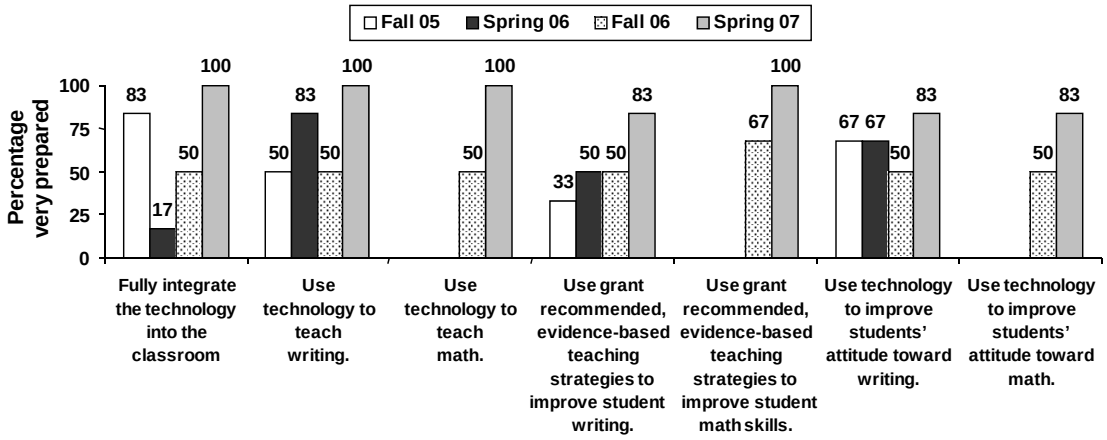



*Note*. *n* = 6. Because the math component did not begin until fall 2006, no FASTT Math or Math Trail data prior to fall 2006 are available.

### *Project Implementation*

Teachers were surveyed at 4 points in time to determine whether the professional development had effectively prepared them to implement the project requirements. Teachers rated their preparedness on a scale from 1 (*not at all prepared*) to 5 (*very prepared*). As Exhibit 12 shows, in fall 2005 83% of the teachers reported being very prepared to fully integrate the technology into the classroom after the initial project training. This proportion decreased to 17% by spring 2006, which might indicate that in the fall the teachers were overconfident in their preparedness to fully integrate the technology into the classroom. By spring 2007 all of the teachers reported being very prepared to fully integrate the technology into the classroom and at least 83% of the teachers reported being very prepared to implement all of the project requirements. The fact that the teachers required nearly 2 years to feel very prepared to implement the project requirements has important implications for future projects. That is, future projects may need to support the participating teachers for a minimum of 2 years.

**Exhibit 12**
**Teacher Ratings of Preparedness for Project Implementation by Time Period**




*Note*. *n* = 6. Because the math component did not begin until fall 2006, no math-related data prior to fall 2006 are available.

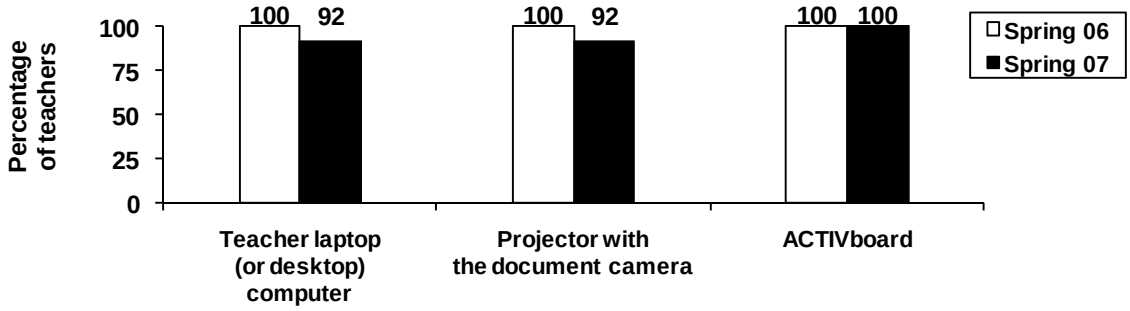
## Teacher Use of Technology

*Did teachers use the hardware in their classroom a minimum of 3 times a week?*

The spring survey asked teachers if they used the laptop or desktop computer, the multimedia projector with document camera, and the ACTIVboard every day, 3 or 4 times a week, 2 days a week, once a week or less, or never. The project requirement was for teachers to use the technology at least 3 times a week. Exhibit 13 shows that at least 92% of the teachers reported using the hardware at least 3 times a week in spring 2006 and spring 2007.

**Exhibit 13**

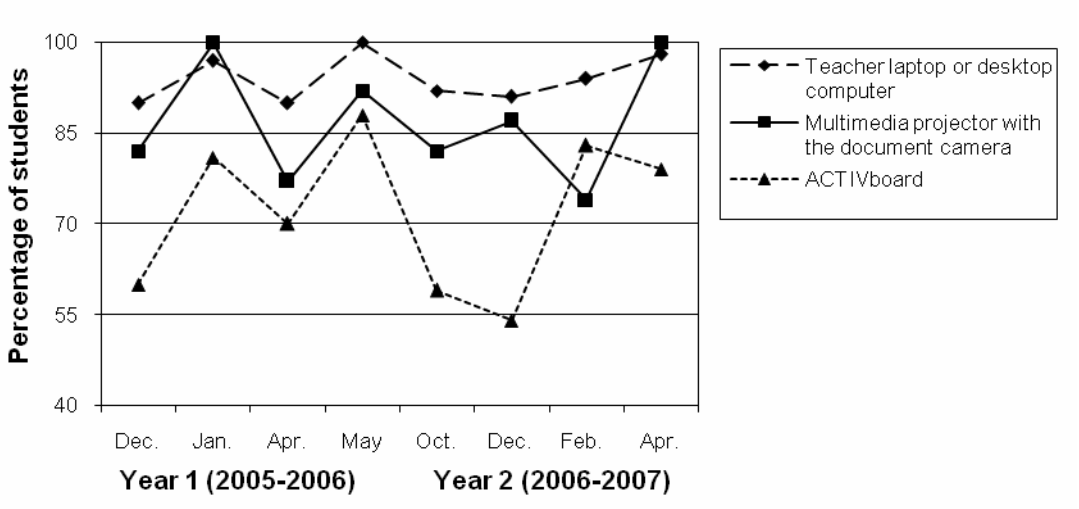
**Teacher Use of Hardware at Least 3 Times a Week**




*Note*. *n* = 6.

The student survey asked the same question. Exhibit 14 shows the students' perceptions of their teachers' use of the hardware at 8 time points throughout the 2-year evaluation period (complete student survey results appear in Appendix G). At least 70% of the students consistently reported that their teachers used the laptop or desktop computer and the multimedia projector with document camera at least 3 times a week. Use of the ACTIVboard greatly varied over time—the highest percentages of students reported teacher use of the ACTIVboard at least 3 times per week in May 2006 and February 2007.

**Exhibit 14**
**Students' Perception of Teacher Use of Hardware**
**at Least 3 Times a Week**




*Note*. December 2005: *n* = 39, *n* = 38, *n* = 40 (respective to key). January 2006: *n* = 37, *n* = 34, *n* = 37. April 2006: *n* = 40, *n* = 35, *n* = 40. May 2006: *n* = 32, *n* = 39, *n* = 32. October 2006: *n* = 51, *n* = 51, *n* = 51. December 2006: *n* = 47, *n* = 46, *n* = 46. February 2007: *n* = 54, *n* = 61, *n* = 54. April 2007: *n* = 52, *n* = 40, *n* = 52.

### *Value of the Hardware and Software*

SETC staff believed that if teachers deemed the hardware and software provided by the project valuable they would be more likely to use them in the classroom. During the spring 2006 and spring 2007 interviews teachers were asked to indicate which technologies were valuable for their classroom and how they were valuable as teaching or learning tools. In spring 2006 only one teacher described the ACTIVboard as the most valuable hardware component, but in spring 2007 all of the teachers except one described the ACTIVboard as one of the most valuable hardware components provided by the project. The teachers explained that the ACTIVboard was easy to use and made lesson planning easier. Additionally, they noted that the students enjoyed using the ACTIVboard, which increased their motivation to learn, and the ACTIVboard fostered group learning. In spring 2007 one teacher commented:

> "With the ACTIVboard they have the visuals so they can see what they are doing and this makes it easier for visual learners and makes them more successful and happier with what they are doing. In the past, a lot of times the students wouldn't participate if they worked at their desk but with the ACTIVboard they come up to the front of the room and they want to work on the math problems."

In spring 2006 2 teachers described the document camera as very valuable, but in spring 2007 4 teachers considered the document camera to be invaluable to their teaching. The teachers appreciated that the document camera allowed them to immediately share with the entire class student work, textbooks, and manipulatives and precluded the need to make transparencies or copies. In spring 2007 one teacher remarked:

> "I don't know if I could teach without [the document camera] anymore. The students can write things out and all of the students can see it and you don't have to make transparencies. They can immediately put their writing up in front of everyone else and read it and everyone can listen to it. I love the document camera."

In spring 2006 and spring 2007 teachers described the laptops and desktop computers as valuable, but they differed on which was more useful for their learning disabled students. Most of the teachers (67%) described the laptops as more useful than the desktop computers in both spring 2006 and spring 2007 because they allowed students to spend a significant amount of time working independently and improving their skills. In spring 2006 and spring 2007 one teacher expressed a preference for the desktop computers, describing them as easier for the students to use; another teacher preferred the desktop computers in spring 2006 because the maintenance and security requirements were reportedly less burdensome.

In spring 2006 and spring 2007 teachers described Texthelp Read&Write GOLD as valuable because the software helped students improve their reading and writing skills and increased their motivation to write. In spring 2007 most of the teachers (86%)

reported that their students were proficient in Texthelp Read&Write GOLD and enjoyed using the software. A third of the teachers reported, however, that some students were not motivated to use Texthelp Read&Write GOLD. The teachers' comments included these:

> "All of them can use it. Not all of them always want to. Some only like to use the spell check but that is probably only 2 of the 28 students."

> "It really works well with the motivated kids but for those that aren't motivated it doesn't really help."

In spring 2007 the teachers explained that students who used Texthelp Read&Write GOLD became more independent writers. When students used the software to read aloud documents they had written, they could hear their mistakes and make corrections. This valuable feature of the software allowed teachers, who in the past often performed this task, to focus on higher order instruction. Teachers (33%) also reported that students used the document scanner to scan books for their classes and used Texthelp Read&Write GOLD to read the text to them. One teacher described how these students became advocates for their own learning by using the hardware and software to complete their schoolwork. Only one teacher commented that some of her students did not like using the document scanner or the read aloud function of Texthelp Read&Write GOLD. Teachers also considered the software's phonetic spell check feature to be valuable and described it as easier for learning disabled students to use than the spell check feature in Microsoft Word or a dictionary.

All of the teachers described the FASTT Math software as valuable in the spring 2007 interviews. Students were reportedly comfortable with the program, which was user friendly and effective. One teacher indicated that students worked on FASTT Math in their free time and another observed students competing to finish the program. The only criticism voiced by teachers (33%) was some students needed the entire school year to finish a single mathematical operation (of 6). That is, these students spent the year on addition with numbers 0 through 9 and did not progress to subtraction, multiplication, or division.

In spring 2007 half of the teachers described conducting the Math Trail projects as very valuable, whereas the other half were unsure. The latter noted that the activities require a level of student independence that is not feasible if many of the students have behavioral issues. In contrast, the teachers pleased with the Math Trail projects reported that it helped students internalize math concepts and improve their communication skills and challenged students mathematically. One teacher commented:

> "I loved [Math Trails] because it brought real life to the kids. . . . They learned that math is around them everywhere. They are more aware of their environment and a different way of looking at math. Instead of just using a worksheet they were able to take ownership and work in groups of 3 and agree what to take a picture of and think of questions before taking the picture. I saw growth in communication, writing, reading, and science skills. It is all encompassing."

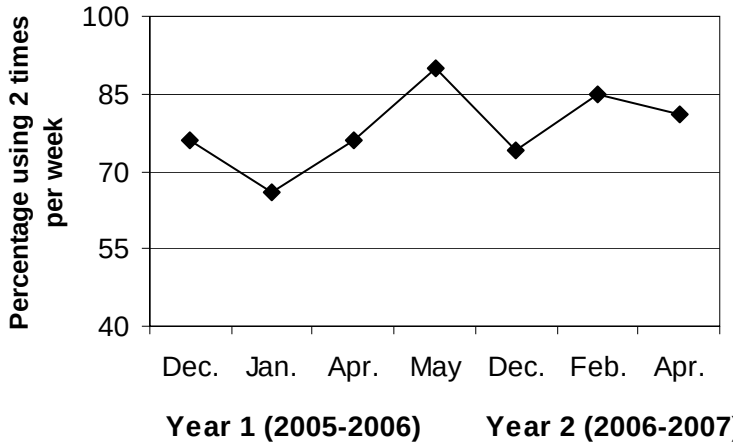
During both the spring 2006 and 2007 interviews, all of the teachers stated their teaching had changed due to using the project-provided technology. Several explained that the technology had enabled them to easily present material in ways that met the different needs of their students. The technology also caused the students to be more attentive because they perceived the technology as fun. Another positive effect was that incorporating the technology their teaching required teachers to dedicate more time to lesson planning and made them more organized. One teacher believed that she had taught her students more than in prior years because the read aloud function in Texthelp Read&Write GOLD helped students better grasp content. Additionally, all of the teachers explained that the use of the technology had caused instruction to shift from being teacher centered to involving more student interaction. The teachers primarily attributed this shift to the ACTIVboard which encouraged the class to work together as a group and Texthelp Read&Write GOLD which encouraged students to work independently.

## Student Use of Software and Programs

*Did students use Texthelp Read&Write GOLD a minimum of 2 times a week?*

The student survey asked the students to indicate whether they used Texthelp Read&Write GOLD every day, 3 or 4 days a week, 2 days a week, once a week or less, or never. The project requirement was for students to use Texthelp Read&Write GOLD at least 2 times a week. The hypothesis was that if students used the software at least twice a week their writing would improve. Exhibit 15 shows that the majority of the students used Texthelp Read&Write GOLD at least 2 times a week during both years of the evaluation. Some students (20%) reported using Texthelp Read&Write GOLD in their math class throughout the 2006–2007 school year.

**Exhibit 15**
**Student Use of Texthelp Read&Write GOLD**

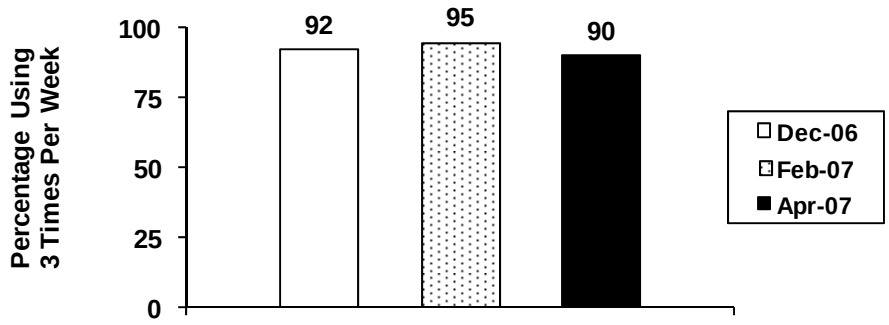



*Note*. December 2005: *n* = 78. January 2006: *n* = 71. April 2006: *n* = 75. May 2006: *n* = 75. December 2006: *n* = 66. February 2007: *n* = 73. April 2007: *n* =63.

*Did students use FASTT Math a minimum of 3 times a week?*

The students were asked whether they used FASTT Math every day, 3 or 4 days a week, 2 days a week, once a week or less, or never. The project requirement was for students to use FASTT Math at least 3 times a week. The hypothesis was that if students used the software at least 3 times a week their math skills would improve. Exhibit 16 shows that at least 90% of the students reported using FASTT Math at least 3 times per week.

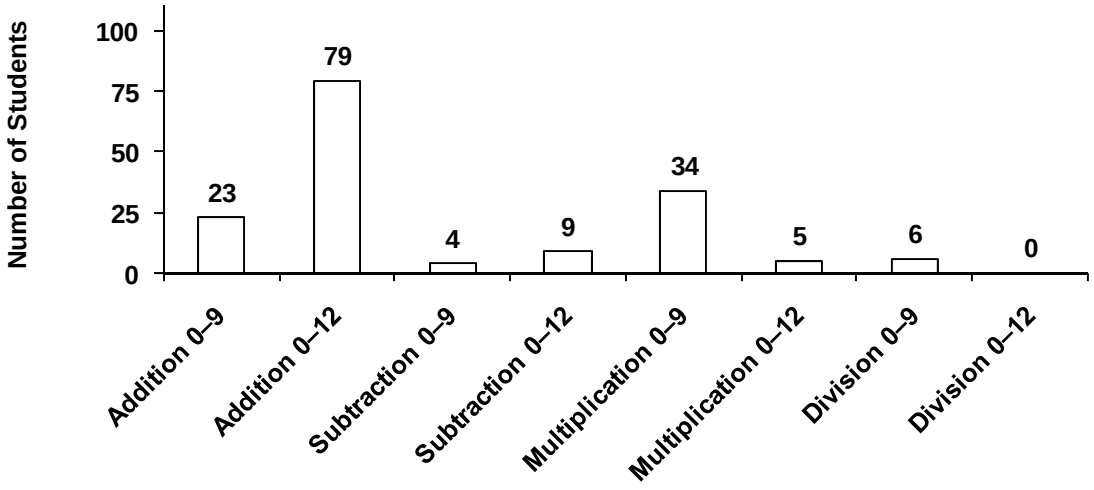
**Exhibit 16**
**Student Use of FASTT Math by Time Period**




*Note.* December 2006: *n* = 71. February 2007: *n* = 88. April 2007: *n* = 72.

Data from the FASTT Math reports provide additional insight into the students' use of FASTT Math. Between September 2006 and April 2007, 109 students used FASTT Math. The majority worked on addition with numbers 0 through 12 (*n* = 79) followed by multiplication with numbers 0 through 9 (*n* = 34). Exhibit 17 shows that few students worked on subtraction or division. For the entire school year students spent a mean of 7 hours using FASTT Math (minimum = 6 minutes; maximum = 34 hours).

**Exhibit 17**
**Student Use of FASTT Math by Operation**




*Note. n* = 109. Data from September 2006 through April 2007.

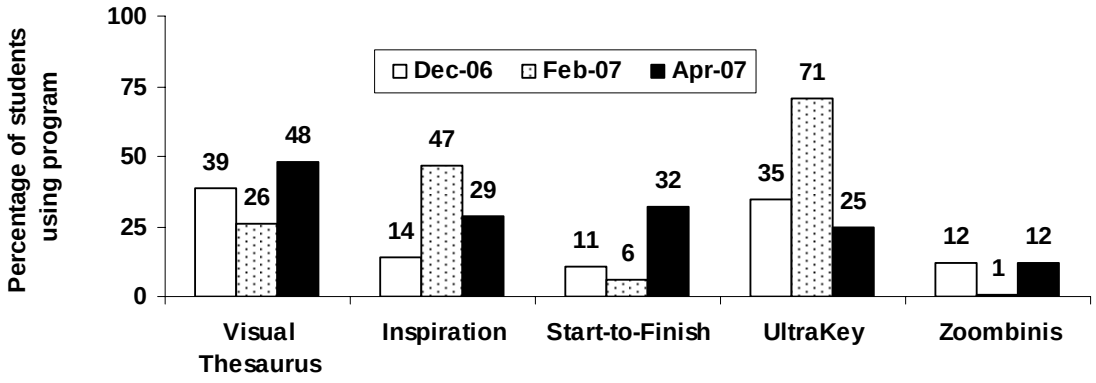
*Did students participate in a minimum of 2 Math Trail projects during the school year?*

In spring 2007 teachers were asked how many of the 2 required Math Trail projects they had completed during the 2006–2007 school year. The hypothesis was that if students participated in at least 2 Math Trail projects their math skills would improve. All of the teachers reported meeting the requirement.

### *Other Software and Programs*

The students surveyed reported whether they had used Visual Thesaurus[1], Inspiration[2], Start-to-Finish Books, UltraKey[3], and Zoombinis[4] every day, 3 or 4 days a week, 2 days a week, once a week or less, or never (see Exhibit 18) during Year 2. There were no project requirements for student use of these technologies. Use of these software and programs varied: at each time point the highest percentage of students reported using Visual Thesaurus, except February 2007 when the highest percentage of students reported using UltraKey. In winter 2007 one teacher surveyed suggested that students' writing skills might have improved more if more copies of UltraKey had been available. This teacher's school is now recommending that all learning disabled students take a computer technology course early in Grade 6.

**Exhibit 18**
**Student Use of Other Software at Least 2 Times a Week**




*Note*. December 2006: *n* = 31, *n* = 35, *n* = 35, *n* = 31, *n* = 34 (respective to x-axis). February 2007: *n* = 38, *n* = 32, *n* = 32, *n* = 38, *n* = 33. April 2007: *n* = 31, *n* = 31, *n* = 31, *n* = 32, *n* = 31.

[1]Thinkmap Inc. (1998–2007). Visual Thesaurus 3 [Computer software]. New York; Author. (For more information see thinkmap.com or visualthesaurus.com)
[2]Inspiration Software Inc. (n.d.). Inspiration 8 [Computer software]. Beaverton, OR: Author. (For more information see inspiration.com)
[3]Bytes of Learning. (n.d.). UltraKey 5.0 [Computer software]. Cheektowaga, NY: Author. (For more information see bytesoflearning.com)
[4]The Learning Company. (n.d.). Zoombinis [Computer software series]. (For more information see learningcompany.com)

## Increased Student Achievement

> *To what extent did the Technology for Learning Disabilities project improve the writing skills of learning disabled students through the use of technology? (Years 1 and 2)*

To address this research question RMC Research compared students' Year 1 writing pretest and posttest scores. The hypothesis was that students exposed to the project technology would increase their writing assessment scores from pretest to posttest. Exhibit 19 shows that the data support the hypothesis: students scored significantly ($p < .01$) higher on the posttest on every writing component except keeping sentences on topic. Because the posttest writing prompt did not ask the students to write for a particular audience, most students received a score of 0 for writing with purpose. Due to this oversight, the scores for writing with a purpose cannot be interpreted. In Year 2 RMC Research verified that both the pre- and posttest prompts specified an audience.

## Exhibit 19
## Year 1 Writing Pretest and Posttest Results

| Component | Mean Score | |
|---|---|---|
| | **Pretest** | **Posttest** |
| **Writing Convention Components** | | |
| Verb agreement | .94 | 1.81 |
| Spelling | .76 | 2.01 |
| Capitalization | .67 | 1.96 |
| Punctuation | .80 | 1.76 |
| Complete sentences | .83 | 1.70 |
| Use of paragraphs | .61 | 1.51 |
| **Total** | 4.61 | 10.75 |
| **Writing Organization Components** | | |
| Sentences on topic | 1.89 | 2.11 |
| Supporting details | 1.10 | 1.41 |
| Beginning, middle, and end | .50 | 1.13 |
| Transitions | .51 | 1.21 |
| Sentence fluency | .87 | 1.43 |
| Voice | .83 | 1.54 |
| Purpose | .75 | 1.42 |
| **Total*** | 6.41 | 10.24 |
| Word count (*M)* | 100 | 139 |
| Percent of correctly spelled words (*M*) | 89% | 98% |

*Note.* Pretest $n = 70$. Posttest $n = 70$. Mean differences assessed using independent *t* test. Component scale: 0 = *does not follow rule* to 3 = *consistently follows rule*. Total writing convention score = 18 possible points. Total writing organization score = 21 possible points. All items except *sentences on topic* were statistically significant at $p < .01$.

During Year 2 RMC Research compared the posttest writing scores of the treatment and comparison groups. The hypothesis was that treatment group would score significantly higher than the comparison group and the data support the hypothesis: the treatment group scored significantly ($p < .001$) higher than the comparison group on every aspect of the posttest (see Exhibit 20) and the treatment group significantly ($p < .001$) improved their scores from pretest to posttest on every writing component. In

contrast, the comparison group significantly ($p <$ 05) improved from pretest to posttest only on verb agreement and capitalization and in terms of their total writing convention score.

**Exhibit 20**
**Writing Posttest Results by Study Group (Year 2)**

| | Posttest Mean Score | |
|---|---|---|
| **Component** | **Treatment** | **Comparison** |
| **Writing Convention Components** | | |
| Verb agreement | 2.23 | 1.45 |
| Spelling | 2.46 | .85 |
| Capitalization | 2.54 | 1.23 |
| Punctuation | 2.31 | 1.30 |
| Complete sentences | 1.88 | .94 |
| Use of paragraphs | 1.50 | .38 |
| **Total** | 12.92 | 6.15 |
| | | |
| **Writing Organization Components** | | |
| Sentences on topic | 2.29 | 1.81 |
| Supporting details | 1.75 | .92 |
| Beginning, middle, and end | 1.37 | .51 |
| Transitions | 1.33 | .57 |
| Sentence fluency | 1.50 | .60 |
| Voice | 1.87 | .98 |
| Purpose | 1.69 | .83 |
| **Total** | 11.78 | 6.22 |
| | | |
| Word count (*M)* | 164 | 103 |
| Percent of correctly spelled words (*M*) | 99% | 92% |

*Note.* Treatment group *n* = 52. Comparison group *n* = 53. Mean differences between treatment and comparison groups assessed using independent *t* test. Mean differences assessed within groups using paired *t* test. Component scale: 0 = *does not follow rule* to 3 = *consistently follows rule*. Total writing convention score = 18 possible points. Total writing organization score = 21 possible points.

Exhibit 21 displays the posttest writing scores of the treatment group students for Years 1 and 2 with respect to their frequency of use of Texthelp Read&Write GOLD. The hypothesis was that students that used Texthelp Read&Write GOLD frequently

would score higher on the posttest than students that used the program less frequently; and the data support the hypothesis: in Year 1 students in the high-use category scored significantly ($p < .05$) higher than low-use category on every aspect of their writing except for spelling, capitalization, use of complete sentences, and percentage of correctly spelled words and in Year 2 students in the high-use category scored higher on every aspect of their writing except for word count and the percentage of correctly spelled words.

**Exhibit 21**
**Posttest Writing Scores by Frequency of Texthelp Read&Write GOLD Use**

| | Year 1 Posttest Mean Score | | Year 2 Posttest Mean Score | |
|---|---|---|---|---|
| **Component** | **Low Use** | **High Use** | **Low Use** | **High Use** |
| **Writing Convention Components** | | | | |
| Verb agreement | 1.39 | 1.96 | 1.86 | 2.53 |
| Spelling | 1.77 | 2.09 | 2.10 | 2.70 |
| Capitalization | 1.83 | 2.00 | 2.29 | 2.70 |
| Punctuation | 1.44 | 1.86 | 2.05 | 2.50 |
| Complete sentences | 1.44 | 1.78 | 1.48 | 2.17 |
| Use of paragraphs | 1.05 | 1.67 | 1.14 | 1.73 |
| **Total** | 8.94 | 11.38 | 10.90 | 14.33 |
| | | | | |
| **Writing Organization Components** | | | | |
| Sentences on topic | 1.66 | 2.26 | 1.90 | 2.53 |
| Supporting details | 1.05 | 1.53 | 1.48 | 1.9 |
| Beginning, middle, and end | .77 | 1.25 | 1.10 | 1.53 |
| Transitions | .83 | 1.34 | 1.00 | 1.53 |
| Sentence fluency | 1.00 | 1.57 | 1.10 | 1.73 |
| Voice | 1.11 | 1.69 | 1.43 | 2.13 |
| Purpose | 1.06 | 1.55 | 1.24 | 1.97 |
| **Total** | 7.50 | 11.19 | 9.24 | 13.37 |
| | | | | |
| Word count (*M)* | 116 | 144 | 153 | 170 |
| Percent of correctly spelled words (*M*) | 99% | 98% | 93% | 97% |

*Note.* Low use during Year 1 $n = 18$. High use during Year 1 $n = 52$. Low use during Year 2 $n = 21$. High use during Year 2 $n = 30$. Mean differences between treatment and comparison groups assessed using independent *t* test. Mean differences assessed within groups using paired *t* test. Component scale: 0 = *does not follow rule* to 3 = *consistently follows rule*. Total writing convention score = 18 possible points. Total writing organization score = 21 possible points.

*To what extent did the Technology for Learning Disabilities project improve the math skills of learning disabled students through the use of technology? (Year 2)*

To address this research question RMC Research compared students' Year 2 math pretest and posttest scores. The hypothesis was that students exposed to the project technology would increase their math assessment scores from pretest to posttest and the treatment group's posttest scores would be higher than the comparison group's posttest scores. Exhibit 22 shows that the data partially supported the hypothesis: the mean treatment group scores increased significantly ($p < .01$) from pretest to posttest, whereas the comparison group scores did not, but the treatment group's posttest scores were not significantly higher than the comparison group's posttest scores.

The increase in the treatment groups' posttest scores may be due to students using FASTT Math, participating in Math Trail projects, or using both interventions. To determine if FASTT Math may have had a significant impact on students' posttest scores students that used FASTT Math frequently were compared to students that used FASTT Math less frequently. The hypothesis was that students who used FASTT Math frequently would score significantly higher on the posttest compared to students that used FASTT Math less frequently. Exhibit 22 displays the math scores of the treatment group students with respect to their frequency of use of FASTT Math. The data did not support the hypothesis: students in the high-use category did not score significantly higher on the posttest compared to the pretest, nor were their posttest scores significantly higher than the scores of the students in the low-use category. In contrast students in the low-use category scored significantly ($p < .05$) higher on the posttest while students in the high-use category did not.

**Exhibit 22**
**Math Pretest and Posttest Results (Year 2)**

| Test | Mean Score | | | |
|---|---|---|---|---|
| | Treatment Group | Comparison Group | High Use FASTT Math | Low Use FASTT Math |
| Pretest | 6.39 | 7.72 | 6.29 | 6.56 |
| Posttest | 8.04 | 7.98 | 7.72 | 8.69 |

*Note.* Mean differences assessed using independent *t* test. Mean differences within groups assessed using paired *t* test. Treatment: *n* = 71. Comparison: *n* = 65. High use: *n* = 47. Low use: *n* = 23. Maximum possible score = 18 points.

## Improved Student Attitude

*To what extent did the project improve students' attitude toward writing? (Years 1 and 2)*

In spring 2006 half of the interviewed teachers reported that the project's greatest impact had been improving students' attitude toward writing. Nearly all of the teachers credited the assistive technology with helping the students complete their schoolwork, which in turn increased their confidence, motivation, and achievement. Their comments include these:

> "I would think it has been with writing and having their own computer that they have been able to write. They can sit down and really compose and then do their revisions at the computer. They are all really comfortable with the ability to utilize Texthelp Read&Write GOLD and use Microsoft Word documents and save them. The practice they have had has made such a difference."

> "The biggest increase is their self-confidence with writing. One kid refused to write and by the end of the year was moved to a regular English class and received an A. . . . The students really wanted to learn more. . . . The technology made them feel successful."

> “Just the fact that they have learned the technology. They have more pathways to be successful and have a lot more confidence.”
>
> “It has increased their motivation. They love Inspiration. Their ideas have increased. They now spend more time prewriting and spend more time drafting things out.”
>
> “The few that didn’t like to write still don’t like to write but now they at least make an effort. They don’t say that they can’t.”

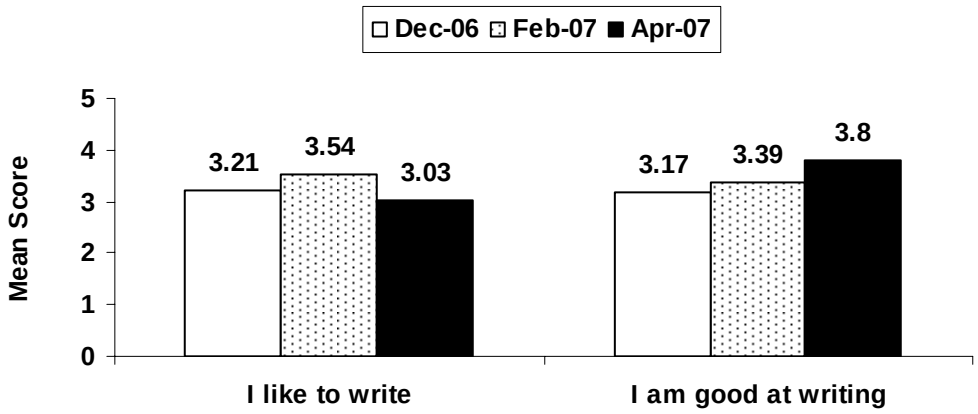
A year later, the spring 2007 survey asked teachers to report whether the technology had improved the students’ attitude toward writing to a great extent, to some extent, not very much, or not at all. They indicated that the technology had improved the students’ attitude to a great extent (83%) or to some extent (17%). Their comments include these:

> “The greatest impact has been on their self-confidence. They feel so much better and they are willing to try harder. Their academics have improved too. This year made the biggest impact because this year I expected more from them and now they are now more independent.”
>
> “They will just keep writing stories now. It has encouraged them to put their own voice in their writing. Now you can see their personality and sense of humor in their writing and they have become better risk takers.”
>
> “A lot of kids I deal with have such a difficult time with paper and pen so they made a huge jump. . . . They also were able to have word prediction to correctly spell the word and hear the definition right away instead of going into spell check and maybe choosing the wrong word because they just chose something that looks close. With word prediction . . . they can hear and see the word and they feel like they are doing it right and fast and this gives them a lot of pride. The color printer was nice because they could print up something and have it look flashy if they were proud of it.”

"I used to give assignments and they would only write a sentence and now their responses are more extensive. They also now use the computers in my class to work on assignments from their other classes."

The student surveys asked the students themselves to indicate, using a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), whether they agreed with the statements "I am good at writing" and "I like to write." Exhibit 23 shows that the mean score for "I am good at writing" increased significantly (independent *t* test, $p < .05$) from 3.17 in December 2006 to 3.80 in April 2007. In contrast, the students' agreement with the statement "I like to write" was lower in April 2007 than it had been in December 2006. Future projects would benefit from comparing treatment and comparison group students' attitudes toward writing.

**Exhibit 23**
**Student Attitude Toward Writing**




*Note.* Like to write: December 2006 *n* = *47,* February 2007 *n* =53, April 2007 *n* = 51. I am good a writing: December 2006 *n* = 39, February 2007 *n* = 61, April 2007 *n* = 41. Scale = 1 (*strongly disagree*) to 5 (*strongly agree*).

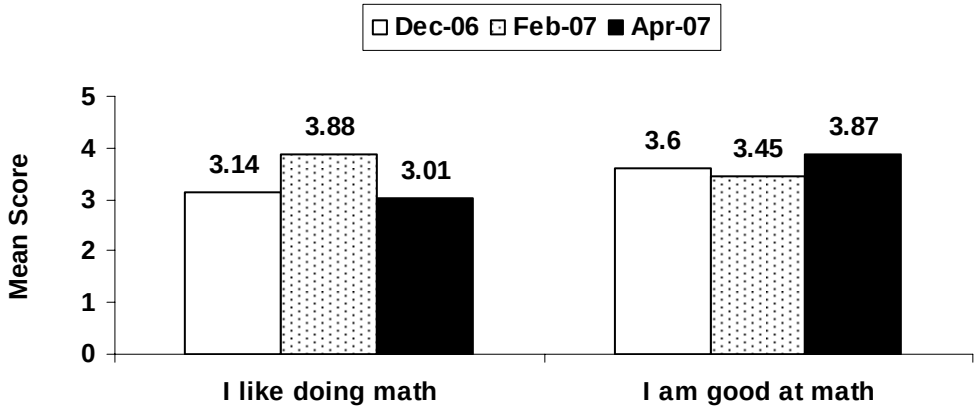
### *To what extent did the project improve students' attitude toward math? (Year 2)*

The spring 2007 survey asked teachers to report whether the technology had improved the students' attitude toward math to a great extent, to some extent, not very much, or

not at all. They indicated that the technology had improved the students' attitude to a great extent (67%) or to some extent (33%). In the spring 2007 interviews the teachers explained that FASTT Math and the Math Trail projects made math enjoyable for the students, which increased their motivation.

The Year 2 student surveys asked the students to indicate, using a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), whether they agreed with the statements "I am good at math" and "I like doing math." Exhibit 24 shows that the mean score for "I am good at math" remained relatively stable throughout the year but was highest in April 2007. Students' agreement with the statement "I like math" increased significantly (independent *t* test, $p < .05$) from 3.14 in December to 3.88 in February 2007 and then decreased to 3.01 in April 2007. Future projects would benefit from comparing treatment and comparison group students' attitudes toward math.

**Exhibit 24**
**Student Attitude Toward Math**



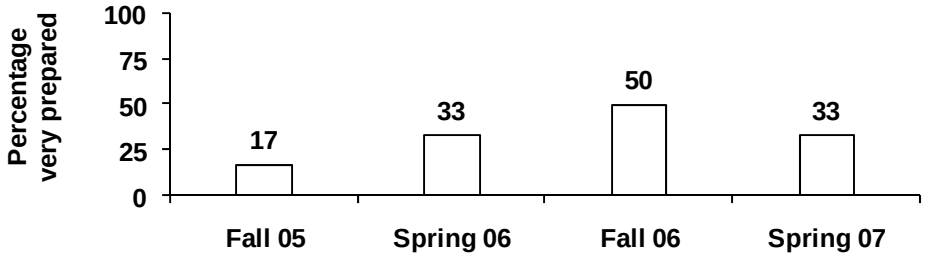

*Note.* I like doing math: December 2006 *n* = *47,* February 2007 *n* =53, April 2007 *n* = 52.
I am good at math: December 2006 *n* = 48, February 2007 *n* = 59, April 2007 *n* = 40.
Scale = 1 (*strongly disagree*) to 5 (*strongly agree*).

## Promotion of Dissemination Strategies and Dissemination of Project Information

> *How successful was the project in encouraging teachers to disseminate information that promoted parent and community support for the Technology for Learning Disabilities project?*
>
> *To what extent did teachers disseminate the information they learned to other educators and audiences?*

Exhibit 25 shows the percentages of teachers who reported being very prepared to disseminate information to others. Although the proportion of teachers who felt very prepared to disseminate information that promoted support for the project in fall 2005 (17%) had nearly doubled by spring 2007 (33%), the majority of the teachers remained unprepared in this respect. Regardless, in both years all of the teachers spoke with parents, school staff, or school administrators about the project. During Year 1 all 6 teachers hosted a parent night in fall and spring, and 4 reported that the events were well attended. During Year 2 the teachers implemented a variety of dissemination strategies including organizing student presentations to parents and school administrators (*n* = 3); sharing information with parents at individual education plan meetings (*n* = 2); presenting at faculty meetings, school board meetings, Parent Teacher Association meetings (*n* = 3), and the district technology fair (*n* = 1); and sharing information about the technology with the school technology committee.

**Exhibit 25**
**Teacher Preparedness to Disseminate Information**




*Note*. *n* = 6.

## Inspiration of Other Educators and Increased Community and Parent Support

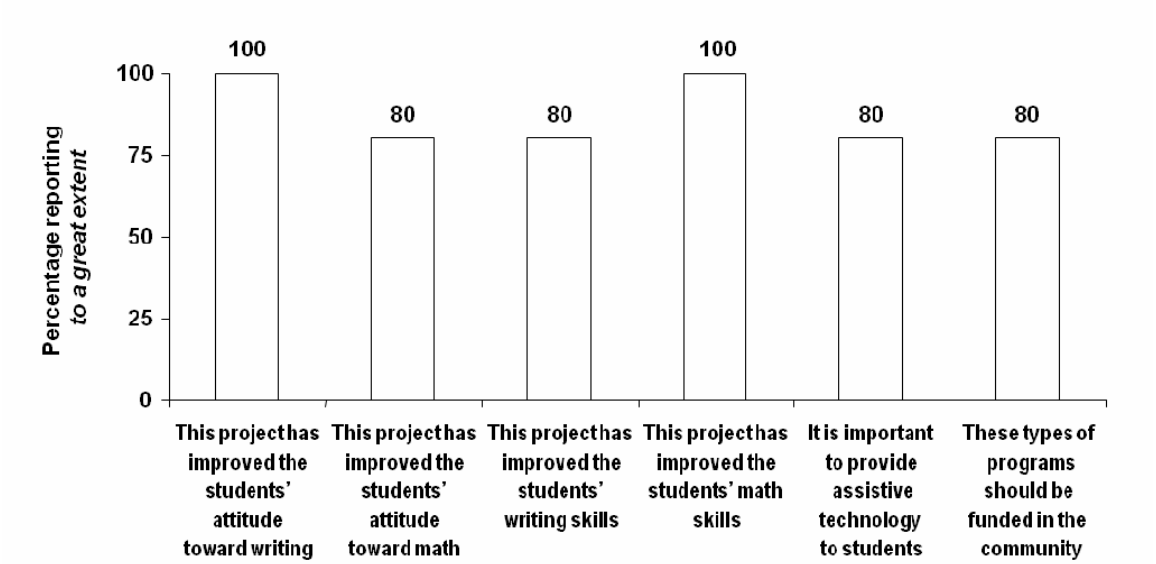
> *To what extent did the project inspire other educators to use the project technology and teaching strategies?*
>
> *To what extent did the project increase parent and community support of programs that provide assistive technology to classrooms?*

During the spring 2006 and 2007 interviews teachers were asked if they had inspired other educators to use the project technology and teaching strategies. In spring 2006 half of the teachers reported that other staff were enthusiastic about the technology (especially the document camera and ACTIVboard). In the remaining schools the project generated little interest. One teacher reported that few staff responded to an invitation to visit the classroom to learn about the project and the technology. This teacher suggested that support from the school administration—such as the opportunity to present to staff at schoolwide meetings—would have been beneficial. Another teacher speculated that fellow teachers might have been reluctant to invest the time in learning about technology they did not have access to. At another school, most of the teachers already had similar technology.

In spring 2007 the teachers reported less on inspiring their peers to use the project technology and teaching strategies and more on increasing support for projects that provide assistive technology to learning disabled students. The teachers described how they had fostered interest among principals, superintendents, school board members, and school staff. One teacher's school purchased approximately 20 document cameras after learning about the benefits of the technology.

In Year 2 a third of the teachers submitted community surveys completed by school administrators, superintendents, or teachers following the year-end presentation in April or May 2007 (complete community survey results appear in Appendix H). The respondents indicated their thoughts, using a scale from 1 (*not at all*) to 4 (*to a great extent*), on a variety of statements. As Exhibit 26 shows, they were very supportive of providing assistive technology to students and believed that the technology had impacted the students' skills and attitudes.

**Exhibit 26**
**Community Survey Results: School Administrators and Staff (Year 2)**




*Note*. *n* = 5.

### *Parent and Community Support*

During the spring 2006 interviews teachers were asked if parents increased their support of programs that provide assistive technology to classrooms receiving information about the project. The teachers (83%) reported that almost all parents had expressed enthusiasm for the project and the technology it provided, and most teachers believed that the project had increased the parents' support for their child's learning. One teacher described how parents who had attended the spring parent night had observed the connections between the technology and their child's increased skill level:

> "We were looking at Texthelp Read&Write GOLD and the mom said that is why [my child] is talking so intelligently. She saw an increase in his vocabulary this year. . . . One of the parents was extremely excited to see the volume that their student was writing—whereas sentences had been nonexistent, the child was now writing paragraphs. . . . [Seeing] how the word prediction [software] was facilitating that was really revealing, and the parents were excited [the software] would be available to their child next year."

In Year 2 a third of the teachers submitted community surveys completed by parents following the year-end presentation in April or May 2007. The respondents indicated their thoughts, using a scale from 1 (*not at all*) to 4 (*to a great extent*), on a variety of statements. As Exhibit 27 shows following the presentations 100% of the parents agreed that to a great extent it is important to provide assistive technology to students and 96% agreed that projects such as Technology for Learning Disabilities should be funded in the community. The survey respondents made the following remarks on the open-ended section of the survey:

> "These programs are great. I wish I [had] them when I was growing up."

> "Technology helps my son where handwriting is difficult. Helps in reading as well."

"The technology has really helped. Where students don't have the computer at home it has helped overall performance in class."

"I think this is a wonderful program helping kids build confidence and organizational skills."

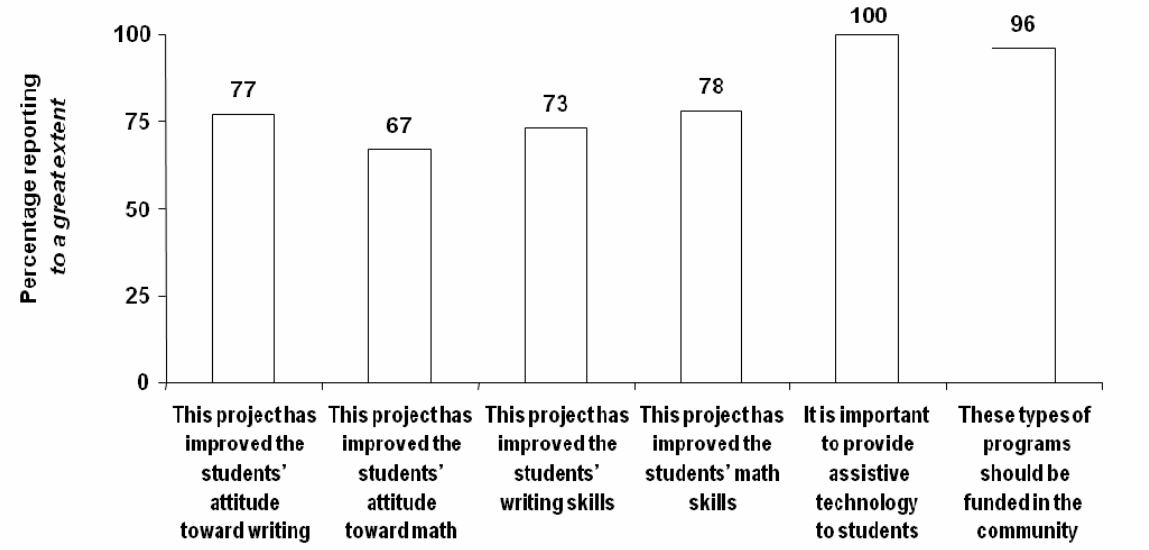
"I think the individual computers are a big help."

"This school strongly benefits from this program and any projects made towards student achievement is imperative."

"I am very impressed in what this program has done for my child. Thanks!"

"The more technology they have the better prepared they are for later life."

**Exhibit 27**
**Community Survey Results: Parents (Year 2)**




*Note*: *n* = 27.

# Summary

This section summarizes the results for each evaluation question.

***How successful was the project at providing teachers with technology?***

- The Technology for Learning Disabilities project successfully provided teachers with the technology.

***How successful was the project at providing teachers with professional development on the use of the technology?***

- The project successfully provided teachers with professional development on the use of the technology.

***Did teachers use the hardware in their classroom a minimum of three times a week?***

- During both years at least 92% of the teachers reported using the laptop or desktop computer, multimedia projector with document camera, and the ACTIVboard at least 3 times a week.

***Did students use Texthelp Read&Write GOLD a minimum of 2 times a week? Did students use FASTT Math a minimum of 3 times a week? Did students participate in a minimum of 2 Math Trail projects during the school year?***

- During both years of the project at least 60% of the students used Texthelp Read&Write GOLD a minimum of 2 times a week.
- During Year 2 of the project at least 90% of the students used FASTT Math a minimum of 3 times a week.
- During Year 2 of the project all of the students participated in at least 2 Math Trail projects during the school year.

***To what extent did the project improve the writing skills of learning disabled students through the use of technology (Years 1 and 2)? To what extent did the project improve the math skills of learning disabled students through the use of technology (Year 2)?***

- During Year 1 students scored significantly higher on the posttest compared to the pretest on every writing component except keeping sentences on topic.
- During Year 2 students in the treatment group scored significantly higher on the posttest compared to the comparison group on every writing component.
- During Year 2 students in the treatment group scored significantly higher on the math posttest compared to the pretest but did not score significantly higher on the math posttest compared to the comparison group.

***To what extent did the project improve students' attitude toward writing (Years 1 and 2)? To what extent did the project improve students' attitude toward math (Year 2)?***

- During Year 1, 50% of the teachers reported that the greatest impact of the project had been increasing students' willingness to write.
- During Year 2, 83% of the teachers reported that the technology improved the students' attitude toward writing to a great extent and students reported a significant increase in being good at writing.
- During Year 2, 67% of the teachers reported that the technology had improved students' attitude toward math to a great extent and students reported a significant increase in liking math.

***How successful was the project in encouraging teachers to disseminate information that promoted parent and community support for the Technology for Learning Disabilities project?***

- During both years teachers were encouraged to disseminate information that promoted parent and community support for the Technology for Learning Disabilities project.

***To what extent did teachers disseminate the information they learned to other educators and audiences?***

- During both years all teachers disseminated information to other educators and audiences.

***To what extent did the project inspire other educators to use the project technology and teaching strategies?***

- During Year 1 approximately 50% of the teachers reported inspiring other educators to use the project technology and teaching strategies.
- During Year 2 teachers reported increasing support for projects that provide assistive technology to learning disabled students.

***To what extent did the project increase parent and community support of programs that provide assistive technology to classrooms?***

- Almost all of the parents and most of the school administrators, superintendents, and teachers that attended the year-end presentation agreed that it is important to provide assistive technology to students and indicated that this type of program should be funded in the community.

# Appendix A
# Data Collection Instruments

# Appendix B
# Individual Learning Profile Assignments

# Appendix C
# Evaluation Briefs

# Appendix D
# Student Writing Assessment Materials

# Appendix E
# Student Math Assessment Materials

# Appendix F
# Teacher Survey Results

# Appendix G
# Student Survey Results

# Appendix H
# Community Survey Results