The document discusses the effects of Fast ForWord products on the academic skills of students in Westfield Washington Schools. The study investigated the gains in Language Arts, Math, and Reading for students who used the products within the curriculum. Results showed statistically significant improvements in all areas for the Fast ForWord participants compared to expected gains. The study design was a case study using a nationally-normed assessment. Participants were 98 fifth- through eighth-grade intermediate and middle school students in Westfield, Indiana. The INTRODUCTION section highlights the importance of early reading and cognitive skills in academic success. The METHODS section details the study design and implementation, including the use of commercially-available products and a pre-post assessment approach.
Westfield Middle School serves nearly 800 seventh and eighth graders.

Westfield Washington Schools used the Fast ForWord products during the 2007-2008 school year and took part in the study reported here. The schools selected students for the study based on their fall and winter RIT scores on the Northwest Evaluation Association (NWEA) online assessment, the Measures of Academic Progress (MAP). To provide a performance comparison, participants’ gains were compared to the expected growth norms on the MAP. One hundred and twenty students from Westfield Washington Schools used the Fast ForWord products and had MAP scores from Fall, 2007 and Spring, 2008. School personnel administered the assessment and reported scores to Scientific Learning for analysis.

Implementation

Educators were trained in current and established neuroscience findings regarding the development of critical cognitive skills that are necessary for reading and learning success. Further training introduced the scientific background validating the efficacy of the Fast ForWord products; methods for assessment of potential candidates for participation; effective implementation techniques; as well as the selection of appropriate measures for testing and evaluation for measuring the gains students have achieved after they have finished using Fast ForWord products.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. The products used by the students in this study (Fast ForWord Literacy, Fast ForWord Literacy Advanced, Fast ForWord Reading Level 2, Fast ForWord Reading Level 3, and Fast ForWord Reading Level 4) include five to six exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension. While there are differences between the products, all help develop certain critical skills as detailed in the following exercise descriptions.

Space Racer\(^1\), and Sky Rider\(^2\): Students hear a series of short, non-verbal tones. Each tone represents a different fragment of the frequency spectrum used in spoken language. Students are asked to differentiate between these tones. The exercises improve working memory, sound processing speed, and sequencing skills.

Galaxy Goal\(^1\): Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

Spin Master\(^1\), Meteor Ball\(^2\), and Lunar Leap\(^2\): Students hear a target phoneme, and then must identify the identical phoneme when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific phoneme.

Lunar Tunes\(^1\), and Laser Match\(^2\): Students choose a square on a grid and hear a sound or word. Each sound or word has a match somewhere within the grid. The goal is to find each square’s match and clear the grid.

Star Pies\(^1\): Students see two pictures representing words that differ only by the initial or final consonant (e.g., “face” versus “vase”, or “tack” versus “tag”). When students hear one of the words, they must click the picture that matches the word. This exercise increases sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

Stellar Stories\(^1\), and Galaxy Theater\(^2\): Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

Bear Bags: More Lunch\(^1\): In this exercise, the participant is asked to help Mama Bear sort words (on pieces of toast) into phoneme-based categories (in lunch bags). It develops phonemic awareness and decoding of single-syllable words. It also develops grapheme/phoneme associations.

Magic Bird\(^3\): This exercise combines spelling and word-building practice with spelling patterns and word families commonly studied in 2nd grade. The task is designed to emphasize the relationships between words by showing how one word can be turned into another by simply changing a single letter in any position. Using a click and drag interface, the

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\(^1\) Exercise from the Fast ForWord Literacy product.

\(^2\) Exercise from the Fast ForWord Literacy Advanced product.

\(^3\) Exercise from the Fast ForWord Reading Level 2 product.
participant must either select the missing letter to complete a partially spelled word or rearrange scrambled letter tiles to spell a word. This exercise develops spelling and sensitivity to letter-sound correspondences.

**Fish Frenzy**: In this exercise, a fishing pelican pronounces a word. Then a series of spoken and/or written words (on fish) fly across the pond and the participant clicks on the word when it matches the pronounced word. This exercise develops decoding skills, identification of sight words, and auditory memory.

**Leaping Lizards**: This exercise uses the “cloze task,” in which a written and aurally presented sentence has a word missing. The participant must select the correct word to complete the sentence from four choices. Vocabulary skills and sentence comprehension are developed in this exercise.

**Dog Bone**: In this exercise, the participant listens to a passage and answers comprehension questions relating to each passage. The questions are aurally presented and written, and the response choices are presented as pictures. Responses are presented as words or short phrases. This exercise develops listening comprehension and working memory skills as measured by performance on multiple choice questions.

**Ant Antics**: The participant will be presented with a picture and then asked to pick one of the four alternatives that best describes an aspect of that picture. This exercise improves vocabulary skills and sentence comprehension.

**Scrap Cat**: In Scrap Cat, a series of words is visually presented and participants are asked to sort each word into the correct semantic, phonological, syntactic, or morphological category. For this exercise only, the participant can click a button to hear any word and see it written aloud and letters appear on the keys of a jukebox. The participant must spell the word by filling in the missing letter or letter group. Five options are always provided, including options that represent common visual and phonological errors. This exercise develops basic spelling patterns, letter-sound correspondences, and decoding.

**Twisted Pictures**: Participants are presented with a variety of pictures and asked to select the sentence that most accurately describes each picture from among four alternatives. The descriptive sentences incorporate a wide range of syntactic structures. As the participant progresses, the sentences get longer and more difficult vocabulary is included. This exercise builds sentence comprehension by developing syntax, working memory, logical reasoning, and vocabulary.

**Book Monkeys** and **Book Monkeys: Book Two**: Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice questions demand that the participant use memory for literal detail, generation of inferences, or grasp of among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

**Hog Hat Zone** and **Lulu’s Laundry Line**: In Hog Hat Zone, short passages from classic children’s literature are presented, with occasional gaps in the text where words are missing. Participants are asked to fill in each gap with the correct word from among four alternatives. In Lulu’s Laundry Line, short passages are presented with occasional gaps where punctuation is missing. These exercises develop paragraph comprehension, complex morphology, flexible reading, and vocabulary, as well as automaticity for decoding and sentence comprehension.

**Hoof Beat**: The participant is presented with a question and four possible answers. The participant must choose the most appropriate answer. The questions relate to semantics, phonology, morphology, orthography, and syntax. The exercise encourages cognitive flexibility during reading and automatic access to the various dimensions of vocabulary. The exercise is designed to build vocabulary by showing the participant how words function.

**Jitterbug Jukebox**: The participant hears a word spoken aloud and letters appear on the keys of a jukebox. The participant must spell the word by

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4 Exercise from the Fast ForWord Reading Level 3 product.

5 Exercise from the Fast ForWord Reading Level 4 product.

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clicking on the jukebox keys. Jitterbug Jukebox helps participants improve spelling and sensitivity to letter-sound correspondences. This exercise includes many of the 500 most commonly used words in written English including most word families found in 3rd and 4th grade content standards.

_Goat Quotes_: In Goat Quotes four newspapers paraphrase a headline at the top of a news kiosk. The participant must select the correct paraphrase. The exercise is designed to sample the basic syntactic (i.e., grammatical) structures of spoken English generally mastered in the early elementary grades. The exercise develops logical thinking and working memory skills as well as careful reading.

_Assessments_
Before and after the participants used the Fast ForWord products, students’ reading skills were assessed with the Northwest Evaluation Association (NWEA) online assessment, the Measures of Academic Progress (MAP). The Language Arts, Math, and Reading tests were used in this study. The study participants were pre-tested on the three subtests in late August or early September, 2007. The tests were administered again in late April or early May of 2008, at the end of the study.

_Measures of Academic Progress (MAP):_ Developed by the Northwest Evaluation Association, the MAP are state-aligned computerized adaptive tests that accurately reflect the instructional level of each student and measure growth over time. The MAP is appropriate for students in grades 2 through 10.

**Analysis**
Scores were reported in terms of RIT scale scores. The RIT scale is infinite, but most student scores fall between the values of 140 and 300. Like meters or pounds, the scale is equal-interval. All analyses used a p-value of less than 0.05 as the criterion for identifying statistical significance.

**RESULTS**

_Participation Level_
Research conducted by Scientific Learning shows a relationship between product use and the benefits of the product. Product use is composed of content completed, days of use, and adherence to the chosen protocol (participation and attendance levels). During the 2007-2008 school year, Westfield Washington Schools chose to use the 30-, 40-, and 50-Minute protocols. These protocols called for students to use the product for 30, 40, or 50 minutes a day, five days per week for several weeks, with the shorter daily protocols requiring more weeks. Table 1 shows detailed product use for students in Westfield Washington Schools who used Fast ForWord products during the 2007-2008 school year. As can be seen in the table, all participants started on the Fast ForWord Literacy product, with the majority progressing onto at least one additional Fast ForWord product.

Figure 1 shows the average daily progress through the Fast ForWord Literacy exercises. This graph represents the learning curve of the students as they progress through the product. The final day shown is determined by the maximum number of days that at least two-thirds of the students participated. For students who used the product fewer than the number of days shown, percent complete is maintained at the level achieved on their final day of product use.

![Learning Curve: Fast ForWord Literacy](#)

<table>
<thead>
<tr>
<th>Fast ForWord Product:</th>
<th>Number of Students</th>
<th>Days Participated</th>
<th>Calendar Days</th>
<th>Percent Completion</th>
<th>Percent Attendance</th>
<th>Percent Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy</td>
<td>120</td>
<td>27.7</td>
<td>59.9</td>
<td>90.7%</td>
<td>79.8%</td>
<td>97.7%</td>
</tr>
<tr>
<td>Literacy Advanced</td>
<td>113</td>
<td>34.1</td>
<td>69.9</td>
<td>74.3%</td>
<td>79.0%</td>
<td>97.2%</td>
</tr>
<tr>
<td>Reading Level 2</td>
<td>10</td>
<td>23.3</td>
<td>55.3</td>
<td>67.7%</td>
<td>87.4%</td>
<td>99.1%</td>
</tr>
<tr>
<td>Reading Level 3</td>
<td>80</td>
<td>22.4</td>
<td>48.5</td>
<td>65.6%</td>
<td>82.2%</td>
<td>99.1%</td>
</tr>
<tr>
<td>Reading Level 4</td>
<td>35</td>
<td>19.3</td>
<td>35.1</td>
<td>65.2%</td>
<td>81.7%</td>
<td>99.0%</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>83.4</td>
<td>177.6</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Table 1. Usage data showing the number of students who used the Fast ForWord products, along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of product completed, the participation level, and the attendance level.
Assessment Results

Measures of Academic Progress (MAP): Westfield Washington Schools used the Language Arts, Math, and Reading tests of the MAP. The tests were administered three times during the 2007-2008 school year, in the Fall, Winter, and Spring. These results look at the improvements between Fall and Spring. One hundred and twenty students had RIT scale scores from these two time points and used Fast ForWord products. Ninety-eight of these 120 students had scores that could be considered true pre- and post-tests, where the pre-test was administered prior to starting the Fast ForWord product and the post-test was administered after the student completed participation.

On average, the students made statistically significant improvements on the Language Arts, Math, and Reading tests (see Table 2, Figure 2).

Schools typically use the Growth Norms, published by NWEA, to determine if students met their academic goals for the school year. Tables 3 through 5 show the results of the Fast ForWord participants compared to the Growth Norms. Results are presented for groups of students with 20 or more students, namely fifth through eighth graders combined (n=98), fifth graders separately (n=45), and sixth graders separately (n=27).

Table 2: On average, students improved in academic skills after Fast ForWord use, with students significantly improving in Language Arts, Math, and Reading tests. * p < 0.05
**LANGUAGE ARTS**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Participants</th>
<th>Average Growth (FFW)</th>
<th>Typical Growth (Norm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th – 8th</td>
<td>98</td>
<td>+ 7.0</td>
<td>+ 4.2*</td>
</tr>
<tr>
<td>5th</td>
<td>45</td>
<td>+ 8.3</td>
<td>+ 5.2</td>
</tr>
<tr>
<td>6th</td>
<td>27</td>
<td>+ 5.6</td>
<td>+ 4.0</td>
</tr>
</tbody>
</table>

Table 3. Students who used the Fast ForWord products significantly exceeded the NWEA Growth Norm in Language Arts. * Based on a weighted average of 5th through 8th graders.

**MATH**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Participants</th>
<th>Average Growth (FFW)</th>
<th>Typical Growth (Norm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th – 8th</td>
<td>98</td>
<td>+ 10.1</td>
<td>+ 7.5*</td>
</tr>
<tr>
<td>5th</td>
<td>45</td>
<td>+ 12.0</td>
<td>+ 8.7</td>
</tr>
<tr>
<td>6th</td>
<td>27</td>
<td>+ 10.3</td>
<td>+ 7.2</td>
</tr>
</tbody>
</table>

Table 4. Students who used the Fast ForWord products significantly exceeded the NWEA Growth Norm in Math. * Based on a weighted average of 5th through 8th graders.

**READING**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Number of Participants</th>
<th>Average Growth (FFW)</th>
<th>Typical Growth (Norm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th – 8th</td>
<td>98</td>
<td>+ 8.8</td>
<td>+ 4.5*</td>
</tr>
<tr>
<td>5th</td>
<td>45</td>
<td>+ 11.1</td>
<td>+ 5.4</td>
</tr>
<tr>
<td>6th</td>
<td>27</td>
<td>+ 9.4</td>
<td>+ 4.3</td>
</tr>
</tbody>
</table>

Table 5. Students who used the Fast ForWord products significantly exceeded the NWEA Growth Norm in Reading. * Based on a weighted average of 5th through 8th graders.

**DISCUSSION**

During the 2007 – 2008 school year, a group of 120 students from Westfield Washington Schools used the Fast ForWord products. Overall, students made statistically significant improvements in their language arts, math, and reading skills, as measured by the MAP. The gains of the students significantly exceeded the expected Growth Norms, demonstrating that an optimal learning environment coupled with a focus on cognitive and early reading skills can help students attain a higher level of academic achievement.

**CONCLUSION**

Language and reading skills are critical for all students, affecting their ability to benefit from instruction, follow directions and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. After Fast ForWord use, students in Westfield Washington Schools made significant gains in their language arts, math, and reading abilities, significantly exceeding their expected gains. This suggests that using the Fast ForWord products strengthened the students’ foundational skills and better positioned them to benefit from the classroom curriculum.

**REFERENCES**


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