Leapster™ Portable Technology Center

Reading Enrichment Study Belmont, CA, Spring 2006

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ABSTRACT

In a six-week study of the *Leapster* Portable Technology Center, kindergarten through grade 2 students used *Leapster* personal learning tools (PLTs) for a total of 10 hours during a daily reading pullout group. At the end of the implementation, kindergarten students improved 81% on a letter identification test, and first- and second-graders made 16% gains on an assessment of phonics skills.

The grade-level reading and spelling activities presented in an engaging, multisensory format make the *Leapster* PLT a valuable resource for teaching reading and prereading skills to students in early grades.

INTRODUCTION

Scientific research has demonstrated that mastery of early reading skills such as phonemic awareness, fluent letter-word recognition, and knowledge and application of the alphabetic principle is critical for young children who are learning to read (National Institute of Child and Human Development, 2000). Studies have also shown that students who fail to learn these skills in early grades face great challenges when it comes to catching up with their peers in later years (Juel, 1988), making it crucial to provide them the right support early on.

Video game–like environments provide a uniquely compelling learning atmosphere for students, especially those who might otherwise be difficult to reach. The inherent structure of leveled activities, whereby learners must master one level before moving on to the next and where they must connect and manipulate information, creates a powerful and motivating learning sphere (Gee, 2004). As interest in using computer-based

games in schools gains momentum, researchers have begun to investigate the effectiveness of this technology in educational settings. A recent study (Rosas, Nussbaum et al., 2003) found a significant difference in learning outcomes for first- and second-graders in classrooms where computer games were used for instruction, compared to control counterparts who did not use the games. Another study of in-class use of handheld technology conducted by SRI International (Vahey & Crawford, 2002) discovered that 90% of participating teachers found the tools to be instructionally effective, increasing student motivation and collaboration.

This current study investigated the effectiveness of the *Leapster*™ PLT, a screen-based handheld computing platform for students in kindergarten through grade 2, in teaching core reading skills within a pullout reading intervention program.

METHOD

The suburban school that participated in this study, Nesbit Elementary, is located 20 miles south of San Francisco. With an enrollment of 260 students, this K-5 school has a diverse student body consisting of 47% Caucasian, 22% Hispanic, 9% African-American, 13% Asian, and 3% Pacific Islander students. Fifteen percent of the school's students are enrolled in special programs for English language learning (ELL) students. This elementary school is one of five in the Belmont-Redwood Shores School District. Relative to the district, Nesbit Elementary serves a greater number of at-risk students including ELL students, minority students, and students who qualify for subsidized lunch. Nonetheless, this school met its 2005 target for growth on California's Academic Performance Index (API) and made Adequate Yearly Progress (AYP) according to No Child Left Behind (NCLB).

Through a daily pullout reading program, Nesbit Elementary provides reading intervention to students who are at risk for falling behind in reading or are performing below grade level. One teacher who provides 30-minute instructional pullout support each day to kindergarten through grade 2 struggling readers volunteered to participate in this study. Students in her reading group had performed below grade level on state and school tests, and the demographics of this pullout group were different from the school's overall demographics, including a greater number of ELL students (64%) and ethnic minorities (84%). More boys (68%) were in the group than girls. Five were kindergartners, nine were first-graders, 10 were second-graders, and one was a third-grader working with grade 2 content.

TREATMENT

Each grade in the *Leapster* Portable Technology Center has a cartridge that contains six games, with each game containing three ability levels. The system tracks students, allowing them to begin at the last level they achieved when returning to the PLT. In addition, as students work with the *Leapster* PLT the content becomes more or less difficult based on their performance in order to meet them at their ability level while still providing a challenge. Embedded in the activities are tutorials for skills, as well as structured hints to scaffold learning and facilitate mastery. To enhance motivation, students earn points and "tokens" as they move through activities. This study focused on reading content, which included activities in phonemic awareness, letter-name and letter-sound identification, decoding, and

sentence structure and other language arts activities. For the purpose of this study, the teacher received five *Leapster*™ personal learning tools along with five cartridges at each grade level (kindergarten, grade 1, and grade 2) and 10 grade 1 student practice books.

In mid-April 2006 the teacher introduced the handheld technology to students in groups of five. Each student had his or her own PLT and worked with the program for 20 minutes a day, five days a week, equaling approximately 10 hours of use over six weeks. Periodically, she supplemented the *Leapster* PLT activities with guided reading groups for first- and second-graders and explicit letter-identification instruction for kindergartners.

Within this classroom, children were grouped according to grade level and ability. For each group each day, the teacher selected a *Leapster* PLT activity that suited the skill areas needing development and had all students except one work with cartridges at their grade level. She then outlined the objectives, demonstrated the activity to the students, and monitored them as they worked with the *Leapster* PLTs. Each student had his or her own cartridge, so each day students could begin at the level where they last left off.

First-graders also completed corresponding activity sheets in the student practice book to reinforce concepts and demonstrate mastery of skills learned on the *Leapster* PLT. These worksheets were primarily assigned as homework.

Student progress was measured using assessments administered by the teacher in both April and in June. Kindergartners were assessed using a simple letter-identification test where they were shown and asked to name 54 letter items (26 uppercase letters, 26 lowercase letters, plus alternate fonts for lowercase *a* and *g*). First- and second-graders took the Basic Phonics Skills Test (BPST) of decoding and word recognition. On this assessment, students were asked to identify consonants, digraphs, and short vowel sounds, and then decode words with short and long vowels as well as vowel digraphs and r-controlled vowels.

RESULTS

Five kindergarten students took the letter-name assessment at the beginning of April and then again as a post-test in mid-June. After using the *Leapster* PLT for six weeks, these students showed a statistically significant 81% improvement in their letter identification raw scores ($t = 8.26$, $p < 0.001$) (Figure 1).

Figure 1: Kindergarten Growth in Letter-Name Assessment

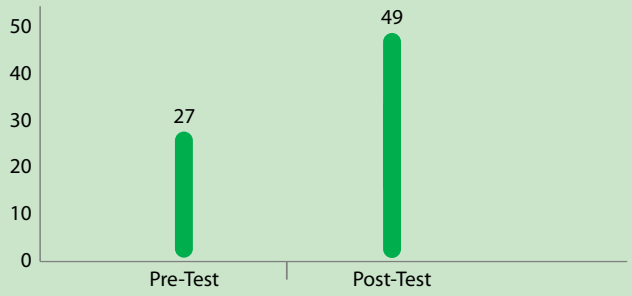
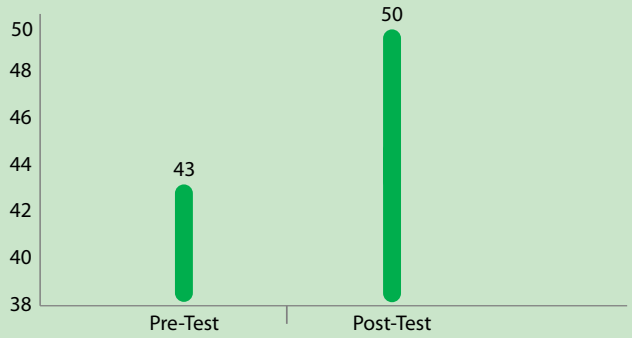


Figure 2: First- and Second- Grade Growth in Phonics Skills Assessment



The 20 first- and second-grade students (including the third-grader who was in the group) took the Basic Phonics Skills Test at the beginning of April, and then again as a post-test in mid-June. The students in this group also posted a statistically significant gain, showing 16% growth from pre- to post-test ($t = 7.20$, $p < 0.001$) (Figure 2).

The small sample size and lack of a control group make it difficult to attribute students' gains exclusively to the *Leapster* PLT. However, these results, along with teacher observations and feedback, suggest that the *Leapster* PLT was a valuable tool in this reading intervention program.

Having academic content delivered in such an engaging and motivating manner assisted the teacher in several ways. Students looked forward to these sessions and were exceptionally motivated to play and learn. The teacher was able to monitor progress of students engaged with the *Leapster* PLT while also working with individual students on guided reading. She noted:

> *[The* Leapster *Portable Technology Center] really allows the teacher some one-on-one time with students. I think it makes a great center in any classroom in order to allow the teacher to work with small groups and differentiate instruction. It requires no planning, and the children absolutely love it. It is durable and multilevel and can be used anywhere. It teaches content in the most important areas and allows children to practice skills in a fun and exciting way. Children love to "play games" and don't realize they are learning content in the process.*

The teacher also noted an increased interactive and social element to students' learning, especially in grade 2. Students were excited to share their success with each other and supported each other as they worked with content. This interaction was especially encouraging to see in the ELL students who are often reluctant to speak English.

DISCUSSION

The *Leapster*™ Portable Technology Center provides a unique learning environment in which students are highly motivated to meet academic challenges while receiving support at their own ability level. As the teacher observed, "They all love it; they are so excited about it. Kindergartners say they like to find the letters in one game, and the second-graders particularly enjoy getting past a level. They are all always talking about how many tokens and points they have earned."

In addition, while the *Leapster* PLT offers students autonomy as they practice, students also find working together on the activities motivating. When students in this study worked together on the *Leapster* PLT, activities became more social and collaborative, and encouraged the types of verbal interaction that are especially important for ELL students.

Despite the relatively short implementation period of this study, the results suggest that the *Leapster* PLT is a valuable classroom resource promoting significant gains in key early reading skills such as letter identification, phonics, and decoding. As educators of young children are challenged to find innovative and effective ways to lay the groundwork for early reading skills, the *Leapster* PLT provides a highly engaging means of capturing students' interest and teaching these critical reading skills.

REFERENCES

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ABOUT US: LeapFrog SchoolHouse offers research-based programs designed specifically for the classroom. We publish PreK–grade 8 curriculum and assessment content that is correlated to state standards and enhanced by our proprietary technology-based personal learning tools (PLTs).

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LEAP FROG SCHOOLHOUSE™

6401 Hollis Street
Suite 100
Emeryville, CA 94608

www.LeapFrogSchoolHouse.com

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