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Title:

**The Effects of a Small-Group Computer-assisted Tutoring Program on
Reading Outcomes for First Graders**

(Paper submitted as part of the symposium
Evidence for Interventions for Struggling Readers
Chaired by Robert E. Slavin)

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Background/context:
Description of prior research and/or its intellectual context and/or its policy context.

Integrating Core and Supplemental Instruction for Struggling Readers. Many children who experience problems learning to read receive both core and supplementary reading instruction at different times of the day. Supplementary small-group instruction has long been common in Title I programs, and the federal Reading First program has emphasized a "three tier" model in which struggling students in grades K-3 may receive supplementary small-group instruction following their initial core reading instruction (Mouzaki, Foorman, & Santi, 2005).

Whenever students receive instruction in two settings on the same topic, problems of coordination arise. The very students who are having the greatest difficulties in learning to read are often asked to integrate two or more different types of instruction from two or more different teachers. This project builds upon a promising model that provides a solution to this problem by integrating content and processes that are used in the regular reading class and in the supplementary small-group setting with the use of technology.

This presentation will report on a cluster randomized evaluation of a small-group computer-assisted tutoring program for struggling readers, called Team Alphie. Using computers and DVDs to supplement instruction, regular and supplementary teachers (usually special education, ESL, and Title I teachers) are able to integrate their efforts, communicate immediately about students' progress and difficulties, share results of assessments, and give students a seamless, fully integrated instructional experience in which supplementary instruction truly supplements core instruction, instead of competing with it.

In beginning reading instruction, computers are often used for skill practice and remediation, but there is limited evidence of their effectiveness. In a meta-analysis, Kulik (2003) found that most studies reported no difference between computer-assisted instruction and traditional reading lessons. A study conducted by Dynarski and his colleagues (2007) found few effects of computer-assisted instruction on student reading achievement. There have been some promising applications of computers in teaching skills such as phonological awareness (Segers & Verhoeven, 2005; Wise, Ring, and Olson, 1999), letter and word recognition (Mioduser, Tur-Kaspa, & Leitner, 2000), and other specific reading skills (Greenlee-Moore & Smith, 1996). However, much remains to be learned about how computers can help improve children's reading outcomes.

Team Alphie was created as a supplementary reading program designed for the Success for All program, to be used with small groups of children working with a tutor. Team Alphie was adapted from a computer-assisted program designed for individual tutoring (Alphie's Alley) which was based on the idea that tutors and computers working together could enhance the reading achievement of at-risk first graders better than tutors or computers alone. Research on Alphie's Alley demonstrated the potential for using computers to support, rather than replace tutors, in one-to-one tutoring in beginning reading (Chambers et al., 2008a 2008b).

Team Alphie combines the strengths of cooperative learning, computer-assisted instruction, and tutoring. It is designed for groups of 4 to 8 struggling readers in grades 1-5. Each group contains children reading at a similar level. The small group model is closely aligned with the reading instruction being provided in students' reading classes, but uses different strategies to help all children master the reading skills being taught in the SFA reading class. Children take turns as "player" and "referee," using strategies similar to those used in PALS (Mathes et al., 2003). In each group students work in pairs on the computer, engaging in well-scaffolded activities geared to the level of the students. The tutor circulates and supports students when they encounter problems.

The Success for All daily 20-minute tutoring sessions in foundational reading are provided to approximately 30% of first graders who are struggling in reading, 20% of second graders and 10% of third graders (Slavin & Madden, 2000; 2001, Slavin, Madden, Chambers & Haxby, 2009). Having tutors use computer-assisted tutoring software tailored to the SFA tutoring program was expected to improve the tutoring that students experience and get students up to grade level more quickly.

Based on previous research and experience, Team Alphie was expected to improve the tutoring in three main ways - assessing students and prescribing instruction, presenting content to students, and providing professional development to tutors (Danis, Rainville, Therrien, Tucker, Abrami, & Chambers, 2005). First, for assessment and prescription, the computer enables tutors to diagnose reading difficulties through multiple means, tracks children's progress carefully, and provides instruction, based on the students' level of functioning.

Second, in presenting content to children, Team Alphie was designed to increase students' task engagement and self-efficacy beliefs. The computer provides appealing animations to engage students' attention and motivation, to give them greater control over their own learning, and to give them immediate feedback on their performance. The computer provides students with 12 types of activities designed to build skills such as phonemic awareness, sound blending, comprehension monitoring, and connected reading.

Third, in professional development, the computer provides demonstrations of effective instruction precisely attuned to the tutor's immediate needs and helps increase implementation fidelity. The computer provides a performance support system for the tutor, including video clips showing expert tutors implementing each type of activity with children with various strengths and weaknesses (Gery, 2002). This "just-in-time" professional development is expected to help tutors to become more thoughtful and strategic in working with their at-risk students (Chambers, Abrami, McWhaw, & Therrien, 2001). It builds on models of cognitive apprenticeship (Collins, Brown, & Newman, 1989) and self-regulated learning (Randi & Corno, 2000).

Team Alphie contains a complex database that allows the computer to make "intelligent" decisions on interventions, based on the performance of the partners, both between and within sessions (Everson, 1995; Mitchell & Grogono, 1993). The computer analyzes the students' responses and provides to the tutor suggested templates of instruction for that pair of students.

Purpose/objective/research question/focus of study:
Description of what the research focused on and why.

We conducted the present study to evaluate the effects of the Team Alphie's small-group computer-assisted tutoring model on struggling first and second graders' reading achievement. We hypothesized that students in the experimental schools would perform better on standardized reading measures at posttest than students in the comparison schools, who did not participate in the computer-assisted tutoring.

Setting:
Specific description of where the research took place.

This study took place in 33 Success for All schools in high poverty communities in GA, MA, KS, CO, FL, WA, and PA.

Population/Participants/Subjects:
Description of participants in the study: who (or what) how many, key features (or characteristics).

Thirty-three schools already using the Success for All reading program were recruited to participate in the study. The 40 lowest achieving students in each of first and second grade were pretested and two tutors at each school designated to participate in the study. Of those students, the 20 students in each grade with the lowest pretest scores were assigned to tutoring.

Intervention/Program/Practice:
Specific description of the intervention, including what it was, how it was administered, and its duration.

Experimental Treatment. Students identified for tutoring in the experimental schools participated in Team Alphie small-group tutoring 45 minutes each day, during times other than core reading periods. Classes consisted of approximately 6 students of similar reading ability. Pairs of students in each class worked together on one computer for all of the class time. Students took turns being the "player' and the "referee". The player answered the questions and the referee confirmed whether the answer matched the correct answer given by the computer. After a number of questions the partners switched roles.

Students worked on Team Alphie's computer activities specifically designed to reinforce skills taught in their core reading programs. The program contains the same embedded multimedia content that students view in their core reading classes. This content consists of animations that provide mnemonics for the letter sounds, puppet skits that demonstrate word-level blending, and vocabulary skits that teach the words from the phonetic readers.

In each activity, students have an opportunity to respond, but if they cannot produce a correct answer, the computer gives them progressive scaffolding until they can reach the right answer. In some activities, students may respond to a partner, who gets the correct answer from the computer. Sample activities that students encounter across grades are as follows:

1. Letter Identification. The computer gives a sound, and students must select a letter or letter combination that makes that sound.
2. Auditory Blending. The computer presents sounds for 2, 3, or 4-phoneme words, which students blend into a word to their partner.
3. Word-Level Blending. The computer displays a word and the student uses sound blending to decode it to their partner.
4. Spelling. The computer says a word and the student types it. At higher levels, the computer reads a sentence that the student must type.
5. Tracking. The student reads a Shared Story on the computer to their partner. The computer models appropriate decoding strategies if students cannot decode a word.
6. Comprehension Monitoring. The computer presents animations that model comprehension monitoring and "fix-it" strategies.
7. Story Questions. The computer displays questions about the Shared Stories that students answer to their partner.

Control Treatment. Students identified for tutoring in the control treatment experienced regular Success for All, including individual tutoring without the technology elements. The use or non-use of the technology was the only factor differentiating experimental and control treatments.

In both conditions tutors received training in tutoring that teaches principles and proven practices for helping struggling students, for monitoring students' progress, and for adapting instruction to remediate specific reading problems. Tutors received follow-up support throughout the school year, both from the school facilitator and from visits from SFA trainers, and an extensive tutoring manual. The tutor had an active role in guiding the child, assessing his or her ongoing progress, and modifying plans in light of the child's needs.

Research Design:
Description of research design (e.g., qualitative case study, quasi-experimental design, secondary analysis, analytic essay, randomized field trial).

The study was a cluster randomized field trial with 33 schools randomly assigned to implement small-group computer-assisted tutoring (Team Alphie) or individual tutoring to low achieving first and second grade students.

Data Collection and Analysis:
Description of plan for collecting and analyzing data, including description of data.

Participants were individually pretested in September and posttested in May. The measures were as follows.
Woodcock-Johnson III Tests of Achievement (Woodcock, McGrew, & Mather, 2001) Letter-Word Identification subtest (pre, post) and Word Attack subtest (post).
Dynamic Indicators of Basic Early Literacy Skills (DIBELS) (Good et al., 2004).

Data analysis is ongoing. Reading outcome measures are presently being compared in experimental and control schools using hierarchical linear modeling (HLM), with students nested within schools and with pretests as covariates.

Findings/Results:
Description of main findings with specific details.

The data are currently being analyzed.

Conclusions:
Description of conclusions and recommendations of author(s) based on findings and over study. (To support the theme of 2008 conference, authors are asked to describe how their conclusions and recommendations might inform one or more of the above noted decisions—curriculum, teaching and teaching quality, school organization, and education policy.)

The results of this study will help determine the effectiveness of providing remedial support to struggling beginning readers in small groups supported by technology, compared to one-to one tutoring. If the study demonstrates the program to be as effective, or more so, than individual tutoring it will have implications for policy and practice in supporting struggling readers. Most schools do not have the resources to provide tutoring to all of the struggling readers who need it but programs that combine technology and cooperative learning may provide the answer.

Appendix A. References
References are to be in APA format. (See APA style examples at the end of the document.)

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