Using an ILS to Help Students At-Risk of School Failure

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One strategy identified as having positive benefits for students at-risk of school failure is Computer-Based Instruction (CBI), and, in particular, Integrated Learning Systems (ILS). However, ILSs are designed to be used on a long-term basis, which may not be the most appropriate delivery strategy for these students. Thus, alternative strategies for utilizing ILS instruction with students are warranted. The purpose of this study was to determine if integrating adult tutoring and parental involvement with mathematics and language arts ILS resources produced positive achievement and attendance gains for students at-risk of school failure. Results indicated that students participating in an after-school enrichment program combining ILS instruction, volunteer adult tutors, and parental involvement had significantly fewer absences than students who did not participate in the program.

The term "at-risk" has been used to describe children with characteristics that may negatively impact school success. These characteristics include low socioeconomic status, high absenteeism, low self-esteem, poor peer relations, involvement with drugs and alcohol, and low academic achievement (Durlak, 1995; Page & Page, 1993; Richardson, Casanova, Placier, & Guilfoyle, 1989). One of the strategies identified as having positive benefits for students at-risk is computer-based instruction (CBI). As Waxman and Padron (1995) state, "[Computers] can significantly improve the education of students at risk of failure." (p. 53). This is due, in part, to the types of focused, structured activities CBI can offer students. Through CBI, students at-risk can receive instruction that is motivational, nonjudgmental, and individualized (Hornbeck, 1991).

CBI has been shown to positively impact at-risk students' academic achievement and behaviors. In a meta-analysis of studies dealing with CBI at the elementary level, Fletcher-Flinn and Gravatt (1995) concluded that CBI, when used to reinforce instructional activities in the classroom, had a significant impact on student achievement. In two studies by Brush (1997, 1997b), low-achieving students using CBI had positive attitudes towards computer activities, were less disruptive in the computer lab, and remained on-task for longer periods of time. Clariana (1993) found that at-risk high school students using a CBI program for mathematics instruction demonstrated significant gains in attendance over their peers who were not usingthe CBI program.

The acceptance and increased usage of CBI (particularly with students at-risk) has led to the development of more elaborate and complex instructional products such as integrated learning systems (ILS). ILSs differ from stand-alone CBI software in that they provide a long-term sequence of computer-based tutorials to students while minimizing the need for teacher intervention (Bender, 1991; Robinson, 1991; Wiburg, 1995). ILSs are primarily designed to be used by students individually so that the computer can provide instruction, feedback, and remediation tailored to the needs of each student (Becker, 1992b; Hativa, 1994; Mevarech, 1994). However, utilizing ILS instruction with students at-risk presents a number of pedagogical concerns, including a de-emphasis of affective outcomes (Mevarech, 1994), increased anxiety and hostility towards the subject matter (Lepper, 1985), and increased off-task behaviors (Becker, 1992, 1992b).

Knowledge regarding the effectiveness of integrating ILSs with other teaching and learning strategies could help alleviate some of the problems involved in using this instruction with students at-risk. The purpose of this study was to determine if integrating an adult tutoring program and parental involvement with mathematics and language arts ILS instruction produced positive academic and attendance gains for students at-risk of school failure.

Method

Subjects

The sample consisted of fifth-grade students ($N = 104$) in one selected elementary school in a small city in Michigan. The school was one of three elementary schools in the district. The children enrolled in the school were generally from low to lower-middle socioeconomic status, the average income of families served by the school was approximately $12,000, and approximately 43% of the students served by this school were eligible for free and reduced lunches.

Instruments

Testing Instrument. The Jostens Comprehensive Assessment Test (JCAT) was used as a post-test instrument.

The JCAT contained three different tests assessing mathematics skills (computation, comprehension, problem solving) and three tests assessing language arts skills (vocabulary, reading comprehension, word attack).

Curriculum. The Jostens mathematics and language arts computer-based curricula were used as the instructional content. This curricula covered the entire range of the 5th grade curricular objectives for mathematics and language arts for the state of Michigan (Jostens Learning Corporation, 1990).

Design

A two-group (experimental vs. control) posttest-only design was used to determine differences between the groups. The dependent variables were achievement and attendance. Achievement was defined as posttest scores on the mathematics and language arts JCAT achievement tests. Attendance was defined as the number of absences recorded for each student during the school year. Independent sample t-tests were used to determine if any significant differences existed between the treatment groups. In addition, the Pearson correlation procedure was used to determine if a significant relationship existed between student attendance and parental involvement in the after-school program.

Procedure

At the beginning of the second week of school, students participating in the study were pretested using the mathematics and language arts portions of the JCAT. After completing the pretests, students were divided into one of two groups. Students designated as at-risk based on state guidelines ($N = 45$) were placed in the experimental group. The remaining students ($N = 59$) were designated the control group. Pretest scores for the experimental group were not significantly different from scores for the control group.

Students in the experimental group were provided with additional instructional time in the form of two 1.5 hour after-school computer lab sessions per week. These sessions were administered by the school's full time computer lab paraprofessional. In addition, adult volunteers were grouped with pairs of students to assist with questions or problems students encountered during the instruction. To assist with family involvement, parents/caregivers were required to attend at least one after-school session per semester, and were encouraged to attend as many sessions as possible. At the end of the 33-week treatment time, students participating in the study were given a post-test using the mathematics and language arts JCAT.

Results and Discussion

Achievement

Analysis of test results revealed that students in the control group had slightly higher posttest scores in both mathematics ($M = 75.68$ for the experimental group, $M = 81.17$ for the control group) and language arts ($M = 58.02$ for the experimental group, $M = 65.14$ for the control group). However, these differences were not significant ($t = -1.25$, $p = .22$ for mathematics; $t = -1.32, p = .19$ for language arts). Refer to Figure 1 for a graphical summary of the pretest/posttest data.

Several possible explanations exist regarding why there were no significant differences in achievement between the control group and experimental group. First, students classified as at-risk tend to perform poorly on standardized measures of academic achievement (Richardson et al., 1989). Thus, it could be argued that without the after-school intervention program, students in the experimental group may have received even lower scores on the posttests. A second possible explanation is that there was minimal teacher involvement in the after-school program. One of the reasons why computer-based instructional activities sometimes have limited effects on student achievement is because the instructional activities students complete on the computer are not related to the activities students are completing in the classroom (Brush, 1998).

Student and Parent Attendance

Analysis of attendance data revealed that students in the experimental group had significantly fewer absences than students in the control group ($M = 6.8$ absences for the experimental group, $M = 8.3$ absences for the control group, $t = -2.71, p < .01$). Analysis of parent attendance data found that the number of after-school sessions in which parents participated ranged from a low of one to a high of 15 ($M = 5.41$, $SD = 2.98$). A Pearson correlation analysis of the relationship between student school attendance and parent participation in the after-school program revealed a significant correlation between student and parent attendance ($r = -0.81, p < .001$). The negative correlation is due to the fact the student attendance was defined as the number of absences from school while parent attendance was defined as the number of times they attended after-school sessions.

These results could be attributed to the parental involvement built into the program. Parents were required to attend at least one after-school session with their children, and were encouraged to visit on a regular basis. Through this involvement, parents had first-hand knowledge of the types of activities their children were completing in school.

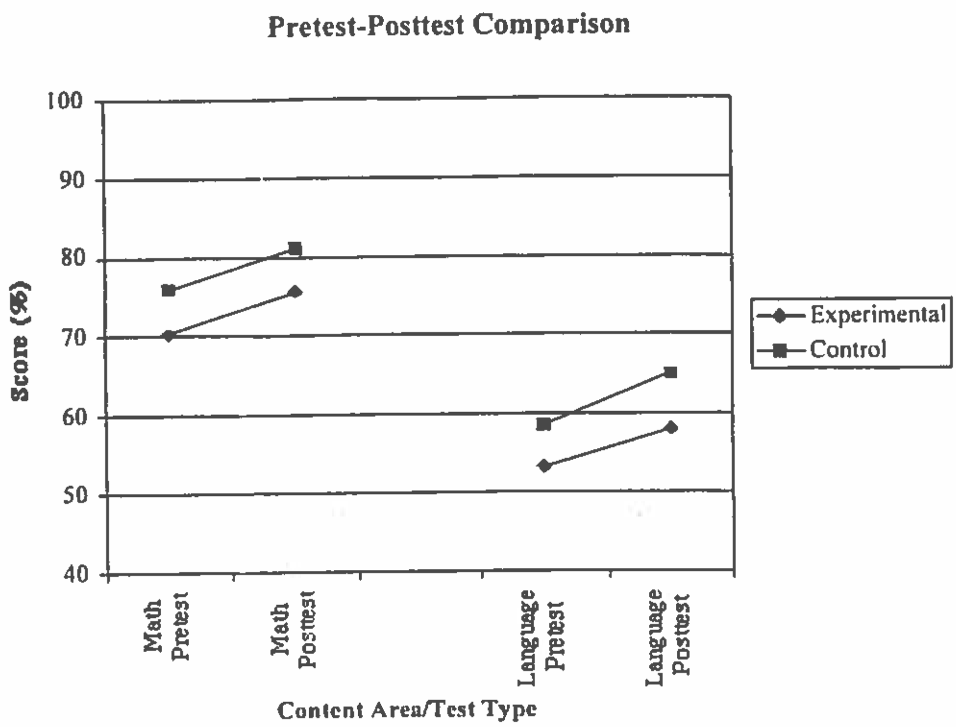

Figure 1. Pretest-Posttest Comparison of Achievement Test Scores in Mathematics and Language Arts

In addition, parents were demonstrating that they believed participation in the program was important. These data should encourage educators who are in the process of developing similar after-school programs to consider involving parents/caregivers in both the design and delivery of their programs.

Another possible explanation for these results is the positive relationships students built with the adult tutors. Many students commented that they enjoyed coming to the after-school program because the tutors were always encouraging, patient, and personal. In addition, students stated that they felt "special" being part of a program that was only available to them. These factors most likely had a direct impact on school attendance.

Conclusions and Recommendations

This study provided some evidence that integrating adult tutoring and strong parental involvement with ILS-delivered instruction can have a positive academic impact on students at-risk of school failure. Based on the results of this study and others which use alternative approaches to implementing ILS instruction (e.g. Brush, 1997, 1997b; Mevarech, 1994), educators may want to consider integrating other instructional strategies in ILS labs as well as designing instructional activities with a strong parental component. An integrated learning system is a powerful tool in its own right when used properly. Combining ILS instruction with alternative instructional strategies can provide at-risk students with a wider range of learning aids.

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