The Effects of the IXL Computer Program on Fourth Graders’ Mathematic Achievement Levels

Kristi J. Marbury

Southeastern Louisiana University
IXL PROGRAM ON MATHEMATIC ACHIEVEMENT LEVELS

Abstract

The purpose of this study is to investigate the effectiveness of the IXL Computer Program on fourth grade students’ mathematic achievement levels. Six female fourth graders identified as at-risk for mathematics will participate in this study using a mixed methods design. The AIMSweb Curriculum-Based Measurement Math Probes will be administered prior to, during, and after treatment to determine achievement levels.
The Effects of the IXL Computer Program on Fourth Graders’ Mathematic Achievement Levels

**Purpose Statement**

The purpose of this study is to investigate the effectiveness of the IXL Computer Program on fourth grade students’ mathematic achievement levels.

**Review of Literature**

Technology is steadily becoming an increasingly important and integral part of classroom instruction at all levels. The Common Core State Standards Initiative and Standards for Mathematical Practice support a constructivist approach to education requiring students to problem solve, think critically, apply knowledge rather than just recall it, and analyze results (Cornelius, 2011). An overarching theme found in research done on computer-based programs’ effects on learning practices and student achievement is that a blended program is better than a one-size fits all approach. A blended classroom is student centered, consists of the teacher as a facilitator, and a technology rich environment (Beck-Hill & Rosen, 2012).

The National Education Technology Plan promotes meaningful and valuable learning experiences that will enable students to succeed in a global networked society (Beck-Hill & Rosen, 2012). Today, most careers incorporate or require applicants to have skills learned in multimedia disciplines (Cornelius, 2011). Unfortunately, there seems to be a divide between the level of Career and Technical Education (CTE) instruction and teaching in other content areas, especially in mathematics (Often, 2011). American fourth and eighth-graders trail far behind their counterparts from other countries in mathematics. With critical thinking being so crucial for careers in the fields of Science, Technology, Engineering, and Math (STEM), teachers are focused on improving math achievement levels.
Algebra seems to be the gateway to success for future mathematical skills in school and in today’s job market (Oishi, 2011). By the time some students reach high school algebra, they have been struggling with math for an extended period of time. This struggle might revert all the way to elementary school. When students fail or experience frustration with math over several years, they may begin to think that they are just not good in math. Parents can sometimes add to this negative thinking by telling their children that they were not good in math either, almost as if it is to be expected. The National Council for Teaching Mathematics (NCTM) strongly recommends that schools provide curriculums that are rich in algebraic thinking, concepts and skills from the earliest elementary grades. Many software programs use adaptive learning technology which evaluates students’ knowledge and individualizes instruction. These programs blended with classrooms that encourage collaboration, problem solving and a continuum of mathematical discussions may lead to an avenue of improving algebra education (Oishi, 2011).

Many educational software programs, such as Khan Academy, provide prescriptive interventions, real-time data and feedback to individual students, empowering them with a sense of ownership of their learning. While many of these computer programs may be differentiated based on students’ needs, they do not always promote inquiry, mathematical thinking or open ended questions (Shaffhauser, 2013). One possible solution to this downfall could be for teachers to create their own videos which would allow for connections to previous learning experiences specific to their classrooms, while also showing the students and parents their thought process while working through a problem (Fulton, 2012).

One online tutoring program that does profess to promote true conceptual understanding of mathematical ideas is 4MALITY, which provides virtual coaches to assist students with
problems. Another positive aspect of *4MALITY* is its ability to address common student misconceptions and confusing language within a problem (Anderson, Maloy, & Edwards, 2010).

Today’s teachers must consider Information and communication technologies (ICT) when designing their classrooms. ICT may include programs where students play games to enhance their mathematical skills. Some studies report computer games as having a positive impact on children’s cognitive development (Bulut & Delen, 2011). In a study done by Kim and Chang (2010), ELL students who played daily computer games performed higher in math than English speaking students who did the same.

According to the Common Core State Standards for Mathematics (CCSSM), fluency can be described as either procedural fluency or basic fact fluency. Currently, many assessments providing data on a student’s basic fact fluency are timed and offer little insight about the student’s use of strategies when solving these facts (Kling and Williams, 2014). One study examining the effects of a computer-based math facts fluency (CBMF) program showed that the computer-based interventions increased students’ math skills. However, what the study did not provide was details about how the students scored in the areas of problem solving and critical thinking (Burns, Kanive, & DeGrande, 2012).

**Hypothesis**

It is hypothesized that there will be a statistically significant difference in mathematic achievement levels among fourth grade students after using the IXL Program.

**Operational Definitions**

Statistically significant is defined by Wikipedia as the probability that an effect is not due to just chance alone. IXL is an interactive technology program which provides comprehensive, standards-aligned math and language arts practice for K–12 students. IXL motivates students
IXL PROGRAM ON MATHEMATIC ACHIEVEMENT LEVELS

through interactive games and exercises while keeping teachers and parents informed and involved with weekly reports. For this study, at-risk students are identified as those scoring below the 25th percentile on the AIMSweb Curriculum-Based Measurement Math Probe administered prior to treatment. Students’ achievement levels include above average, average, below average, and at-risk based on AIMSweb scores.

Methodology

Research Design

This study will utilize a mixed methods design. The independent variable is the IXL program, and the levels will include mathematic achievement of at-risk students prior to and after implementation of the program. The dependent variable is mathematic achievement levels. Student achievement levels will be determined using results from the AIMSweb Curriculum-Based Measurement Math Probes. The qualitative element will be collected by interviewing students about their experiences with mathematic achievement during the school year and at the end of the study.

Sample

This study will use convenience sampling. The subjects will include six at-risk students who are currently struggling with math fluency and problem solving. The subjects attend public school and come from families who have middle to high socioeconomic status. All of the subjects are nine or ten year old Caucasian or African American females.

Instrumentation

For this study, the AIMSweb Curriculum-Based Measurement Math Probes will be administered prior to, during, and after treatment. Each AIMSweb CBM test is an alternate form of equivalent difficulty. Each test consists of 25 math computation problems representing the
IXL PROGRAM ON MATHEMATIC ACHIEVEMENT LEVELS

year-long, grade-level math computation curriculum in exactly the same way using prescriptive methods for constructing the tests. AIMSweb CBM is highly prescriptive and standardized, which ensures reliable and valid scores. Students will be given standardized math probes at regular intervals to produce accurate and meaningful results that will be used to quantify short- and long-term student gains by the end of the study. Probes will be scored for problems correct, and student scores will be graphed for consideration when making decisions about the instructional programs and teaching methods for each student in the study. AIMSweb CBM will provide a doable and technically strong approach for quantifying student progress. AIMSweb CBM Computation will be administered to a group of students at one time, and students will have a set amount of time (eight minutes) to answer the math problems on the Computation test. Timing the CBM Computation test correctly is critical to ensure consistency from test to test.

Procedure

Six fourth grade students scoring at-risk on the AIMSweb CBM test will participate in this study throughout a nine week period. The students attend public school, and come from families who have middle to high socioeconomic status. All of the students are nine or ten year old Caucasian or African American students. The timeframe for this study will be nine weeks. The students will practice math skills using the IXL computer program three to five times per week. Math skills on the IXL program will be assigned to each student. These skills will be similar to both math concepts currently being taught in class, and to those items from the AIMSweb CBM tests. Progress monitoring will be done during implementation of the program, which will include weekly detailed printed reports showing each student’s progress on specific skills. The AIMSweb test will also be given during the treatment phase of the study, and at the
IXL PROGRAM ON MATHEMATIC ACHIEVEMENT LEVELS

end of the study. The teacher will refer to the teacher prompted directions when administering each AIMSweb test.

**Data Analysis**

In order to assess the effectiveness of the IXL program, results from the AIMSweb CBM tests will be reported graphically and through a visual comparison of the results obtained in the treatment and baseline phases. The criteria used to evaluate this data will be the presence of student growth from the at-risk category to the average category. Qualitative data from student interviews will be analyzed to determine emerging trends.
IXL PROGRAM ON MATHEMATIC ACHIEVEMENT LEVELS

References


