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The Effect of Success Maker Software on State Scores in Elementary School Math

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Abstract

At the research site, which is located in southeastern United States, over 30% of students did not pass standardized tests in math for 3 consecutive years indicating that students were not meeting math standards. In order to help students pass state tests, Success Maker, which is an educational software, was integrated into the math curriculum. The effect of Success Maker on state tests in math had not been examined using quantitative data. The research question was regarding the effect of Success Maker on proficiency in math as measured by state testing. The theoretical framework was based on the social learning theory. Archived state scores in math were collected from 2 elementary school cohorts where the first cohort used Success Maker in the classroom and the second cohort did not use Success Maker in the classroom. Data were analyzed using an independent samples t test to examine the difference in the means of state scores in math of 2 cohorts. The findings revealed that state scores in math improved after Success Maker was integrated into the curriculum. Successful integration of software into the math curriculum could help elementary school math teachers help their students meet academic standards.

Keywords:

Adequate yearly progress in math, African American students and math proficiency, achievement in elementary school math, student use of technology, technology and math, software and math, integration of software into the math curriculum

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Introduction

In order to help students who do not meet academic standards (Grady, Watkins, & Montalvo, 2012), academic software could be integrated into the curriculum (South Carolina Department of Education, 2014) because students need a better understanding of math concepts (Hallett, Nunes, & Bryant, 2010). Success Maker is considered an intervention software (South Carolina Department of Education, 2014) that may help students meet academic standards (Jones, Irvin, & Kibe, 2012; Pearson, 2013).

Problem Statement

At the research site, which is a rural public school district, located in southeastern United States, over 30% of elementary school students did not pass standardized tests in math for 3 consecutive years (South Carolina Department of Education, 2014) indicating that students were not meeting math standards. Students at the research site were not meeting adequate yearly progress (AYP) by not demonstrating proficiency in math content areas (South Carolina Department of Education, 2014). In order to help these students pass state tests, Success Maker, which is software, was integrated into the math curriculum. The effect of Success Maker on proficiency in math state tests had not been examined using quantitative data. The purpose of this study was to examine (a) if the integration of Success Maker into the math curriculum helped students at the research site improve their math proficiency, (b) whether school administrators should make district-wide decisions to use Success Maker for other academic subjects, and (c) whether district administrators should allocate human and capital resources for professional development for math teachers to use software for students to increase their proficiency in math as measured by standardized testing.

Guiding/Research Question

The research question that guided this study was regarding the effect of Success Maker on proficiency in elementary school math as measured by state scores.

$H_0$1: There was no difference in the means of math state scores before and after the implementation of Success Maker.

H_a1: There was a significant difference in the means of math state scores before and after the implementation of Success Maker.

The independent variable was the integration of Success Maker into the math curriculum. The dependent variable was state scores in math.

Theoretical Framework

The theoretical framework was based on the social learning theory, which posits that learning is a cognitive process. Teaching takes place in a learning environment through observation or direct instruction. Students learn by watching the math teacher teaching math concepts. Students' learning takes place in a social context, which is the classroom, where students cooperate with peers and the teacher to exchange ideas, opinions, and knowledge. In the classroom, there is a general social interaction where students are taught math concepts. By using Success Maker in the classroom, students may work with math manipulatives to understand math concepts.

Review of Literature

Authentic assessments help teachers evaluate students' proficiency in math skills (Mundia, 2012). Teaching math in a problem-solving-based learning environment helps students improve their proficiency (Karatas & Baki, 2013).

Math students need to reduce math anxiety because anxiety has an effect on student achievement (Hadley & Dorward, 2011; Savas, Tas, & Duru, 2010). Effective teaching strategies could reduce anxiety in math (Adedoyin, 2010; Bodovski & Youn, 2011). Parental involvement in children's education could help students reduce their math anxiety (Jacobbe, Ross, & Hensberry, 2012). Mobility rate of students had negative effects on students' math achievement (Thompson, Meyers, & Oshima, 2011) when measured by standardized math assessments (Parke & Keener, 2011).

Math students understood math concepts better with math interventions (Burns, 2011; Flynn, Hosp, Hosp, & Robbins, 2011; Zheng, Flynn, & Swanson, 2010). Integration of technology into the math curriculum could impact standardized tests (Anthony & Clark, 2011; Fast et al., 2010). Everyday Mathematics software was used in Grade 6 and had a positive effect on state scores (Grady et al., 2012). Math Fact software was used in Grades 1-3 and impacted state scores (Stickney, Sharp, & Kenyon, 2012). Math recovery (MR) tutoring

sessions helped students improve their math proficiency (Sheldon, Epstein, & Galindo, 2010; Smith, Cobb, Farran, Cordray, & Munter, 2012). Math scores improved after the implementation of software-related interventions (Elliott, Kratochwill, McKevitt, & Malecki, 2009; Leh & Jitendra, 2012; Phelps, Corey, DeMonte, Harrison, & Ball, 2012). A significant difference among math scores of students in two groups with interventions and without interventions had been documented (Meloy, Deville, & Frisbie, 2002).

Math teaching strategies should be inclusive regardless of ethnicity (Else-Quest, Mineo, & Higgins, 2013; Martin, 2012; Rapp, 2009). Math instructional resources should also be inclusive (Carr, 2012; Clarke, 2012). Math teachers should not be lacking instructional learning strategies (Kistner, Rakoczy, Otto, Dignath-van Ewijk, Büttner, & Klieme, 2010) when teaching different strands of math (Cowan, Donlan, Shepherd, Cole-Fletcher, Saxton, & Hurry, 2011) because students might be understanding math concepts procedurally and conceptually (Hallett et al., 2010; Ketterlin-Geller, Chard, & Hank, 2008). Math teachers should teach students conceptually in order for students to (a) better understand math concepts (Anderson, 2012) and (b) improve their proficiency as measured by standardized tests (Genao, 2013). Professional development (PD) helps (a) math teachers to better teach the math curriculum (Dessoff, 2012) and (b) students when being taught by knowledgeable teachers (Barrett, Butler, & Toma, 2012) who improved their specific instructional practices and use a large variety of math resources (Doabler, Fien, Nelson-Walker, & Baker, 2012).

Methodology

The research design was quantitative. The state mean scores in math of two cohorts of students before and after the integration of Success Maker software into the math curriculum were examined. State scores were numeric values. The mean state scores of the two cohorts was analyzed to examine if there was a statistical significant difference in students' math proficiency. An independent samples *t* test was used to examine if there was a difference in the means of the cohorts' math state scores at the .05 alpha level.

Setting, Population, and Sample

The research site had over 1,000 students per academic year (South Carolina Department of Education, 2013) in elementary classrooms. All students participated in state tests in math. A convenience sampling was used because students who participated in state testing had been assigned to classes by school administrators before this study was conducted. The selection criteria included students who (a) participated in the state testing in math and (b) were full time students at the research site.

Instrumentation and Materials

Success Maker is used to help (a) students improve their math skills and (b) math teachers with standard-based assessments of students' computational fluency. According to South Carolina Department of Education (2014), (a) state testing had been tested for reliability and validity, (b) state tests in math measure content proficiency levels, and (c) state scores range from 300 to 900.

Data Collection and Analysis

The administrator responsible for research at the research site provided archived state scores in math in electronic format without revealing any information regarding each student. The first cohort of math students participated in state testing before the implementation of Success Maker in the academic year 2012-2013. The second cohort of math students participated in state testing after the implementation of Success Maker in the academic year 2013-2014. Using a sample calculator, 200 state scores were selected randomly from the state scores list where (a) 100 scores were selected for the first cohort while another 100 scores were selected for the second cohort. Each state score was numeric between a minimum of 300 and a maximum of 900. State scores were entered into SPSS 20 to compare the mean state scores of two cohorts. Data were analyzed using an independent samples *t* test to examine if there was a difference in the means of math scores of the two cohorts.

Findings

The mean of state scores of cohort 1 was M = 606.90 (SD = 119). The mean of state scores of cohort 2 was M = 634.80 (SD = 112). The mean of the experimental group (cohort 2) was higher than the mean of the control group (cohort 1). The mean difference was M = 27.9 (SD = *36.4)* with t (200) = -9.31, $p < .001$.

Discussion

The state scores increased after the implementation of Success Maker Program. The null hypothesis was rejected and the alternative hypothesis was accepted. The findings of this study are in line with the findings of studies on the integration of software into the curriculum. Educational software can provide students and teachers with feedback by (a) assessing students, (b) helping students understand math concepts, and (c) providing instructional activities for students to solve problems (Burton, 2010). In conclusion, the findings revealed that Success Maker helped students increase their proficiency in math as measured by state tests.

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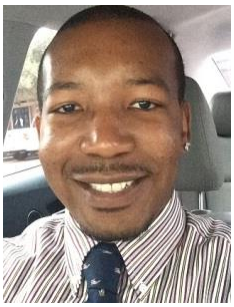
Biodata

Peter KIRIAKIDIS (USA & Canada) PhD, has earned a doctorate degree in Educational Leadership in Higher Education. Peter's educational, IT, and research leadership relates to inspiration, direction, clear focus, vision, mission, and excellence. In the past 20 years, his successful administrative, consulting, training, teaching, and IT experience at the university, college, and K-12 levels has been an involved and intense one in a multicultural/diverse environment. Peter has expertise in quantitative, qualitative, and mixed-methods research. As a University Research Reviewer and research faculty, Peter's role is that of a content expert, research methods expert, and editor. Peter has been serving on EdD, PhD, and DBA doctoral committees. As a research reviewer, Peter ensures that a dissertation meets high quality academic standards set forth by the university.

Peter has program and project management experiences including the development and evaluation of graduate and undergraduate programs and courses for industry and institutions of education. Peter has conducted research for large school districts related to (a) the evaluation of the effectiveness of professional programs for teachers on student achievement as measured by standardized mandated testing, (b) the development of district-wide policies and procedures based on test scores in science, math, reading, and language arts literacy; and (c) schools and district performance of instructional practices and enhanced curricula. Peter has also conducted research for large graduate colleges and universities related to (a) interactions between online students and instructors, synchronous and asynchronous communication in the online learning environment, (b) the development of policies and procedures for online course delivery, and (c) enhancement of curricula.

Peter has expertise in higher education educational leadership: (a) chairing comprehensive examinations and EdD, PhD, DBA, and MA committees; (b) developing and evaluating curriculum and academic programs; and (c) teaching graduate courses in research, educational leadership in higher education, educational and information technology, online technology, e-commerce, software development, and information systems. Peter is a reviewer of many peer-reviewed academic national

and international journals. Peter has presented a plethora of research studies nationally and internationally.



Brandon Terrell GEER (USA) has expertise in teaching elementary school math. Brandon's current role is teacher. Brandon has facilitated and supported district initiatives related to software for math classes.