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STUDENTS' MATH SCORES**

Bilingual Instruction and Math Education: Will Students Score Better

If They Receive Math Education in Their Native Language?

by

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Introduction

I chose this hypothesis for several reasons. First, public school classrooms are getting more diverse with bilingual students, especially in the Twin Cities metro area. Second, the achievement gap with grade level students is high (Capps, Fix, Murray, Ost, Passel, & Herwanto, 2005). Third, many of the bilingual students enter the classroom with disadvantaged academic backgrounds (Kruizenga, 2010). For these reasons among others, I will investigate if students' math score will improve if they are taught by a bilingual teacher who is proficient in their first language. If the hypothesis is validated, this would support the theory that more bilingual teachers in the classroom could help reduce the achievement gap.

Advantages & Benefits

Minnesota is facing one of the widest achievement gaps in the nation. This study could be beneficial for educators as a solution for addressing the achievement gap. Hence, the study could be expanded, and replicated to other areas of learning. Many studies related to or similar to this topic have been done, which will be helpful for me to learn from.

Disadvantages & Challenge

The schools may not fit the criteria of the experiment. For instance, they may not have a bilingual teacher who teaches 10th grade—it could be a challenge for me to find schools that fit my experimental design. One of the schools that come to my mind is Ubah Medical Academy (UMA). UMA is a charter public school based in Hopkins, MN; more than 90 percent of the school's students are immigrants of East African descent.

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Prior to the study, I need to know the students' Minnesota Comprehensive Assessment - MCA math scores. The average MCA scores can be found from the MN report card website and specific scores can be obtained from the school. After knowing the students' scores and all other underlying factors that can deviate the result (e.g., students' background, level of education and other relevant issues), the students will be assigned into two groups, control and experimental. Students will be divided based on computer random selection. Students will be taught at the same pace and time with the same curriculum.

Literature Review

Marian, Shook, & Schroeder, (2013) explained whether bilingual education effects students' reading and math scores by comparing students test scores from different elementary programs. The article indicated that when students have a bilingual education they perform better academically. In particular, the article emphasizes more on bilingual two-way immersion programs. It concluded that bilingual two-way immersion leads students to perform better in math and content learning areas not only for minority language students, (students whose native language is not English) but also for the majority language students (Marian, Shook, & Schroeder, 2013).

Loeb, Soland, & Fox (2014) discussed teacher quality, and whether that quality be felt across student groups. For example, whether a teacher who is good for non-English learner students can also be good to English learner students and vice versa (Loeb, Soland, & Fox, p.1, 2014). The article said that EL students are a large group who enter school with low proficiency in math and English language and face specific challenges throughout their schooling (Loeb,

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Soland, & Fox, 2014). The article used data from Miami-Dade County Public Schools which has a large Hispanic student population with a large group of English learner students. The main conclusion for their research question was that teacher who is effective and good with one group (EL) is also effective and good of the other group (non EL) (Loeb, Soland, & Fox, p.3, 2014). In addition, bilingual teachers who are proficient in the students' first language and teachers who have bilingual certification tend to be more effective with English Learner students than teachers who are not proficient in the students' first language or do not have bilingual certification (Loeb, Soland, & Fox, p.3, 2014).

Gerena and Keiler (2012) explained the effectiveness of Peer – Teaching model with English Language Learner (ELL) and Former- English Language Learner students in a five week summer program. It investigated whether bilingual teacher assistant scholar (TAS) used or followed the guidelines and strategies in line with the second language learning rules, and if the use of students' native language by the TAS help ELL/F-ELL students understand challenging material to enhance their school achievements. The TASs took orientations but were not trained as second language teachers (Gerena and Keiler, 2012). The article found that students' test scores improve when they are taught by bilingual TAS, (Gerena and Keiler, 2012).

Adegokes (2013) examined the relationship between languages and mathematical achievement. The article investigated high school students in Nigeria by comparing the proficiency in English and Yoruba languages and math test scores. The main focus of the study in this article was to find if the proficiency of English language would increase the comprehension of math and math test scores (Adegoke, 2013). The article indicated that there is a huge

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correlation between mathematical achievement and proficiency of English language.

Furthermore, the article said that if students are proficient in a second language, in this case Yoruba, the more likely they would be proficient in English, which leads them to achieve higher in mathematical education, (Adegoke, p. 312, 2013).

Lindholm-Leary & Borsatos (2005) gave a general overview of the achievement gap between students of color particularly Hispanic students and white students. The article examines Hispanic high school students who had dual language programs in elementary school in respect to their math achievement and school attitude and comparing them to other Hispanic students who did not have dual language program in elementary school. The article indicated that students who have a dual language program score better, have a better attitude toward school, are less likely to drop out of school, and are more likely to go to college than their counterparts who did not go through dual language program in elementary school, (Lindholm-Leary, & Borsato, 2005).

Clarkson (2007) talked about the correlation between language and solving mathematical problems. It added that when students are able to solve mathematical problems, they would also be more likely to solve other life problems and become critical thinkers, (Clarkson, P. C., 2007). The article analyzed test results of bilingual Vietnamese Australian students. The article concluded that these when students were taking math tests they unconsciously switch between languages—students switch between Vietnamese language and English unplanned and unknown, (Clarkson, P. C. (2007).

Murray (2010) pointed out how it was imperative for individuals and nations to be

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proficient in language in order for them to be competitive in today's world both economically and culturally. To some extent, the article urged schools and teachers to encourage students to keep their culture (Murray, 2010). It mentioned immigrants in the United States and how some schools only wanted the English language in the classroom, even though students might perform better academically if they were taught both English and their native language (Murray, 2010). The article studied Irish students who spoke Irish both at home and at school and Irish students who spoke Irish language at school and English language at home. The article concluded that students who were proficient both in English and other languages, in this case Irish, would do better in math than those who were proficient in one language- Irish only, (Murray, 2010). However, the article conditioned the positive performance to the proficiency level of the languages (Murray, 2010).

In summary, the research indicates that the correlation between bilingual instruction and mathematics is a huge one. If the native languages of the students are utilized at school—they may perform better in school, thereby reducing the achievement gap. The Achievement gap is very high in Minnesota schools. The barriers and disadvantages of immigrants with limited English language are even greater. The State has an opportunity to empower multilingual students to be proud of their identity, language and their unique perspectives.

Method

Participants

I will do the experiment with students from Ubah Medical Academy (UMA). UMA is a charter public school located in Hopkins, MN. The total number of students in the 2014-2015

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school year is 369, of which 366 students identified as black, two as white and one as Asian/Pacific Islander. Out of a total of 83 students took the 2014 MCA math test, 35 of them are proficient, meeting the grade level standard, whereas 48 of them are not proficient—they do not meet the minimum standards that the school and the Minnesota Department of Education set for their level. The 366 students who identify themselves as black are also from families of East African immigrants. Thus, many of the students are either immigrants themselves or born to immigrant parents. The students are bilingual and so are their teachers. I will communicate with the director of the school whom I have known through his work in the East African community. Therefore, I will not need to undertake any additional recruitment.

Based on random computer selection, I will assign half of the students from 10th grade students into two groups (i.e., control group and treatment group). Students are fluent in both English and Somali. They share a similar background. However, in order to analyze the result and see whether students' math score will improve after the experiment, I will request students' math teacher to pull the 2014 MCA math scores of the 22 students who will be participating in the study.

Procedure

I will assign 12 of the students to take math with a teacher who is proficient in the students' first language based on random computer selection—students will be able to communicate in the Somali language. There will be no restrictions in English as well—both languages will be used to the students' preference. Afterwards, I will assign the other 12 students to a teacher who does not speak the students' first language using the same process, random

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computer selection. The teaching and communication will be done only in English. Students for both sides will not have a choice to pick the teacher they want. Classes are mix gender. Students in the bilingual teacher class will be my treatment group. The control group will be the other class. After the experiment, students will take same test (MCA-math test). The new scores will be compared to their previous MCA score. I will be looking into average score improvement as well as individual score improvement.

Materials

There will be no specific or extra equipment needed in the study. Students come with their notebooks, pencils and relevant math materials that they are learning. Both classes will run at the same pace and time with the same materials. The independent variable will be the participation of the students and the teachers in these two classes whereas the dependent variable will be the improvement of the math score.

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