Mullenix, C. "Effects of Instruction Utilizing the Curry/Samara Mathematics Curriculum Model Matrix on the Mathematics Achievement of Intermediate School Children." Unpublished Doctor of Education Dissertation, University of Houston, August, 2006.

Modified Abstract from Dissertation with

Recorded Results and Implication

One of the more important issues in mathematics education today is the fact that ways need to be found to promote understanding in mathematics (Hiebert and Carpenter, 1992). Since the first publication of *Principles and Standards for School Mathematics* (NCTM, 1989), an emerging theoretical view on mathematical learning that has been growing in significance is that multiple representations of concepts can be utilized to help students develop deeper, more flexible mathematics understanding (Porzio, 1994). Curriculum designers and researchers have suggested and implemented different ideas, based on mathematical learning theories. However, there are not enough experimental studies that examine the effects of mathematics curricula, supported by NCTM, based on current mathematics learning theory, and organized according to specific mathematics curriculum designs, on student mathematic achievement.

This study examined the difference between the mathematic achievement of students from two inner city urban intermediate school students in a one-year study and a two-year study. Two groups were used in both studies. The experimental group for the one-year study consisted of students who were taught with the implementation of the Curry/Samara Model Mathematics Matrix over a one-year period from 2001-2002. The experimental group for the two-year study consisted of students who were taught with the implementation of the Curry/Samara Model Mathematics Matrix over a two-year period from 2001-2003. The comparison group for the one-year study consisted of students

taught using more traditional instruction and local area mathematics benchmarks from 2001-2002. The comparison group for the two-year study consisted of students taught using more traditional instruction and local area mathematics benchmarks from 2001-2003. Subjects attended two similar intermediate schools and were influenced by similar school cultures and expectations.

For the one-year study, a pretest-posttest control group, quasi-experimental design with a mathematics program, emphasizing a standards- and theoretically-based mathematics curriculum as the independent variable and mathematics achievement based on the Iowa Test of Basic Skills mathematics section as the dependent variable was used. An Analysis of Covariance (ANCOVA) was the procedure used to examine data because the ITBS yields percentile-rank scores that are normally distributed.

For the two-year study, a pretest-posttest control group, quasi-experimental design with a mathematics program, emphasizing a standards- and theoretically-based mathematics curriculum as the independent variable and mathematics achievement based on the mathematics section of the TAKS as the dependent variable was used. An Analysis of Covariance (ANCOVA) was the procedure used to examine data because the TAKS yields raw scores that are ratio data and normally distributed. The research questions are:

1. What is the effect of instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, on the mathematics achievement of intermediate school students?
2. What is the effect of instruction that implements a standards- and theoretically

-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, on the mathematics achievement gifted students in intermediate school?

3. What is the effect of instruction that implements a standards- and theoretically -based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, on the mathematics achievement of accelerated students in intermediate school?
4. What is the effect of instruction that implements a standards- and theoretically -based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, on the mathematics achievement of limited -English proficient students in intermediate school?

Conclusions and Interpretations Regarding Hypothesis Two – One-Year Study

As noted earlier, the second hypothesis stated: There is a statistically significant difference between the mathematics achievement of gifted intermediate school students who participate in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, and the mathematics achievement of gifted intermediate school students who participate in a more traditional mathematics program. The analysis relevant to this hypothesis for gifted intermediate school students yielded an *F*-ratio (4.06) that was statistically significant (p = .050). The adjusted mean percentile rank for the experimental group was 87.79 and the adjusted mean for the comparison group was 83.40. These results indicated that the adjusted mean for the experimental group was statistically significantly higher than the adjusted mean

for the comparison group. Therefore, the second research hypothesis was accepted. The following interpretation is suggested. **The mathematics achievement of gifted intermediate school students who participated in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, was statistically significantly higher than the mathematics achievement of gifted intermediate school students who participated in a more traditional mathematics program.**

Conclusions and Interpretations Regarding Hypothesis Four – One-Year Study

As noted earlier, the fourth hypothesis stated: There is a statistically significant difference between the mathematics achievement of limited-English proficient intermediate school mathematics students who participate in instruction emphasizing a mathematics program that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, and the mathematics achievement of limited-English proficient intermediate school mathematics students in who participate in a more traditional mathematics curriculum.

The analysis relevant to this hypothesis for limited-English proficient intermediate school students yielded an *F*-ratio (5.07) that was statistically significant ($p = .027$). The adjusted mean percentile rank for the experimental group was 37.82 and the adjusted mean percentile rank for the comparison group was 29.98. These results indicated that the adjusted mean for the experimental group was statistically significantly higher than the adjusted mean for the comparison group. Therefore, the fourth research hypothesis was accepted. The following interpretation is suggested. **The mathematics achievement of limited-English**

proficient intermediate school students who participated in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, was statistically significantly higher than the mathematics achievement of limited-English proficient intermediate school students who participated in a more traditional mathematics program. Indeed, inasmuch as the obtained effect size (*d* = +0.40) was more than one-third standard deviation, it can be argued that this difference was also educationally significant.

Conclusions and Interpretations Regarding Hypothesis One – Two -Year Study

As noted above, the first hypothesis stated: There is a statistically significant difference between the mathematics achievement of intermediate school students who participate in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, and the mathematics achievement of intermediate school students who participate in a more traditional mathematics program.

The analysis relevant to this hypothesis for all sixth grade intermediate school students yielded an *F*-ratio (5.29) that was statistically significant ($p = .022$). The adjusted mean raw TAKS score for the experimental group was 32.27 and the adjusted mean raw TAKS score for the comparison group was 31.14. These results indicated that the adjusted mean for the experimental group was statistically significantly higher than the adjusted mean for the comparison group. Therefore, the first research hypothesis was accepted. The following interpretation is suggested. **The mathematics achievement of sixth grade intermediate school students who participated in instruction that implements a**

standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, was statistically significantly higher than the mathematics achievement of sixth grade intermediate school students who participated in a more traditional mathematics program.

Conclusions and Interpretations Regarding Hypothesis Three – Two -Year Study

As noted earlier, the third hypothesis stated: There is a statistically significant difference between the mathematics achievement of accelerated intermediate school students who participate in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, and the mathematics achievement of accelerated intermediate school students who participate in a more traditional mathematics program.

The analysis relevant to this hypothesis for sixth grade accelerated students yielded an *F*-ratio (11.09) that was statistically significant($p < .001$). The adjusted mean raw TAKS score for the experimental group was 39.67 and the adjusted mean for the comparison group was 36.30. These results indicated that the adjusted mean raw TAKS score for the experimental group was statistically significantly higher than the adjusted mean for the comparison group. **Therefore, the third research hypothesis was accepted. The following interpretation is suggested. The mathematics achievement of sixth grade accelerated intermediate school students, who participated in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, was statistically significantly higher than the mathematics achievement of sixth grade accelerated intermediate school students**

who participated in a more traditional mathematics program. Indeed, inasmuch as the obtained effect size (*d* = +0.58) was more than one-half standard deviation, it can also be argued that this difference was educationally significant.

There were not enough students in the gifted student subgroup or the limited-English student subgroup after two years to measure student outcomes with ANCOVA.

Implications

The results of this study indicated that gifted intermediate school students who participated in instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, had statistically significantly higher mathematics achievement after one year than did gifted intermediate school students who participated in a more traditional mathematics program. **This suggests that gifted intermediate school students should receive mathematics instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, if higher mathematics achievement is valued.**

The results of this study also indicated that limited-English proficient intermediate school students who participated in instruction that implemented a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, had statistically significantly higher mathematics achievement after one year than did limited-English proficient intermediate school students who participated in a more traditional mathematics program. This higher mathematics achievement was also found to be educationally significant. **This clearly demonstrates that limited-English proficient intermediate school students should receive mathematics instruction that implements a**

standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, if higher mathematics achievement is valued.

Furthermore, the results of this study indicated that sixth grade intermediate school students who participated in mathematics instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, had statistically significantly higher mathematics achievement after two years than did sixth grade intermediate school students who participated in a more traditional mathematics program. **This suggests that sixth grade intermediate school students should receive mathematics instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, if higher mathematics achievement is valued in the long term.**

Also, the results of this study indicated that accelerated intermediate school students who participated in mathematics instruction that implements a standards- and theoretically -based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, had statistically significantly higher mathematics achievement after two years than did accelerated intermediate school students who participated in a more traditional mathematics program. This higher mathematical achievement was also educationally significant. **Clearly, this demonstrates that accelerated intermediate school students should receive mathematics instruction that implements a standards- and theoretically-based mathematics curriculum, organized according to the Curry/Samara Model Mathematics Matrix, if higher mathematics achievement is valued in the long term.**