

# **Differentiated Instruction in Mathematics**

## **Abstract**

Many elementary school students struggle with the rigor and demands of mathematics competencies. As students move up in grade level, they may demonstrate a lack of fundamental mathematics skills. The purpose of this study is to examine the effect that differentiated instruction flexible grouping has on the mathematics achievement scores of elementary students.

## **Statement of the Problem**

The continuing educational movement toward inclusion has directly impacted classrooms by requiring teachers to respond to a broader range of academic needs. By expanding this range, many educators have found it difficult to direct proper attention in a way that is conducive to all learners. Additionally, the common practice of teaching to the middle and hoping that instruction reaches all students has become ineffective as classrooms are now filled with students of mixed-abilities and mixed exceptionalities (Pierce et al., 2004). In addition to facing these challenges, educators must also manage the rising increase of low achievement scores in mathematics across all grade levels (Geary, 2011).

## **Purpose and Research Questions**

The purpose of this study is to examine student responses to flexible grouping in an upper elementary mathematics classroom. The goal is to implement this strategy to increase the rate of individual student work thus ultimately improving overall assessment scores in mathematics. Flexible grouping is a successful teaching strategy because it enhances learning by matching student characteristics to instruction and assessment. The following research question will be investigated: How effective are differentiated instruction small groups on the mathematics achievements of fifth grade inclusion students?

## **Literature Review**

The differentiated instruction approach provides different avenues for acquiring content and processing ideas so that each student has an equal opportunity to learn the instruction effectively based on their own instructional needs. While differentiated instruction is not a new concept, the recent push for inclusive classrooms has revitalized the differentiation movement. Researchers in a number of studies have consistently found differentiated instruction to be an effective instructional strategy leading to greater student motivation and increased student achievement scores, especially in mathematics including, Gotfried (2013), Hart et al. (2015), and Poncy et al. (2013). In fact, many have implemented flexible small grouping as an answer to meeting student needs in mathematics achievement. If children grasp the essential mathematics outcomes, they will be enriched during flexible group time. Similarly, if they need an intervention or additional time and support, they will also receive it in their small groups. In mathematics, flexible small grouping allows the teacher to reach advanced and struggling students simultaneously while still building a cooperative learning environment. Essentially, flexible math groups aim to improve the mathematics outcomes for all students by changing the way that students work together (Barbour, 1990).

## **Research Methodology**

The study will be conducted amongst two 5th grade mathematics inclusion classrooms. The special education teacher will collaborate with the general education teacher in order to implement flexible small groups and will be responsible for collecting data before, during, and after the implementation of the intervention. Students performing in the lowest 25 percentile in mathematics will be invited to join the study. The study will consist of two heterogeneous groups of five students each. Students will vary in socio-economic backgrounds. Those students selected

who have been identified as having SLD already receive extended time and small group instruction as accommodations listed on their 504 plans. Other participants include an additional 46 students who belong to both mathematics classrooms.

Data will be collected on the following variables: (a) learner profiles, (b) students' attitudes regarding mathematics, (c) student frequency of participation during intervention, and (d) a comparison of the number of correctly answered mathematics questions pre/post the implementation of the intervention.

### **Results**

Research findings will be available in time for the conference and will be presented accordingly.

### **Implications**

The implementation of appropriate differentiated instruction may offer students with disabilities an opportunity to learn specific mathematics skills in a smaller group setting. This in turn may improve students' interest and confidence in both learning mathematics as well as their overall mathematics competency.

### **References**

- Barbour, N. H. (1990). Flexible grouping: It works! *Childhood Education*, 67(2), 66-67.
- Brulles, D., Peters, S. J., & Saunders, R. (2012). Schoolwide mathematics achievement within the gifted cluster grouping model. *Journal of Advanced Academics*, 23(3), 200-216.
- Dixon, F. A., Yssel, N., McConnell, J. M., & Hardin, T. (2014, 06). Differentiated instruction, professional development, and teacher efficacy. *Journal for the Education of the Gifted*, 37, 111-127.

- Fuchs, L. S., Fuchs, D., Craddock, C., Hollenbeck, K. N., Hamlett, C. L., & Schatschneider, C. (2008). Effects of small-group tutoring with and without validated classroom instruction on at-risk students' math problem solving: Are two tiers of prevention better than one? *Journal of Educational Psychology, 100*(3), 491-509. doi:<http://dx.doi.org/10.1037/0022-0663.100.3.491>
- Geary, D. C. (2011). Consequences, Characteristics, and Causes of Mathematical Learning Disabilities and Persistent Low Achievement in Mathematics. *Journal of Developmental and Behavioral Pediatrics : JDBP, 32*(3), 250–263. <http://doi.org/10.1097/DBP.0b013e318209edef>
- Gottfried, M. A. (2013). The spillover effects of grade-retained classmates: Evidence from urban elementary schools. *American Journal of Education, 119*(3), 405-444.
- Hart, S. A., Logan, J. A. R., Thompson, L., Kovas, Y., McLoughlin, G., & Petrill, S. A. (2015). A latent profile analysis of math achievement, numerosity, and math anxiety in twins. *Journal of Educational Psychology*, doi:<http://dx.doi.org/10.1037/edu0000045>
- Konstantinou-Katzi, P., Tsolaki, E., Meletiou-Mavrotheris, M., & Koutselini, M. (2013). Differentiation of teaching and learning mathematics: An action research study in tertiary education. *International Journal of Mathematical Education in Science and Technology, 44*(3), 332-349.
- Matthews, M. S., Ritchotte, J. A., & McBee, M. T. (2013). Effects of schoolwide cluster grouping and within-class ability grouping on elementary school students' academic achievement growth. *High Ability Studies, 24*(2), 81-97.
- Pierce, R. L., & Adams, C. M. (2004). Tiered lessons: One way to differentiate mathematics instruction. *Gifted Child Today, 27*(2), 58-66. Retrieved from

<http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/62112127?accountid=10901>

- Poncy, B. C., Fontenelle, S. F., & Skinner, C. H. (2013). Using detect, practice, and repair (DPR) to differentiate and individualize math fact instruction in a class-wide setting. *Journal of Behavioral Education, 22*(3), 211-228. doi:<http://dx.doi.org/10.1007/s10864-013-9171-7>
- Rubenstein, L. D., Gilson, C. M., Bruce-Davis, M. N., & Gubbins, E. J. (2015). Teachers' Reactions to Pre-Differentiated and Enriched Mathematics Curricula. *Journal for the Education of the Gifted, 38*(2), 141-168.
- Tricarico, K., & Yendol-Hoppey, D. (2012). Teacher learning through self-regulation: An exploratory study of alternatively prepared teachers' ability to plan differentiated instruction in an urban elementary school. *Teacher Education Quarterly, 39*(1), 139-158.
- Yang, D., Lai, M., Yao, R., & Huang, Y. (2014). Effects of remedial instruction on low-SES & low-math students' mathematics competence, interest and confidence. *Journal of Education and Learning, 3*(1), 1-15.
- Ysseldyke, J., & Tardrew, S. (2007). Use of a progress monitoring system to enable teachers to differentiate mathematics instruction. *Journal of Applied School Psychology, 24*(1), 1-28. doi:[http://dx.doi.org/10.1300/J370v24n01\\_01](http://dx.doi.org/10.1300/J370v24n01_01)