

Action Research Analysis Paper 2

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Lincoln Public Schools (LPS) is the biggest school system in Lincoln Nebraska. LPS has a total of 40,935 students in its district. Among those students, LPS labels 4,761 (12.1%) as “Gifted” and 596 (1.5%) as “Highly Gifted.” Also among the students in LPS, 9,051 are in middle schools. From those students in middle school, 496 of them attend Dawes and 633 of them attend Lefler. Of the students that attend Dawes, 64 (12.9%) identify as “Gifted” with 0 “Highly Gifted” students. Of those that attend Lefler, 102 (16.1%) identify as “Gifted” with 8 “Highly Gifted” students.

LPS employs mentors that teach the “Gifted” and “Highly Gifted” students in its district. As a mentor for the LPS gifted program, Mr. Wheeler travels to Dawes and Lefler and works on mathematics with different gifted students. Since the students that he works with are gifted, they pick up on material after seeing it just once or twice, the students ask when they get stuck and need help and they are well behaved. However, the gifted students do face one similar challenge – showing their work. When it comes to simple arithmetic, showing work is not necessary, but, when the students get into more difficult problems, showing work is a necessity.

Mr. Wheeler noticed that showing work was a challenge when he graded exams. After each exam, students correct their mistakes, ensuring that they fully understand the material. After further evaluation, 75% of missed problems came from students not showing work. These findings are astonishing since the students float around a 90% for a semester grade, and addressing this problem would improve the students’ grade by a half, or a full, letter grade.

Investigating more into this issue, it is found that showing work, step by step, will improve students' likelihood of finding the correct answer. There is evidence that shows connection from the hand to brain can improve memory and the way one retrieves information (Mueller, 2014). By this logic, if a student shows work during homework, they are physically and mentally integrating the steps in solving a problem. Then when the student shows work on a test, they will be retrieving the information from their brain that they had integrated from the homework. Thus, the student's performance will increase and will miss fewer problems.

This investigation then leads to a question – how implement methods that encourage showing work. A study done by one of Harvard's graduate students in Mathematics Education showed that if a teacher solves a problem using multiple methods, students are likely choose the one they prefer, rather than the one the teacher prefers (Tamer, 2015). Therefore, students will find showing work less of a mandatory process but one that they enjoy.

Showing students multiple methods will not always do the trick. Gifted students often do not show work due to their personality types; material comes easily, therefore, not showing work, to them, is more efficient. In this case, teachers should increase the difficulty of the problems. This will require more critical thinking skills, so the students will track their process via showing work (Bireley, 1991).

On top of these two methods, a final method could be implemented – take points away for no work. This method could be tricky because it can weaken

student-teacher relationships, but, it has been effective. Gifted students do well in school, however, if they do poor, they will show work so that they do not lose points.

Mr. Wheeler will begin an intervention by making sure when he creates lesson plans that provide multiple methods of solving each problem. Not only will this increase students likelihood by providing a way that they prefer, it can help their understanding of a topic. Keeping track of students reaction to the methods are important, sometimes providing multiple methods will make them bored and pay less attention.

With showing multiple methods, the problem's difficulty will increase. If the book do not provide difficult example, Mr. Wheeler will find more difficult problems online. This will serve many benefits. Students will be required to show work on these problems. Gifted students want challenge and increased difficulty will provide that. It will also cause students to struggle more, which increases students learning (Bireley, 1991). Increasing the difficulty of homework means less problems on the homework. The difficulty of work verse the amount is a delicate balance. Students should not spend too much time on homework, otherwise a reverse effect will occur (Parker, 2014).

This day in age, technology has an increasing purpose in the classroom. It helps give students another resource. Many subjects within schools have utilized the technology. However in mathematics, especially in secondary education, technology is less common. Part of this problem comes from finding way that technology would increase mathematical skills during the development phase of mathematical problem solving. Calculators and graphing devices provide easy, quick ways of

solving problems, but it does not help provide understanding to students, atleast not as much as traditional math teachings.

This allows a potential development. If students had access to an iPad or some sort of technology with a touch screen, they can take hand written notes and do homework on the device. This veers away from the traditional pencil and paper, which will provide a more exciting platform for homework. Students would be able to color coordinate the steps during the problem solving process. Also, students can easily store and retrieve previous notes and homework.

Having this potential use of technology in mathematics during secondary education provides a more efficient way for note taking and doing homework. However, this does not mean students will increase the amount of work they show. So, if there was a certain way for the technology to check if the students work was shown and declines submitted assignments that have no work shown, this would increase students' shown work.

Mr. Wheeler will implement these two strategies to his students. However, as a last resort, he will deduct points from homework and tests for no work. When students realize that showing work helps them improve grades and success on tests, it will act as a positive reinforcement for students. As students progress through math subjects, showing work becomes a necessity for their success. This intervention will help increase students shown work, which in turn will improve the students grades and performances.

Citations:

Bireley, M., & Genshaft, J. (1991). *Understanding the gifted adolescent: educational, developmental, and multicultural issues*. New York: Teachers College Press.

Mueller, P. (2014, April 24). Take Notes by Hand for Better Long-Term Comprehension. Retrieved December 03, 2017.

Parker, C. (2014, March 10). Stanford research shows pitfalls of homework. Retrieved December 30, 2017.

Tamer, M. (2015, April 13). Multiple Methods. Retrieved November 30, 2017.