

Tracking in Mathematics

Kelsey Cummings

Teaching Projects: Math for Teaching Capstone

Harvard Extension School

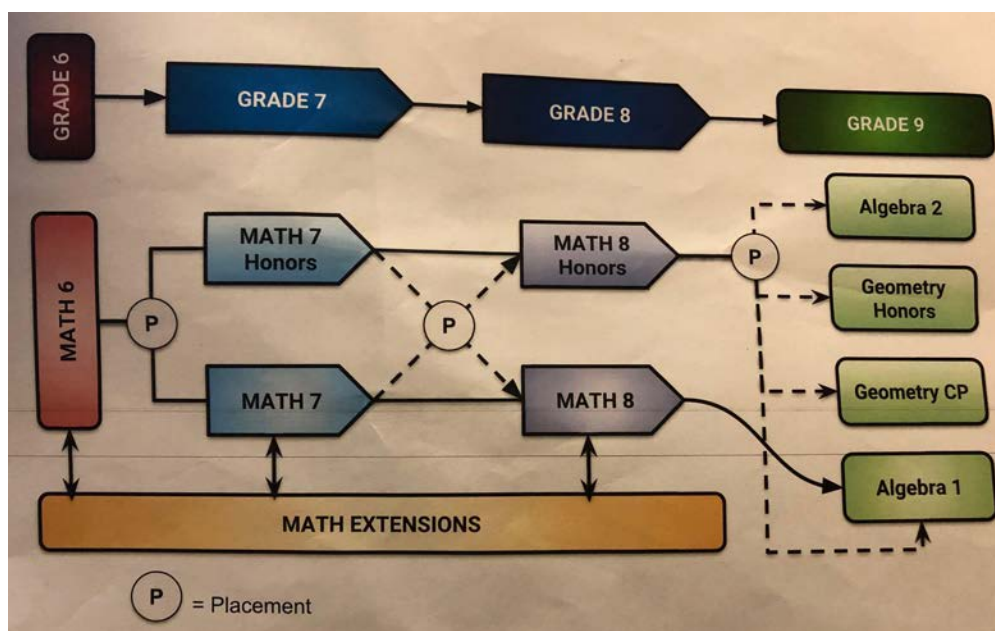
April 2019

Introduction

Your child is entering middle school and the schedule has finally arrived in the mail. The kids are excited and sharing whom their teachers will be this year. However, you overhear parents discussing the varying math classes where their children have been placed. Totally confused, you try to absorb the two options, accelerated or general education math. You think to yourself, what does this all mean? What is the best option for my child? Is this decision going to influence the math courses they take for the rest of their school career? You have so many questions and after searching online you encounter varied and contrasting opinions. This decision is a big one, so you feel pressured to get it right.

Tracking in mathematics has become a hot topic in many school systems. By definition, tracking means that students are separated into different levels of courses due to their mathematical ability and prior performance. Generally, this occurs at the middle school level and continues through to senior year of high school. Consequently, this is one of the main reasons that parental involvement is significantly higher during this time in a child's schooling. Children are chosen for a track in the 5th or 6th grade at age eleven and twelve that often continues all the way until secondary school and may even impact their college decisions. The reason that I chose this topic for my research is because the middle school that I work at is having major discussions and debates about tracking and the courses that are currently being offered. We are asking ourselves questions like: When should we start tracking students? How many levels should be recommended at each grade level? What percent of students should be in each level? The central and critical issue that must be confronted is that all decisions are being determined by the administration. Unfortunately, this management and oversight can have a negative impact on teachers and students alike since it results in everyone feeling controlled. Currently, my school

starts tracking in the seventh grade. As a department, we offer an honors course at the seventh and eighth grade level. Approximately fifty percent of the grade is in general education math, while the other fifty percent is in honors. The following chart was shared with my department during one of our monthly meetings.



As pictured, students can move between levels, but this rarely ever happens. For the most part, the track that students are placed on in seventh grade is the track that they will remain on throughout high school. As a department, the goal is to propose the best option for our students, but the superintendent, curriculum director, and the principal regulate final decisions.

Before commencing my research, I asked other math teachers from different school systems what their middle school curriculum looked like for tracking in mathematics. Personally, I thought the advanced numbers were high at my school until I heard what other teachers replied. Some shared that almost 75% were advanced and others commented that Algebra 1 was not the highest level offered to 8th graders, but instead advanced Geometry. Another teacher shared that their school does not have a tracking system, but instead, all students are in advanced

mathematics. There has been a real charge from various states to increase the number of students in advanced classes. Schools are now graded based off of the number of students in advanced placement courses, which will increase as the number of students starting in advanced courses at the middle school level increase. In this paper, I will examine the research that has been presented on tracking in mathematics. I will explore the positive and negative effects tracking has on students academically and emotionally, parental influences, and the culture of fast-track math. Additionally, I will gather the opinions of administration, teachers, and students on tracking in mathematics and the advantages and disadvantages it possesses.

Advantages of Math Tracking

When tracking was first implemented, it was meant to help both high and low level students. The progressive students would have an environment that would proceed at a faster pace and the ability to examine more rigorous problems, whereas the less advanced students would be allowed time to process and undertake more practice problems at a slower speed. As an eighth grade teacher, I believe it is crucial for students to be separated by aptitude. The range of mathematical abilities is so vast that it would be impractical and short sighted to place all students in the same math class. Tracking allows for differential instruction and the ability to keep students on an even playing field while being challenged at their level. Students' learning capabilities are all unique, so it would be erroneous to think every pupil should be in the same class forced to be subjected to an unbalanced pace. If all students assembled in the same classroom, it would be extremely difficult to reach all mathematic levels. It would be a flawed from the onset due to either lower level students getting too much assistance to succeed, or the higher level student not being challenged enough hindering their growth potential. Rahul Sinha

wrote the article, “*Tracking is unpopular, but is it good for our children?*”, in the *Greater Greater Washington* and has a strong argument as to why tracking is good for all students. He believes tracking is, “The concept that each child will neither start out behind nor be bored. Each child can learn as much as he or she can handle, as fast as he or she can absorb it” (Sinha March 27, 2013). Mathematics is a subject that relies on all prior learning and it is imperative that students do not proceed until they fully understand a concept.

When considering how many levels to implement at each grade, department heads and principals should consider a study that was done in Massachusetts that found, “that for every additional track of math in the 8th grade, 3% more of the student body scores at the advanced level” (Sinha March 27, 2013). Another study found that both the higher and lower achieving students were able to perform better on testing when they were in tracked classes (Sinha March 27, 2013). If students in the lower classes are attempting to learn at a level way over their head, they will feel pressured to advance and plod on chapter by chapter without ever truly understanding the material. Traveling at a slower pace with more grade level challenges allows the students to fully comprehend the material before moving on to the next chapter. It only stands to reason that if students are learning at a comfortable pace, the material will connect and they will naturally perform better on testing.

Another advantage to tracking is that it allows students to assimilate with peers that share similar abilities and learning styles enabling them to work together as equal partners. This eliminates one student from completing all of the work because they are “better at math”. Susan Demirsky Allan wrote a special feature in *Grouping and the Gifted* that stated, “Children typically model their behavior after the behavior of other children of similar ability who are coping well with school. Children of low and average ability do not model themselves on fast

learners...Students gain most from watching someone of similar ability cope rather than watching someone who has attained mastery” (Allan, Feldhusen, et al, 1991, page 64). Putting lower level students in a class with high achieving students exposes their inferiority and may lead to embarrassment and low self-esteem. In actuality, not all students love mathematics or have interest in the same subjects. Grouping by ability allows those that have a true love for math to explore at a deeper level with their contemporaries.

Disadvantages of Math Tracking

Unfortunately, the lower level students are the recipients of many of the disadvantages associated with tracking. When lower achieving math students are segregated in one class, they do not have a role model to infuse motivation and provide the extra assistance needed to overcome obstacles. Another negative connotation with tracking is that teachers in the lower level classes are not as qualified as those in the advanced. This is more evident at the high school level. Normally, when a new teacher is hired, they start off by teaching the lower level classes and climb up the ladder. If a student is placed in a newly hired educator’s class every year, it is likely that the teacher is learning right alongside the student and not yet a master of his or her domain.

Another major influence on schools that wish to eliminate the tracking system is the concept of equity. Susan Yonezawa and Makeba Jones in the article, *Students Perspectives on Tracking and Detracking*, describe the common beliefs that detracking will do for our school systems, “Detracking has been described as an equity-minded reform that attempts to level the playing field among students of different socio-economic, racial, and linguistic groups” (Yonezawa & Jones, 2006, page 15). A study was done to determine the percent of students that

were tracked high and went on to eighth grade algebra by race. Lee Stiff, Janet Johnson, and Patrick Akos, authors of, *Examining What We Know for Sure: Tracking in Middle Grades Mathematics*, shared that 51% of whites, 19% of blacks, 26% of hispanics/latinos, and 59% of other went on to advanced mathematics. This data clearly displays that more Caucasian and other students take the advanced track, while blacks, Hispanics, and Latinos are more likely to stagnate on the lower track.

While most of the disadvantages are with the lower level students, there is one major disadvantage that the higher track students encounter. The Journal of Educational Research wrote an article on the *Influences of Math Tracking on Seventh-Grade Students' Self-Beliefs and Social Comparisons*. They found that, “students with higher ability are challenged by students of similar ability...higher level students may experience lower self-esteem and self-concepts if they are not doing as well as their higher level counterparts” (Chiu et al., 2008, page 126). Advanced classes are meant to be fast paced and challenging. If a student is not doing as well as their counterparts, it can lead to severe anxiety and have a negative impact on their daily lives. Many times it is these students that have the most pressure from home or put the most pressure on themselves to be perfect.

Math Placement

Teachers dedicate time, effort and analysis into the placement of students. When deciding on whether to put a student on a lower or higher track, Lee Stiff, Janet Johnson, and Patrick Akos, authors of, *Examining What We Know for Sure: Tracking in Middle Grades Mathematics*, believe it is better to put a mediocre student on the higher track to allow them to reach their maximum potential. “Otherwise-capable students placed into low math tracks have shown a

decrease in their mathematics self-efficacy” (Stiff, Johnson, & Akos, page 64). It is often these students that teachers struggle with placing the most. Personally, these are the students that I anguish about after they have moved on to high school. Are these advanced classes helping or hurting them? If the math learned in the class becomes too difficult, students may start memorizing facts or just doing whatever possible to get through a test, rather than fully understanding and comprehending the material. This will result in a downward spiral since math is a subject that utilizes previous knowledge to tackle the next topic.

Whether you agree or disagree with tracking, it is currently being used in many educational systems. Until a non-tracking decision is made, educators need to determine and standardize the best tracking options for their students. Being on the fast-track has become important to the culture that we live in today. Parents often override a math teacher that has placed their child in a regular education or college prep math course. In a parent’s mind, it is more important for the child to be on the fast-track for math than be in a class that will go at an appropriate pace for the student as recommended by the teacher. The parent believes that if a student is in an advanced math course it will improve their chances of getting into the college of their choice. As an educator, I believe it is important to empower students to reach their highest academic potential, but unfortunately some students are being pushed too far too early.

Students are being forced into Algebra before they are developmentally ready, therefore leading to their downfall in the higher grades because they are missing the fundamentals. Michelle Morrison, author of, *Math Tracks: What Pace in Math Is Best for the Middle School Child*, quotes a passage from the Brown Center Report that said, “In 1990, very few eighth graders, about one out of six, were enrolled in an algebra course” (Morrison, 2011, page 28). She shares that after 1990 it became a national goal to enroll all children in Algebra by the eighth

grade. By 1996, the original 17% increased to 53% of students enrolled in Algebra. This may appear like more students are moving into Algebra because the teachers are preparing them better, but as the director of the Brown Center on Education Policy pointed out, “the proficiency scores of those advanced eighth-grade Algebra students actually shows a continued decline. Clearly, some preadolescents are ready for Algebra while others, who have not developed formal operational thinking, are not prepared for the abstract nature of Algebra” (Morrison, 2011, page 28-29). As an eighth grade math teacher for Algebra, I encounter this problem every year. Students are deficient in basic skills, which cause them to lack a deep understanding for Algebra. Some students are just sneaking by without full comprehension of the material because it is over their head. Memorizing material for a test and then forgetting it by the next lesson is a common practice for these students. This point truly shows that many thirteen year olds are not ready for such an advanced, fast paced curriculum. Many parents may think this path is helping their children for the future, but in the end, it may actually be hurting because a maturation process takes time.

A study was done to examine the course placements in California middle schools from 2003-2013. Thurston Domina, Paul Hanselman, NaYoung Hwang, and Andrew McEachin, the researchers in the study, found that over these ten years, the number of students taking Algebra 1 doubled to 65%. This was due to a major push from the state and most commonly known as the algebra-for-all era. Many schools decided to push all eighth graders into Algebra to meet the state requirements. This caused some schools to push it even further and make a double advanced eighth grade course, Geometry. There were two major concerns that came to mind when I read this article. Is Algebra 1 being made easier to meet the needs of all students taking it and that is why even more advanced courses are being created or are the majority of the students

not truly understanding the material because their minds are not fully developed for such abstract mathematics? The drive for an algebra-for-all curriculum was put in place to provide equal opportunities for all students. Although this may have been true for some schools, others just kept creating higher classes for the more proficient students, which seem to be counterproductive. The conclusion of Domina, Hanselman, Hwang, and McEachin's study in *Detracking and Tracking Up*, states that, "If the tracking up phenomenon obviates the equity gains associated with curricular intensification, increasing opportunity to learn may not narrow opportunity gaps" (Domina, Hanselman, Hwang, & McEachin, 2016, page 1026). In the end, an effort from the state to increase the opportunities for lower level students will most likely create even more opportunities for the upper level.

Perspectives on Math Tracking

There are many different opinions on math tracking. Michelle Morrison, author of *Math Tracks: What Pace in Math Is Best for the Middle School Child*, provides feedback from high school math department heads, middle school program directors, and alumni from the accelerated math track. This accelerated track involves students completing Algebra 1 as a seventh grader and taking Geometry in the eighth grade. Many of these students end up running out of courses to take by their senior year. Some of the responses are as follows (Morrison, 2011, page 29-31):

High School Math Department Heads:

- "The most important work of a middle school math program in preparing students for high school math studies is to develop a strong foundation in algebra, build their

confidence as math students, and expose them to both algebra and geometry connections in the real world” (Morrison, page 29).

- “Accelerated math at the middle school level is only valuable to the student if they first have a very solid and deep mastery of algebra and are truly exceptionally gifted as mathematical thinkers ” (Morrison, page 30).

As a college math major and now a middle school mathematics teacher, I do not see many positives in rushing through Algebra 1 in seventh grade to learn advanced geometry in the eighth grade. I completely agree with these math department heads that Algebra 1 is the foundation of all future math courses. If students do not have a full understanding of algebra, they will never have a complete understanding of geometry, trigonometry, or calculus. Instead of pushing students into an advanced geometry course, I think it would be more beneficial to do a year of advanced algebra for these high achieving students. There are so many concepts in algebra that can be mastered at a very deep level before skipping on to geometry. If these students truly understand and learn the subject, advanced geometry will be more successful as a freshman in high school.

Middle School Program Directors:

- “I feel that this effort is inappropriate developmentally for students this age. I also feel that this push is parent driven and not children driven” (Morrison, page 31).
- “It is an asset only if the student is exceptional in math” (Morrison, page 31).

Students often struggle when their parents override a teacher's recommendation and place them in advanced math. As a teacher, I am able to spot these students very quickly and they are the students that I must work with on a daily basis because their foundational skills are just not ready for the advanced classes. Personally, I think this is hurting the student much more than it is helping. It might be nice to say you are in an advanced math class, but as this middle school program director said, it really is only an asset if the student truly is exceptional at math.

Alumni of the Accelerated Track:

- “Honestly, being in advanced math made me hate the subject. I was always in class with kids who were older than me so I was afraid to ask questions and show weakness...Basically, I am on the same math level as a lot of my other friends and maybe even a little behind because some of my friends who took Calculus last year or are taking it this year seem to have a better grasp on the subject than I ever did” (Morrison, page 31).

Before placing any of my students in the accelerated math course at the high school, which requires them to take Advanced Geometry and Algebra 2 simultaneously, we have a sit down conversation about whether or not they want to do it. I never want a student to hate math because they were placed incorrectly and that is why it is crucial they are involved in the decision process. When a student is forced into something by either their teacher or parent that they do not want to do, it can affect them emotionally and academically immediately following the decision being made for them.

Conclusion

Unfortunately, differences of opinion with respect to the most effective means of implementing tracking within a math curriculum leave teachers, administrators, parents, and students with more questions than answers. As educators continue to collect data and experiment with various tracking techniques, the debates over the productivity of tracking will surely continue. Moreover, additional research is needed, and the professional observations of teachers must be calculated as well. In the meantime, school systems continue to struggle with answering a fundamental question: Is a curriculum that exercises tracking to educate its students more or less effective than the alternatives?

It is clear that there is no one foolproof way of tracking or not tracking students in the classroom. In my opinion, students should be tracked starting in sixth grade. Additionally, I believe there should be two levels in the sixth grade and three levels in the seventh and eighth grade. As an eighth grade math teacher, I see a wide range of mathematical abilities year to year. In my lower level classes, I have found that range of abilities is extreme. Unfortunately, the advanced pace would be too much for the lower level students, but the higher level would not be challenged enough due to the inabilities of others in the room and the work would become too easy. I think there should be a middle course offered that allows these average students to be pushed, but still offer the support needed when they struggle. This course would also help to make the advanced math courses be truly advanced and not have over fifty percent of the grade in it. By separating grade level math into thirds, I think it would allow for all students to be properly placed. In the end, proper tracking results in the most effective classroom experience for each individual student.

Bibliography

- Allan, S. D., Feldhusen, J. F., & al, et. (1991). Ability-Grouping Research Reviews: What Do They Say about Grouping and the Gifted? Four Responses to Allan. *Educational Leadership; Alexandria*, 48(6), 60.
- Chiu, D., Beru, Y., Watley, E., Wubu, S., Simson, E., Kessinger, R., ... Wigfield, A. (2008). Influences of Math Tracking on Seventh-Grade Students' Self-Beliefs and Social Comparisons. *The Journal of Educational Research*, 102(2), 125–136.
<https://doi.org/10.3200/JOER.102.2.125-136>
- Domina, T., Hanselman, P., Hwang, N., & McEachin, A. (2016). Detracking and Tracking Up: Mathematics Course Placements in California Middle Schools, 2003–2013. *American Educational Research Journal*, 53(4), 1229–1266.
<https://doi.org/10.3102/0002831216650405>
- Morrison, M. (2011, Winter /2012). Math Tracks: What Pace in Math Is Best for the Middle School Child? *Montessori Life; New York*, 23(4), 26–35.
- SinhaMarch 27, E. R., & 201324. (n.d.). “Tracking” is unpopular, but is it good for our children? Retrieved March 23, 2019, from <https://ggwash.org/view/30696/tracking-is-unpopular-but-is-it-good-for-our-children>
- Stiff, L. V., Johnson, J. L., & Akos, P. (n.d.). Examining What We Know for Sure: Tracking in Middle Grades Mathematics, 7.
- Yonezawa, S., & Jones, M. (2006). Students Perspectives on Tracking and Detracking. *Theory Into Practice*, 45(1), 15–23. https://doi.org/10.1207/s15430421tip4501_3