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Mathematics Tracking: Policy Brief

Melissa P. Donham
Baylor University, melissa_donham1@baylor.edu

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Introduction

The National Council of Teachers of Mathematics (NCTM, 2018) described the purpose of high school mathematics as students learning mathematics to "expand professional opportunities, understand and critique the world, and experience the joy, wonder, and beauty of mathematics" (p. 9). High-quality mathematics instruction allows students to move beyond viewing the subject as a set of rules to memorize, and instead, view mathematics as a way to make connections to the world around them. A solid mathematical foundation supports students in their post-secondary opportunities (Hanselman, 2017). While this is the goal for mathematics education, students do not have equal opportunities to reach this goal. Tracking is a policy that can serve as a systemic barrier to students receiving this type of meaningful mathematics instruction in school. This policy brief will discuss the arguments for and against mathematics tracking policies, implications for educators and policymakers, and future directions.

Research Overview

Tracking is a long-standing practice in schools. Tracks or pathways are fixed sequences of courses that homogeneously group students by ability level (NCTM, 2018; Werblow et al., 2013). Mathematics typically has the most tracks in schools (Hallinan, 1996). These courses are identified by labels such as "honors", "regular", or "remedial" (NCTM, 2018). Students are often placed in tracks beginning in upper elementary or middle school. The tracks in which students are placed in earlier grades set them up for the mathematics courses they are able to take in high school. The typical course sequence for high school is Algebra I, Geometry, Algebra II, and Pre-calculus. Calculus and Statistics are optional Advanced Placement courses for students at the end of this sequence (Hanselman, 2017). Students that take Algebra I in middle school are able to

reach higher levels of mathematics courses than their peers who are not placed in the advanced track (Loveless, 2008). The number of mathematics tracks for students can differ from school to school, but the policy of having mathematics tracks is common throughout schools in the United States.

Discussion and Analysis

For Tracking

Many teachers, principals, and parents are stakeholders that support tracking policies in schools. First, teachers support tracking from a classroom management perspective. They believe it is easier to manage classrooms that do not have a large range of instructional needs (Ansalone & Biafora, 2004). By using ability grouping, teachers can use instructional strategies that are best for their different levels of students. There is also a comfort level for students when they are in classes with students at similar ability levels. Second, principals see tracking as a way to provide families more flexibility and choice in their student's school experience (Biafora & Ansalone, 2008). Principals' hands are often tied with the amount of choice they can give, so offering different tracks allows parents to choose what level of mathematics is best for their students. In addition to teachers and principals, many parents support tracking as well. Parents view tracking as a way to provide individualized instruction for their children (Ansalone & Biafora, 2010). Homogeneous grouping allows higher-level students to learn at a faster pace, so they can potentially learn more in their classes. Lower-level students can also receive the type of instruction they need from teachers, so they do not get left behind. Also, by having the opportunity to take Algebra I in middle school, students can take the Advanced Placement mathematics courses. Without this option, it is difficult for students to reach Calculus or Statistics in high school.

Against Tracking

Those opposed to tracking believe it is a structural barrier that sends the message that learning mathematics is not possible for some students (NCTM, 2018). Mathematics tracks sort students into those that can and those that cannot (Boaler, 2016). Tracking leads to inequities for students. Of the subjects taught in the United States, mathematics has the most significant differences in achievement and participation for the different racial, gender, and socioeconomic status (SES) groups (Boaler, 2016; Lee, 2002). This could be a result of the placement of students in the different tracks. Schools have different placement requirements, whether it be teacher recommendation, parent choice, or test scores (Biafora & Ansalone, 2008). Overall, research suggests that students of color and students from low SES backgrounds are disproportionately placed in the lower tracks (Boaler & Staples, 2008; Hanselman, 2017; NCTM, 2014; Werblow et al., 2013; White et al., 2018). Placement in tracks is often determined by perceived nonacademic factors such as race, socioeconomic status, gender, and language (NCTM, 2018). Adults are often the ones determining the placement of students.

Inequities between tracks are also present through the type of mathematics instruction students receive. Students in the higher tracks experience mathematics instruction that deepens their conceptual understanding and develops problem-solving and critical thinking skills (NCTM, 2018). Students in the lower tracks experience instruction focused on memorization, worksheets, and rote procedures (White et al., 2018). NCTM (2018) suggested the need to ensure all students have access to high-quality mathematics instruction to address the principle of access and equity. This is often not the case in tracked classes. The inequities in mathematics instruction also lead to an opportunity gap as students in the lower track fall further behind in math (Flores,

2007). Some students are given the opportunity to experience rigorous mathematics instruction, while others are not.

Research Implications and Future Directions

Those calling for de-tracking policies are not intending for all students to be in the same on-level classes. NCTM (2018) suggests a new way to format mathematics courses to support de-tracking. There are currently a large number of expected learning standards for mathematics courses that make it difficult for teachers to teach for understanding. To change this, NCTM calls for a focus on the Essential Concepts in the high school mathematics curriculum to build a mathematical foundation for students. These Essential Concepts include topics from the four content domains: number, algebra and functions, statistics and probability, and geometry and measurement. To reformat mathematics pathways using these concepts, NCTM (2018) recommends:

> High schools should offer continuous four-year mathematics pathways with all students studying mathematics each year, including two to three years of mathematics in a common shared pathway focusing on the Essential Concepts, to ensure the highest-quality mathematics education for all students. (p. 83)

This common pathway would avoid the issue of separate and unequal tracks for students. After students finish the common courses, they can choose mathematics courses related to their interests. The typical sequence of courses would change with this new format as well. Instead of following the Algebra I, Geometry, and Algebra II sequence, the courses would be more integrated to help students make connections between the concepts. These pathways can look different, but the goal is to avoid different levels of the same course.

Policy implications include developing these pathways that allow students to not be separated into tracks to allow for meaningful mathematics learning (NCTM, 2018). The priority should not be the "race to calculus". Currently, only some students are able to reach that level of mathematics. New pathways allow students to learn the Essential Concepts together, then choose additional mathematics courses that are relevant to them.

Teachers and schools can examine the tracking policies for their mathematics courses (NCTM, 2018). This can include how students are placed in the tracks and the demographics of students in the different tracks. Teachers can also reflect on their practices to ensure they are teaching equitably, have high expectations for all students, and give high-quality instruction to all students. There should be guidance for teachers on how to differentiate in the classroom to address the needs of all learners. Administrators and teachers can collaborate to develop mathematics pathways that would work at their school to de-track students.

Future research can examine the outcomes of schools' efforts to de-track mathematics classes. This could focus on teachers' experiences and students' experiences. De-tracking can be a daunting task for school administrators and educators, there could also be research that explores the process schools' take to find ways they are successful.

Conclusion

Tracking is a long-standing policy in the United States and affects mathematics more than other subjects. Tracking policies may look different from school to school, but the overarching idea of mathematics tracking is present in most schools today. The arguments for and against tracking make this a difficult policy to change. NCTM (2018) called for mathematics courses to be reformatted to a common pathway focusing on the Essential Concepts before allowing students to select mathematics courses based on their interests in later grades. Schools

can work towards this suggestion by limiting the number of pathways they offer. If schools offer three different mathematics pathways, they can limit it to two. Schools could also offer more courses for the on-level pathway that can earn college credit, so students on the advanced pathway are not the only ones with this option. In addition to reducing the number of pathways, schools can wait to begin the different pathways for students. If schools begin tracking students in fifth grade, they can instead have students in a common pathway until seventh or eighth grade. While finding ways to de-track students can seem like a daunting task, schools can begin to take small steps towards reducing the inequalities produced from tracking policies. Teachers, administrators, and policymakers need to examine how they can best promote equity and support all students in their mathematics pathways.

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