

TRACKING IN MIDDLE SCHOOL MATHEMATICS

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STATEMENT BY AUTHOR

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TRACKING IN MIDDLE SCHOOL MATHEMATICS

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This paper is a review of research pertaining to the issue of tracking in middle and high school mathematics. More focus is given to middle school because this is usually where tracking begins in mathematics. It supports research on the rationale behind detracking our schools and moving towards heterogeneous classrooms. Research behind the psychological effects of tracking is also provided, along with how tracking can segregate our school systems.

There is a variety of research on the effect of tracking in mathematics. One of the most prevalent issues is how tracking is detrimental to the low tracked students. It not only affects their academic scores, but also their perception about themselves compared to their peers that are on a higher track. Likewise, research shows that detracking can slightly improve high achieving students that were in high tracked classes. Tracking has been at the center of debates in today's education and this paper will show the positive and negative effects that it can have on our students and communities.

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Chapter 1: Introduction

Whether or not to track students in mathematics has become a passionate topic for me. I have always believed in providing the best education for each child and have come to a crossroads in my teaching career. Does tracking provide each student with an optimal opportunity to succeed or not? Should students be grouped by ability or grouped heterogeneously? What will bring about educational equity and excellence for each child (Oakes, 1985; Casement, 2001; Burton & Pace, 2009)?

Throughout my middle and high school days, I was placed in the high track for mathematics. Mathematics came fairly easily to me and I was studious and always completed my work, which is what I believed the expectations were in the high track. I took pride in being placed in the high track, which increased my self-concept and self-esteem (Preckel & Brull, 2008). What I discovered in my graduate classes was shocking to me. I had a difficult time teaching simple concepts to classmates. I realized that I lacked the ability to work with others who did not have the same mathematics ability I did. I am convinced that throughout my schooling, I was not required to work with anyone else on a different “track” and believe that I would have learned the skills necessary to work effectively with people of different abilities if I was in heterogeneous mathematics classes, not tracked classes that I stayed in my entire school career (Schafer & Olexa, 1971; Tomlinson, 2006).

This paper examines the research about whether students should be tracked in mathematics, which usually begins in middle school. By thorough research, I will investigate whether tracking increases each individual’s mathematics knowledge more than a heterogeneous, mixed ability class.

Statement of the Problem

For some, tracking is the solution to individualized instruction for each student (Brewer, Rees, & Argys, 1995). Tracking enables teachers to teach at a consistent pace. Tracking appears to be an easy solution, but it is not a solution designed with success for all students in mind. All students deserve the best possible education and tracking does not provide that opportunity (Schafer & Olexa, 1971).

Research Questions:

1. Are the criteria used to track students fair and consistent for all?
2. How does tracking affect the low, middle, and high tracked students in mathematics?

Does tracking affect learning for the low, middle, and high track differently?

Does tracking affect one's self-esteem or self-concept?

Does tracking affect one's career opportunities after high school?

Does tracking affect teacher's expectations of their tracked students?

3. Does tracking affect the achievement gap between genders or minorities?
4. What are the alternatives to tracking students?

Significance of the Research Problem

Mathematics is a struggle for many middle students in America (Casement, 2001; Cogan, Schmidt, & Wiley, 2001). Every year, standards and expectations for mathematics increase and we continually have students that do not meet the standards. Our achievement gap continues to expand (Burriss & Welner, 2005) and students continue to be placed in mathematics tracks that end in multiple places. Learning is occurring on each track, but the track they are on will determine how much mathematics they will complete in their schooling (Schafer & Olexa, 1971).

Limitations and Assumptions

The author is limiting the research to middle and high school mathematics, with the focus on middle school. I will not include research on students with severe educational handicaps.

I am assuming that if tracking occurs in a school, there are three tracks: low, medium, and high track. I am assuming that all students can learn and the teachers and researchers involved in the studies are highly qualified, competent individuals that have the best interest of students as their priority.

Definition of Terms

Ability groups- grouping students according to their given ability, courses taken, and through recommendations (Yonezawa, Wells, & Serna, 2002).

Detracking- replacing tracked courses with mixed-ability, heterogeneous classes (Yonezawa, Wells, & Serna, 2002).

Heterogeneous groups-“mixed ability class” (Yonezawa, Wells, & Serna, 2002).

High level thinking- “critical, logical, reflective, metacognitive, and creative thinking” (King, F.J., Goodson, L., Rohoni, F., 1998).

Homogeneous groups- grouping according to past performances with similar students at the same ability (Bulgar & Tarlow, 1999).

Self-concept- the way a person assesses their ability in a given area/subject (Chiu, Beru, Watley, Wubu, Simson Kessinger, Rivera, Schmidlein, & Wigfield, 2008)

Self-esteem- one’s assessment of their personal value or worth (Chiu, Beru, Watley, Wubu, Simson Kessinger, Rivera, Schmidlein, & Wigfield, 2008).

Middle School- Grades 6-8

Tracking- grouping of students with similar abilities into the same classroom where instruction is provided at their pace (Mulkey, Catsambis, Steelman, & Crain, 2005; NASP, 2005; Chiu, Beru, Watley, Wubu, Simson Kessinger, Rivera, Schmidlein, & Wigfield, 2008; Yonezawa, Wells, & Serna, 2002).

Chapter 2: Review of the Literature

Summary of the Statement

The issue of United States students' mathematics scores being weak and unacceptable has been debated for several decades amongst professionals, parents, and students (Casement, 2001; Cogen, Schmidt, & Wiley, 2001). What must be done to improve our United States overall scores? One controversial solution has been to track students into homogeneous groups based upon their mathematical ability, which usually begins in middle school (Oakes, 1985). But is this beneficial to students' emotional, academic, and social needs? Does it benefit students on the low, middle, and high track? Is it widening our achievement gap? The following is a review of literature on tracking in middle and high school to answer these questions.

Criteria for Tracking

Students are tracked into mathematics classes in a variety of ways. The most common way is through standardized test scores. In addition to test scores, teachers usually recommend students to be placed in the high, middle, and low track based upon what they have observed in their classroom (Grossman & Aness, 2004; Lynn & Wheelock, 1997; Mulkey et al., 2005; Oakes, 1985). Sometimes, parents recommend where they would like to see their child placed (Mulkey, et al., 2005). Lastly, very rarely, students choose their track, depending on their school goals (Oakes, 1985).

Most students are tracked into their mathematics class by the time they reach middle school using the criteria above (Wheelock, 1992). But, research shows that the adolescent's brain is constantly changing and growing and that they each develop at different rates (Mulkey et al., 2005; Wheelock, 1992). John Lounsbury states, "The

education of young adolescents must, of course, be an integrated venture; physical, social, emotional, and intellectual development are intertwined and interactive. To rank one dimension above the others, to try to separate them out, is to misunderstand the nature of ten-to-fourteen-year olds” (Wheelock, 1992, p. 11). Middle school students are growing and changing at rates comparable to children from birth to three years old, but this is not just physically growing, but socially, emotionally, and intellectually growing and changing. Anne Wheelock (1994) also concludes that one’s extent of developmental change is more correlated to one’s academic challenges than ones natural born ability (Wheelock, 1994, pg 10-11). What if a student had a bad test day and that test determined his/her track for the rest of their mathematics career? What if everything “made sense” the next year? Could that student change tracks?

Once placed in a track, it is almost impossible to switch to another one (Mulkey et al., 2005; Yonezawa et al., 2002). In 1985, Sue Galletti, a middle school principal near Seattle, met with thirty of the most involved parents of their high track program. She began to explain the school’s process of selecting students, based on test and IQ scores. The parents soon realized how unfair it was to choose only twenty-five students for the high track, based on those criteria, when there were so many talented students in their school. They later decided to detrack, in an effort to provide fairness and equity for all students (Lynn & Wheelock, 1997). Overall, the criteria for tracking appears to be vague, inconsistent, and subjective, yet greatly impacts one’s academic track and future (Grossman & Aness, 2004; Lynn & Wheelock, 1997).

How Tracking Affects Low Track Students’ Learning

Students placed in low track math classes tend to have negative educational opportunities. They receive a slow, repetitive, watered down and unchallenging curriculum (Reed, 2008). This track usually has less content experienced teachers, fewer resources, and less required of them in class (Brewer et al., 1995; Chiu et al., 2008; Wheelock, 1991). For example, researcher Lorraine McDonnell (1990) and her colleagues discovered that 42% of math teachers with five years or less teaching experience teach the remedial, vocational, and general-mathematics classes, compared with 19% of those teaching in the pre-algebra and algebra classes (McDonnell et al., 1990). In addition, low track students receive less exposure to higher level thinking and questioning skills (Mulkey et al., 2005; Yonezawa et al., 2002). The majority of class time is spent copying material off the board and reviewing basic facts, which is opposite of what's done in the middle and high tracks (Reed, 2008). The majority of low track classes contain low income and minority students, which naturally segregates the tracks (Burns & Welner, 2005; Yonezawa et al., 2002). "Lowered expectations result in curriculum and instruction that not only reflects the economic poverty of students who are overrepresented in low-level classes but are likely to prepare students for a future of poverty" (Tomlinson, 2006, p. 31).

Jim Reisinger of Ponderosa High School in Parker, Colorado, taught twenty-four years of high school mathematics classes, teaching the majority of this time in the low track classes. He was not pleased with the academic results so he changed his teaching and began providing the same high track content to his low track classes. He received additional staff help, peer tutors, and offered extra support to students when needed. His

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results were a success, both academically and socially with his students. They had more confidence and self-esteem, along with better grades (Wheelock, 1992).

How Tracking Affects High Track Students' Learning

Students enrolled in high track mathematics classes are characterized as the school's best and brightest students. They tend to be independent, focused, competitive, and desire to get A's in all their classes (Reed, 2008). Teachers have extremely high expectations for high track students (Mulkey et al., 2005; Tomlinson, 2006), whom are usually academically recognized more often in school than low track students (Chiu et al., 2008). Once a student is placed in a track, they tend to stay there (Mulkey et al., 2005; Yonezawa et al., 2002). In addition, many high track students feel entitled once placed in the high track (Yonezawa et al., 2002) and have higher self-esteem than those in lower tracks (Butler, 2008; Mulkey et al., 2005; Preckel & Brull, 2008). They take pride in their work and have more rigorous classes, higher expectations for themselves, and more academic success than other tracks (Brewer et al., 1995; Mulkey et al., 2005; Reed, 2008; Tomlinson, 2006). Lastly, they receive more educational resources to assist them in their daily work than the lower tracks (Brewer et al., 1995). In conclusion, high track students benefit the most academically from tracking, compared to the lower tracks (Preckel & Brull, 2008).

In a study done by Franzis Preckel and Matthias Brull (2008), high tracked girls and low tracked boys were positively affected by tracking. But, low tracked girls and high tracked boys were negatively affected from tracking. They also discovered that students preferred same-sex comparisons, which might explain why females and males were affected oppositely when tracked (Preckel & Brull, 2008). Likewise, high track

students were negatively affected by tracking because they felt more insecure about their abilities, when being compared to the highest academic students each day (Mulkey et al., 2005).

How Tracking Affects Middle Track Students' Learning

Liora Linchevski and Bilha Kutscher (1998) did a two year study on an Israeli junior high school. All students were assigned to four mixed ability groups and two of the four groups were randomly chosen for the study. The two not chosen for the study taught their groups homogeneously. The other two were separated into three tracked groups: low, medium, and high. In total, there were three heterogeneous and two homogeneous classes. They gave two different pre-tests at the beginning of seventh grade (a homogeneous and a heterogeneous test) and gave two different post-tests at the end of eighth grade. The results showed significant achievement gains for the middle track students who were in the heterogeneous classes. Their average was 80%, compared to only 64% in the homogeneous class for the mixed ability test. For the same ability test, the homogeneous classes scored an average of only 41%, compared to 65% in the heterogeneous group. Therefore, heterogeneous grouping benefited the middle track the most. The low track significantly increased in the heterogeneous group class and the high track stayed academically high, with very little difference between homogeneous and heterogeneous groupings (Linchevski & Kutscher, 1998).

Self Esteem/Concept in Tracked Classrooms

The classroom climate in high, middle, and low tracks varies greatly. High track classes are more likely to have positive, engaging, cooperative atmospheres (Oakes, 1985). On the contrary, low track classes tend to be hostile, unfriendly, and

uncooperative. The middle track atmosphere was about an average of the high and low tracks (Oakes, 1985).

The majority of low track class time is spent addressing behaviors, instead of teaching them higher level thinking skills (Oakes, 1985; Reed, 2008). Low track students appeared to have lower self-esteem than the middle and high track students (Chiu et al., 2008; Mulkey et al., 2005; Oakes, 1985). Low track students also reported feeling left out, excluded, and struggled with peer and teacher interactions. They were more hostile, angry, and didn't enjoy class time. They didn't work well with their peers and had more negative interactions with their teachers than the higher tracks (Oakes, 1985).

The majority of high track students reported having positive self-concepts and felt respected by their peers and teachers (Mulkey et al., 2005; Preckel & Brull, 2008). They were more involved in classroom activities and desired to do well (Oakes, 2008). High track students reported having positive peer relationships and functioned like a team, working toward a common goal. Likewise, a significant number of high track students struggled with same track comparisons and felt like their ability, or lack of ability, was just as apparent in the high track as it was in the lower tracks (Preckel & Brull, 2008).

Donna Chiu and her associates (2008) performed a study involving 170 students and found that academic grades affected students' self-esteem, not the track they were placed in. Students in high tracks tend to get better grades, therefore, had higher self-esteem than low and medium track students (Chiu et al., 2008). "This loss in academic self-concept is of high practical concern because academic self-concept is one of the main predictors for academic achievement and learning" (Preckel & Brull, 2008).

Tracking has shown to negatively impact students' attitudes about school, which in turn,

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negatively impacts their achievement in school. Therefore, one's self-concept not only affects one's emotional and social needs, but also affects one's academic concept (Lynn & Wheelock, 1997).

Tracking & Career Opportunities

Tracking alters the mathematical opportunities that a student will experience in school. Because math courses are mainly taught in a sequential order in the United States, the classes one can and will take could be dramatically different from student to student, school to school, and state to state (Cogan et al., 2001). Students placed in the high math track in middle school take more advanced mathematics classes in high school than those in the lower tracks (Mulkey et al., 2005). They do better on standardized tests (Brewer et al., 1995) and are better prepared for college mathematics classes, which provides them with more career options that require extensive mathematics knowledge (Cogan et al., 2001). Therefore, one's academic career and future after school is affected by the courses one completes in high school (Cogan et al., 2001). Mathematical success in high school directly corresponds to academic success in college (Mulkey et al., 2005).

Lynn Mulkey and her colleagues (2005) did an extensive study of the long term effects of tracking in mathematics, beginning in middle school, through twelfth grade. They discovered that tracking in middle school not only affected the math courses that were taken, but also largely affected their self-concept. They found that those who took the high track classes in middle school, did indeed, take more rigorous mathematic classes in high school. Mulkey and her associates (2005) found females had lower self-esteem than their male classmates. Females in low tracks benefited the most from tracking and high tracked males benefited the least. They also found that high tracked

males and females were less likely to make concrete college plans, than those in untracked middle schools, because they felt less secure about their mathematical ability. In addition, they noted that those in high and low tracks had weaker self-esteems than students in untracked middle schools. Lastly, they found males in the high track academically outperformed the un-tracked participants, but struggled with social comparisons and self-concept. Therefore, the costs of tracking appeared to not only hinder the academic achievement of many, but also negatively affected their self-concept (Mulkey et al. 2005).

Teacher Expectations

Teacher expectations are directly correlated to the track a student is placed in. High track teachers expect their students to be highly motivated. They expect more independent work, higher level thinking, and expect to have very few behavior concerns (Oakes, 1985; Reed, 2008). Low track teachers expect to deal often with behavior issues, spend the majority of class time re-teaching basic, repetitive skills through board work, and expect little or no work to be done outside of school. Middle track students are expected to do more than the lower track, but not as much as the high track. Varying expectations result in not only frustrated students that have unclear overall expectations, but in the widening of the achievement gap (Oakes, 1985).

Jeannie Oakes (1985) conducted a study on 299 tracked English and mathematics classes. First, she studied the teacher-student relationship. She found that teachers were not openly positive or negative in the different tracks. Evidence did show that students in the high track felt more respected and did not get trivial work, compared to the low track. Higher tracks also spent more time with hands-on activities than the lower tracks and

appeared to have a more positive self-esteem. The middle track was almost an average of the high and low track students. Therefore, they found that teacher-student relationships were most positive in the higher track classes (Oakes, 1985).

Achievement Gap & Segregation

The rigor and mathematical content in the high track is more intense than in the low and medium track. Research by Brewer (1995), Oakes (1985), Linchevski and Kutcher (1998), and Reed (2008) shows that placing students in homogeneous classes, based on their ability, increases the achievement gap amongst students (Brewer et al., 1995; Oakes, 1985; Linchevski & Kutscher, 1998; Reed, 2008). There is a strong correlation between minority students and the low track (Brewer et al., 1995; Burris & Welner, 2005; Reed, 2008). Haycock (1999, p. 27) states that, “Low-income students are only about half as likely to be placed in algebra as other students.” They are also less likely to follow a college ready track (Haycock, 1999; Lynn & Wheelock, 1997).

Minority students are less likely to be placed in rigorous classes, which continues to widen the achievement gap across the United States (Cogan et al., 2001; Oakes, 1985). According to data compiled from a 1988 study of eighth graders by the National Education Longitudinal Survey, African American, Native American, Latino, and low income students were almost twice as likely to be in low track classes as white or upper-income students (Ingels et al, 1990). Tracking is widening the gap between the high and low tracks because high track students are being pushed to reach their potential and low track students are not provided the same expectations (Oakes, 1985).

Grossman and Ancess (2004) performed a study on a suburban school district in South Hills and discovered the district had a large achievement gap with minority

students. They found minority students were less likely to be chosen for the high track classes, which largely relied on teacher recommendations. The majority of the students interviewed believed their teachers and counselors did not encourage them to take more advanced classes, and minority students believed they were weak in math. After learning of these findings, the school district began to eliminate ability grouping in mathematics and began training their teachers on differentiation and responsive classroom (Grossman & Aness, 2004).

Alternatives to Tracking

One alternative to tracking students homogeneously in same ability classes is to group them heterogeneously in mixed ability classes. To be successful, heterogeneous classes require cooperative learning, differentiation, scaffolding, flexible grouping, additional peer and teacher support, and hands on learning (Lynn & Wheelock, 1997; Tomlinson, 2006; Wheelock, 1992). This high level of teaching involves extensive planning and time for the teacher(s). Because most educators are not experts in all of the methods listed above, additional support, research, professional and staff development, and most importantly, time, will be required to make this type of teaching successful (Gessner, 2008; Tomlinson, 2006; Watanabe, 2007; Wheelock, 1992).

Castle High School in Hawaii decided to experiment to see whether heterogeneous groups would be more successful than homogeneous groups. After one year, their heterogeneous classes had fewer absences than the homogeneous classes, 33% were rated “exemplary”, compared to 18% in the homogeneous class, and there were fewer discipline referrals in the heterogeneous classes. Similarly, at Wellesley Middle School, sixth and seventh graders were grouped homogeneously and heterogeneously and

assessed at the end of the year. Results showed that the majority of their low track students in the heterogeneous classes achieved at middle track level or higher after one year (Wheelock, 1992, p. 57-58).

In the 1990's, Rockville Centre School District in Long Island decided to replace their tracked classes with heterogeneously grouped ones, with hopes of improving their Regents diplomas. To receive this diploma, students had to pass two exams, which involved algebra and trigonometry. The problem with their tracked curriculum was that several students were not receiving algebra until tenth grade and needed to have it before ninth grade to pass the first exam. So, the middle school math teachers heterogeneously grouped their students and modified and condensed their curriculum, offering after school help four days a week for struggling learners. Their results speak for themselves. Ninety percent passed their first Regent's exam before starting their freshman year. Their regular education African American or Hispanic students' results more than tripled, from 23% to 75%. Asian American or white regular education students increased from 54% to 98% within two years. Not only was it an academic success, but teachers noted that students enjoyed the new curriculum, enjoyed their classmates, and were less disruptive than in their previous homogeneous groupings (Burriss & Welner, 2005).

In 1985, Sue Galletti, a middle school principal, decided to detrack their seventh grade high track math class. The school heterogeneously grouped the students, created an enriched and rigorous curriculum, and the high track teacher became a resource teacher who worked alongside the other teachers. The students enjoyed the new curriculum, had better attitudes and self-esteem towards math than the previous year, and the high track students excelled with their peers (Lynn & Wheelock, 1997).

In another detracking study, Yonezawa, Wells, and Serna (2002) studied ten detracking schools (four middle schools and six high schools). The schools gave students the opportunity to choose their classes, but not all students chose higher tracks. Several students in the study said they were not informed that they had a choice; others stated they were denied their choice or put on a waiting list by the counselor. Some students tried to move down to a lower track, but had to get permission from their parents to do so. Some low and middle track students could not get their “choice” because they lacked the hidden prerequisites. They also concluded that many low and middle track students hesitated to move to higher tracks, even when encouraged by educators and parents. Student had come to believe they were not “smart enough” to be in that class and/or feared being grouped with a different track of students who were not in their previous social groups. High track students and their parents consistently demanded the best classes and teachers. Minority students feared changing tracks and being the minority in the class. Overall, the study showed the detracking is helpful for some, but is unlikely to change the racial and tracking system overnight (Yonezawa, et al., 2002).

Another alternative to tracking is allowing students to stay in their assigned track and teach to the top, while providing the rigor, high expectations, and instruction that is found in the high track. Similarly, to be successful, all the strategies used in heterogeneous classes must also be used in tracked classes, which are difficult to implement (Tomlinson, 2006).

Research continues to show that high, middle, and low track students learn best while heterogeneously grouped, when accompanied by successful cooperative learning techniques (Vann, 1999). In a study performed by Linchevski and Kutcher (1998),

middle and low heterogeneously grouped students did significantly better than homogeneously grouped students. The high track students showed very little difference in their ability, depending on grouping (Linchevski & Kutscher, 1998). Oakes (1985) states that hundreds of studies have been done the past sixty years on homogeneous vs. heterogeneous grouping. Various students, grades, ages, and groupings were studied. The results differ in their specific findings, but one clear conclusion between them all is that “no group of students has been found to benefit consistently from being in a homogeneous group” (Oakes, 1985, p. 7).

Chapter 3: Discussion

Are the Criteria used to Track Students Fair and Consistent for All Students?

Research revealed in chapter two of this paper shows that the criteria used to track students were not fair and consistent for all students. What determined a student's track was controversial and subjective. Most schools tracked students by IQ and a standardized test score, but others used teacher recommendations, parent requests, and/or student requests. If a student was a poor test taker or had one bad testing day, their entire math track could be affected. One bad test day could result in a low track for their entire career. Or, one good test day could advance one's math career and provide greater opportunities for them. Recommendations were subjective to the person providing them, and therefore, not fair and consistent. As John Lounsbury noted above, we should not rank students by their intellectual development alone, but need to consider their emotional, physical, and social development as well (Wheelock, 1992). Therefore, tracking students based on their intellectual development alone during adolescence is not beneficial, fair, consistent, or in the best interest of all students.

How Does Tracking Affect Low, Middle, and High Tracked Students in Mathematics?

Based upon the research reviewed, tracking affected the low, middle, and high tracks in both positive and negative ways.

High track students have benefited the most academically from tracking (Preckel & Brull, 2008). Tracking enabled them to take higher math courses in high school and in college, which provided them with more career opportunities. Research showed that it benefited them academically, but not all were positively affected emotionally or socially. Some students had higher self-esteems from being in the higher track, but several

reported feeling less confident. They struggled with same track comparisons and the pressure of performing resulted in low self-esteem for a significant number of high track students. Teachers' expectations for the high track students appeared to be universally high in all the research. Their classes were extremely competitive, rigorous, and required high level thinking and cooperation amongst students. As Mulkey and her associates (2005) study showed, the high track students outperformed the untracked participants, but several struggled with self-esteem. Therefore, high track students were held to higher academic and teacher expectations. But, their career opportunities and self-concept appeared to be positive for some, but negative for others (Mulkey et al, 2005).

Research consistently showed how detrimental tracking was for the low track students. Low self-esteem, grades, and expectations were accompanied by increased behavior problems. Low track students felt inferior and less respected than high track students. They consistently had negative attitudes about school, which research has shown to negatively affect their academics (Lynn & Wheelock, 1997). Low income and minority students consistently filled the low track classes and were not likely to be in the high track classes. Research showed that few students were positively affected academically from tracking and that low track students did not receive many academic opportunities after high school. Student-teacher and peer relationships were less positive in the low and middle tracks. Teachers also expected less academically from these tracks of students, as they spent the majority of their teaching on remedial, repetitive material. As Oakes' (1985) study showed, the low track students felt less respected by their peers and teachers, had more behavior problems, and received more trivial work than the

higher tracks (Oakes, 1985). Overall, the low track was negatively affected in their academics, self-concept, career opportunities, and had low teacher expectations.

The middle track was positively and negatively affected from tracking. The majority of the research concluded that the medium track students performed better academically once they were detracked and placed in heterogeneous classes. Linchevski and Kutscher's (1998) study showed that the middle track students made significant achievement gains once they were placed into heterogeneous classes. Students received an average score of 80%, compared to only 64% in the homogeneous class for the mixed ability test. For the same ability test, they scored 65% in the heterogeneous groups compared to only 41% in homogeneous classes (Linchevski & Kutscher, 1998). The majority of middle track students had lower self-esteems, lower teacher expectations, and less career opportunities than high track students. They did have more teacher expectations than the low track, more career opportunities, but not necessarily more self-esteem than the lower track.

Does Tracking Affect the Achievement Gap or Increase Segregation?

Tracking negatively affected the achievement gap and segregation in several ways. Tracking dramatically altered what material was covered; students were not receiving the same high quality teaching in every track. An abundance of minority and low income students were placed in the low track, making the social disparity of minority and low-income students more visible (Reed, 2008). As stated in the 1988 National Educational Longitudinal Survey (1990), African American, Native American, Latino, and low income students were almost twice as likely to be in low track classes as white or upper-income students (Ingels et al, 1990).

Rockville Centre School District's study indicated that their minority students did significantly better once they were heterogeneously grouped. Their regular education African American or Hispanic students more than tripled their previous Regent's exam results, from 23% to 75% passing. Their Asian American or white regular students increased from 54% to 98% passing (Burris & Welner, 2005). Likewise, in the detracking study by Yonezawa and her colleagues (2002), the minority students feared changing tracks and many refused to switch to another track because they might fail or not fit in with the other tracks of students. Equity for all students, including one's race, income, or ability, was not apparent in the tracking process (Cogan et al., 2001).

What are the Alternatives to Tracking Students?

An alternative to tracking students homogeneously is to group students heterogeneously. Research concluded that this alternative was beneficial to all tracks of learners. The low and middle tracks benefited the most academically from heterogeneous grouping. Their scores went from low and average to average and above average. The students became an active part of the high learning environment with the high level thinkers that once were independent of them. The high track students showed no significant academic gains or losses when grouped heterogeneously (Linchevski & Kutscher, 1998). Students had higher self-esteems, better attitudes, and enjoyed being with all types of learners when grouped heterogeneously (Lynn & Wheelock, 1997).

Not only did students perform better academically when heterogeneously grouped, they also had fewer behavior problems. Castle High School noticed a drop in discipline issues after they switched to heterogeneous classes (Wheelock, 1992, p. 58). Rockville Centre School not only achieved more academic success once they switched to

heterogeneous classes, but teachers reported their students were happier, enjoyed the new curriculum, enjoyed their new classmates, and were less disruptive than in their homogeneous classes (Burris & Welner, 2005).

In an effort to group students heterogeneously, research shows that detracking is a very long, timely, and difficult thing to do. Several schools have detracked too quickly and had very negative experiences. It requires collaboration and rethinking of traditional teaching methods amongst administration, teachers, parents, and students. Researchers also found that once detracked, students have a difficult time releasing the stigma of the track they once were assigned. As stated in the study by Yonezawa, Wells, and Serna (2002), detracking was very difficult to implement and required collaboration from students, parents, staff, administration and the community. Even then, it is unlikely to change the racial and tracking system overnight (Yonezawa et al., 2002). Overall, research concluded that heterogeneous grouping benefited all tracks of students academically and socially.

Chapter 4: Conclusion

Author's Interpretation

Research consistently shows the criteria used to track middle school math students is not fair or consistent. Low and middle track students are not receiving high quality education or opportunities, low and middle track students perform better academically in heterogeneous classrooms, tracking increases the achievement gap, and all tracks of students struggle with self-esteem, no matter their track placement. So, why are students still be tracked in middle school?

A reason I believe tracking is still happening in middle school math classes is because it is extremely difficult and timely for teachers to successfully teach heterogeneous ability classrooms. Teachers are currently overwhelmed with large class sizes and their daily teaching duties continue to increase each year. The idea of changing one's curriculum and how they teach can appear to be a daunting task. The main problem I discovered in my research with heterogeneous groups was the amount of time, planning, and support teachers must have in order to be successful in this setting. Teaching in mixed ability classrooms is extremely hard and requires extensive knowledge of cooperative learning, differentiation, and flexible grouping. Research shows that the majority of teachers who received proper training and were supported by their colleagues, administrators, and community preferred heterogeneous grouped classes. Their scores increased and behavior problems decreased. If teachers are not fully supported or trained in how implement heterogeneous classes, they will not be successful. The majority of homogeneous classrooms have a universal lesson and assignment for all students. In successful heterogeneous classrooms, there can be differing assignments for students,

depending on their academic ability. This is overwhelming for teachers, unless they are properly trained on how to manage multiple assignments and abilities.

Another reason I believe tracking is still occurring in middle school math is because parents are advocating for their child to be in the high, or advanced track. Many parents believe their child is gifted and if they are placed in a heterogeneous classroom, their child will be bored and held back by the low ability students. But, research shows that all students in heterogeneous classrooms can be successful, no matter their academic ability. High track students are very slightly affected academically, whether placed in homogeneous or in heterogeneous classrooms, but low and middle track students make large academic gains in heterogeneous classrooms. So, why do parents still insist on a high track? Are parents the driving force behind tracking? These questions are beyond my research.

Lastly, I believe tracking is still occurring in middle school math classes because it is what many districts have been doing for decades. Change is extremely hard and research continually showed how difficult it was to detrack a school. Schools, teachers, administrators, parents, and students need to work collaboratively in order to successfully detrack a school. If school districts choose to detrack, I recommend extensive research of multiple districts that have successfully detracked. Research showed districts that included the students, teachers, parents, administration, and community in their detracking process, were more successful. Collaboration and extensive training, support, and time were key factors to successfully detracking a school. Change takes time. Educating everyone on why detracking is the best option for all students is also extremely important.

Because detracking is a political nightmare, some schools may choose to keep students in their tracks and to provide high track education for all students. Research shows how difficult this is for school districts to implement and how much time it takes to detrack. The problem with this is that you lose the heterogeneous group of students and the discussions and modeling that can occur in a mixed ability group classroom is not possible. Overall, heterogeneous grouping proved to be the most successful for all students.

Author's Experiences

The district in which the author works in is located in northern Minnesota. She works at a middle school with approximately 1100 students in grades 5-8. About 10% of the author's school consists of minority students. Forty-four percent of the students receive free and reduced lunch and 12% of the students are Special Education students. She currently teaches 6th grade reading, math, and social studies, with the majority of her eight years teaching 6th, 7th, and 8th grade math. She served as the math department head for seven years and participates in math trainings with teachers from neighboring districts.

Much of what the research indicates, she has found true in her teaching experiences. Her first teaching experience was with the low track students, not including special education students, in 6th and 8th grade. The classes were designed to assist the lowest 15 students in each grade, based on their math Minnesota Comprehensive Test Scores (MCA's). She found the students considered themselves to be the least smart students in the school and had very low expectations in class. She struggled to get them

excited about learning and began teaching them with high expectations. After several discussions with other colleagues, she was encouraged to lower her expectations and focus on remedial skills. As research shows, she was also a first year teacher with very little experience teaching the low track. After learning more about tracking through this paper, she would have done things differently if she was more educated on low tracks.

After this experience, the author moved to southern Minnesota for two years, and taught 7th grade math the first year. There were about 900 students in grades 5th-8th grade. Six of her seven classes were heterogeneously grouped, and one class was the low track class that included 30 students (15 special education students and 15 low track students, and one special education teacher). She enjoyed the heterogeneous classes and differentiated her lessons by providing three homework options, to meet the varying needs of her students. She gave a pre-test for each chapter, which determined the homework track they received for the first assignment of the chapter. All students were encouraged to try the harder track, but none were allowed to move down to an easier track, unless she agreed with their decision. One common, grade level test was given at the end of each chapter to assess their learning, along with several formative assessments throughout the chapter. MCA scores each spring confirmed the majority of students were positively affected through the heterogeneous class. Likewise, the low track class was a nightmare all year long. Her special education colleague, designed to be her team teacher, had no experience in math. Her colleague spent the majority of her time taking notes while she was teaching to try to learn the material and redirecting her special education students. Her colleague was unable to pull her students and teach them in smaller groups, as the administration had planned. The author provided a similar curriculum for this

class, but had a difficult time getting the students to do any higher-level thinking activities. Students continually said that they were the “dumb students in the dumb class.” They had low self-esteem, which was followed by a negative and low work ethic. As the research stated on low track teachers, she was an unexperienced teacher who found herself lowering her expectations as well. At the close of that year, the school decided to end this low track class, due to recommendations from the teachers.

Her next year was spent teaching 8th grade math in the same school. Five classes were heterogeneously grouped, and one class was the advanced, high track class. She taught the heterogeneous classes the same as she did the previous year and had great success in their MCA scores. But, her expectations for the high track class were much higher, coinciding with research reviewed. She provided a 9th grade curriculum for her 8th grade high track class and moved through the curriculum faster than she did in the heterogeneous ones. She noticed her high track students were more motivated, but lacked the ability to work with one another. She also observed a majority of her high track students were perfectionists and struggled with their self-esteem. They were extremely competitive with one another and wanted to have the highest grade on the exams. Parent emails and phone calls were common in the high track; they wanted to make sure their child was being challenged, but did not approve when their child received a low score on an assignment. Overall, she learned how different the student’s, parent’s, and teacher’s expectations were, depending on the track.

After that, she moved back to the school where she first taught for in northern Minnesota. This is her sixth year teaching sixth grade. The first three years she taught four sections of math and she currently she teaches two sections of math. Her math

classes have always been heterogeneously grouped. She teaches high level thinking to all students and differentiates her assignments with three levels of homework. She gives the same pre and post-test at the beginning of each new chapter or unit, which allows her to modify her instruction to meet the students' needs and abilities. Students are placed in a homework level, based on their pre-test score, but always have permission to move up to a more difficult level at any time. The majority of her student's improve their math MCA test scores each spring, and she attributes that to the heterogeneously grouped classroom. She uses flexible grouping in her classroom and observes the varying levels of discussion during their activities. Her lowest achieving students are excited to be in a regular classroom with their peers. Her high achieving students are continually challenged by the curriculum and work more successfully with others, compared to her homogenous class in 8th grade. The medium and low achieving students are exposed to higher level thinking and have positive self-esteem. She's had some of the top 6th grade students placed in her class and parents feared the students would not be challenged, but they discovered their child was challenged and working at a high level. She knows she has a wealth of knowledge to learn in order to successfully implement heterogeneous classes, and plans to continue researching and collaborating with other professionals. Overall, the author is blessed to be able to teach her students heterogeneously, even though the pressure to track them is coming from parents and administration. Students are tracked into math classes in 7th grade in her district, and she is hoping to keep the tracking out of the 6th grade, due to the success the students and the author are having each year. The research in this paper also affirms her passion to teach heterogeneous ability classrooms. Although

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it is very difficult to teach the heterogeneous classes, she believes it is the best option available for all of her students to succeed.

Suggestions for Further Research

Research shows that successful heterogeneous classrooms require extensive knowledge of cooperative learning, differentiation, flexible grouping, scaffolding, and much more. How much knowledge is needed? When are teachers considered successful in these areas? Are districts providing the support and training teachers need to be successful? If not, how will schools attain successful heterogeneous classrooms? I conclude that more research on this topic is needed.

If tracking is not beneficial to all students, how do schools successfully detrack? Research shows it takes time, planning, and collaboration by all involved. How long will it take to successfully detrack one's school, if the teachers need to be trained to teach in heterogeneous classrooms? More research is needed on this topic as well.

If schools choose not to detrack their students, but keep them in their homogenous track and provide high quality education for all students, will students be as academically successful as the heterogeneously placed students? Will there still be behavior and low self-esteem issues in the lower tracks, even though they are receiving higher quality education and higher teacher expectations? How will teachers provide higher level thinking to the low track students? Will there be any safety nets in place to provide students with the extra help or support students need? I did not find enough research to answer these questions.

How the Author Plans on Using this Research

This research has been extremely valuable to my math teaching career. My top priority as a teacher is to provide a high quality education for all, which tracking has not been shown to do in my research. Therefore, I plan on sharing my research findings with others that are debating whether to track or detrack. I also plan to use this research to assist me in my attempt to continue teaching heterogeneously in my 6th grade math classes.

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The reform without cost? *Phi Delta Kappan*, 77, 210-212. Retrieved September 27, 2009, from Wilson Web database.

This article goes through a study of high school math students to see if tracking affects test scores. They find that the low track students do worse on tests and usually have teachers that are not as qualified as the high track teachers. Likewise, students in the high tracks perform better, but also have more expectations and more experienced teachers. A concern to the authors is segregation in tracked students in ability, race, and class. There is a strong correlation between socioeconomic status and the low track. Therefore, is the 5 percent gain of the top track worth the 5 percent loss in the low track? If we want to close the achievement gap, detracking would be the answer.

Bulgar, S.A. & Tarlow, L.D. (1999, April). Homogeneous groups develop thoughtful

mathematics. *Mathematics Teaching in the Middle School*, (4), 7, 478-483. Retrieved September 27, 2009, from Wilson Web database.

This article focuses on the benefits of homogeneous groups and how they can create successful math activities. They studied students that were divided into 4 same ability groups and measured their success. The students did well working together and the lower students were excited to be included in the activity (usually sent to work in another

room), even though they struggled on where to begin their work. No definite conclusions on whether homogeneous is better or not.

Burris, C., & Welner, K. (2005). *Closing the achievement gap by detracking*. Retrieved July 30, 2009 from <http://epsl.asu.edu/epru/articles/EPSL-0505-111-EPRU.pdf>

This article is a study of how the achievement gap can be closed by closing the curriculum gap that is provided from tracking. Rockville Center School District was studied as they detracked their entire school and their results were astounding. They completed eliminated all low tracks and required all their students to take accelerated classes, with additional help and classes provide so all could achieve. They found that students rose to the expectations given to them and they had less behavioral issues in class when students were grouped homogeneously. This article will be useful for my research because it specifically discusses how detracking middle school math resulted in more students earning diplomas and higher grades.

Burton, D. & Pace, D. (2009, February). Preparing pre-service teachers to teach mathematics to inclusive classrooms: A three-year case study. *School Science and Mathematics*, (109), 2, 208-115. Retrieved September 27, 2009, from Wilson Web database.

This article shows how diverse our classrooms are, with multiple abilities and disabilities. The author focuses on how we need to have equity and high expectations for all students, especially students with special needs. This study measured how prepared pre-service

teachers felt to teach mathematics to students with special needs. They found that many teachers felt they didn't receive sufficient to teach comfortably to lower tracked students. This article will be helpful in stressing the importance of excellence in all math teachers, regardless of what "track" or level one is teaching.

Casement, W. (2001). Bright students, elite schools, and math that's too easy. *Independent School*, (61), 1, 50-60. Retrieved September 27, 2009, from Wilson Web database.

This article stresses that Americans struggle in mathematics, except for a small elite group of students. Our advanced children need to be challenged more because they get bored in class and lose interest in math. The author stresses that we need to have equity for all students and believes that ability grouping can be successful if used correctly...not leaving children out. We can't forget about late bloomers and varied growth spurts because that leaves tracking to be unethical. I will use this paper to stress the importance of differentiating instruction to meet the needs of all students, including the late bloomers.

Cogan, L. S., Schmidt, W. H., & Wiley, D. E. (2001). Who takes math and in which track? Using TIMSS to characterize U.S. student's eighth-grade mathematics learning opportunities. *Educational Evaluation and Policy Analysis*, (23), 4, 323-341. Retrieved September 27, 2009, from Wilson Web database.

This article also states that the United States performance in math is unacceptable. Studies on what mathematics courses are being offered to eighth grade students is done. The findings conclude that within schools and amongst teachers, a different curriculum is taught. How I teach algebra can be completely different than my colleague across the hall. They also state that tracking influences what a student learns and whether they are being prepared for future courses, including college, or not. This article will be used to confirm my findings that tracking dramatically effects the course one takes in life. I will also use it to discuss the importance of equity.

Chiu, D., Beru, Y., Watley, E., Wubu, S. Simson, E., Kessinger, R., Rivera, A., Schmidlein, P., & Wigfield, A. (2008, November-December). Influences of math tracking on seventh-grade students' self-beliefs and social comparisons. *The Journal of Educational Research*, (102), 2, 125-135. Retrieved September 27, 2009, from Wilson Web database.

This article is a study about math tracking in 7th grade and how it affects one's self-concept, esteem, and how they compare themselves to their peers. Research found that students tend to compare themselves more often between peers in their tracks than those outside of their tracks. In addition, there was no evidence to prove that low track students have lower self-esteem, but they do have a lower self-concept (knowledge of subject). This study also had limitations: only 59% of students participated and they did not have a low math class. Therefore, results from their study show that tracking is not bad for esteem or comparison amongst peers.

Grossman, F. D. & Aness, J. (2004, November). Narrowing the gap in affluent schools.

Educational Leadership, (62), 3, 70-73. Retrieved September 27, 2009, from Wilson Web database.

This article discusses the large achievement and minority gap that exists in most schools. They focus on mathematics. Three studies were done and in all three schools, the low tracked students were told they were not good at math by a teacher. They also tended to be minority students. One school offered a summer math class that allowed all minorities the opportunity to advance a class in the following year. The other studies detracked their schools and moved to heterogeneous grouping, in efforts to close the gap. This article will be very helpful in showing the requirements used to track a school, along with providing information on how minorities do in mathematics.

Haycock, K. (1999, April). Closing the gap. *Schools in the Middle*, (8), 6, 27-29. Retrieved September 27, 2009, from Wilson Web database.

This article discusses the achievement gap that we have in our schools and in math. There is a huge gap in math performance by low-income students and the majority of those students are placed in the low track math. The low track math teachers tend to have less education than in the higher tracks and those students tend to not take the higher math courses in high school or college. Teachers are challenged to expect high standards from ALL students, along with additional time to work, training for teachers, and clear goals for their students.

Linchevski, L. & Kutscher, B. (1998). Tell me with whom you're learning, and I'll tell you how much you've learned: Mixed ability versus same-ability grouping in mathematics. *Journal for Research in Mathematics Education*, 29, 533-554.

This article discusses the debate about mixed ability classes or same ability classes. A study was done and students were put into mixed and same ability 7th grade math classes and the results were very conclusive: high level students are not harmed (lower scores) when placed in heterogeneous classes. The low and middle track of students increased tremendously when placed in a mixed class compared to a same ability class. This article is very beneficial because it is a study about a 7th grade math class and I want to focus my research on tracking in middle school math.

Lynn, L. & Wheelock, A. (1997, January-February). Special issue on detracking: Navigating the political waters. *The Harvard education letter*, (13),1, 12-21.

This article discusses how parent play a huge and important role in detracking a school. Students were also given freedom to choose what classes they wanted to be in and many stayed in their same track because they didn't want to lose their peer group that they had for years. Ways to build heterogeneous groups are encouraged as well. This article will be used to emphasize the role that parents play in the success or failure of detracking.

Lynn, L. & Wheelock, A. (1997, January-February). Special issue on detracking: Making detracking work. *The Harvard education letter*, (13),1, 2-8.

This article discusses how to make detracking work in all schools. It explains that we need to have high expectations for all students and teach to the top, not the middle. Sue Galletti, a principal trying to detrack her school, discusses how important it is to use the right words when detracking, such as expanding programs, not eliminating programs. She also had parents come in and try to pick the students for an advanced class based on test scores and they discovered how unfair and difficult it was to pick and leave students out that were just as smart because only 25 could be in that class. Also, ways to change a curriculum are given, along with additional help and training for teachers and students. This article will be useful in providing ways to detrack and how to have the community involved in that process.

Oakes, J. (1985). *Keeping track: How schools structure inequality*. Yale University.

This book discusses the drawback of tracking students in school. Research is conducted and the results show that tracking decreases student's attitude about themselves if they are in a lower tracked class and increases one's attitude if you're in a higher track. Examples on how to teach heterogeneously are provided, along with a search for equity and equality in schools, regardless of one's ability. This book will be very beneficial in providing resources on how to increase students self confidence in math by teaching to the top and expecting more from every student.

Schafer, W. E., & Olexa, C. (1971). *Tracking and opportunity*. Scranton: Chandler Publishing Company.

This book researches the effects of tracking on students in the last several years. The authors suggest that schools are contributing to the unequal opportunity, achievement gap, segregation, and are decreasing the desire for our students to learn. The majority of the book is a study of the effects of tracking on student careers through high school. Some examples are the study of dropouts, participation in extra-curricular activities, and misbehavior in school. This book will be very helpful in proving that tracking effects the way students perceive themselves.

Tomlinson, C.A. (2006). An alternative to ability grouping. *Principal Leadership (Middle School Edition)*, (6), 8, 31-32. Retrieved September 27, 2009, from Wilson Web database.

This article discusses how teachers usually have lower expectations for the lower tracked students and higher expectations for the high tracked student. But, we need to strive for equity and excellence at all levels. The author suggests differentiating students in heterogeneous classes and teaching to the top, not the middle, so that all students have the opportunity to be challenged by one another and themselves. The main issue is whether educators will take the time to try something new that benefits all students: heterogeneous groups, differentiation, and flexible grouping. This article will be very helpful in stressing that heterogeneous groups help all students, not only a few.

Vann, A. S. (1999, January). The pros and cons of math ability grouping. *Principal*, (78), 358-59. Retrieved September 27, 2009, from Wilson Web database.

This article provides pros and cons for ability grouping in math. Studies show that high tracked students do better, but low achieving students perform better when they are in a heterogeneous classroom because they are exposed to higher level thinking and questioning with their peers. No conclusion is made on whether to track or not by the author. I will use this article to stress that low level students need to be exposed to the higher level thinking in a heterogeneous classroom.

Wheelock, A. (1994). *Alternatives to tracking and ability grouping*. American Association of School Administrators.

This book goes through the problems that have resulted from tracking students and how we need to change our teaching and stop tracking. There is a focus on high expectations and outcomes for all students, multiple solution paths, inclusive learning, and additional coaching and training to help students and teachers can their thinking, teaching, and learning. Lastly, parents, community, and schools are all need to be on board to fully detrack and change our schools. This book will be very helpful as I write out the steps for detracking middle school math in my research paper.

Wheelock, A. (1992). *Crossing the Tracks: How "untracking" can save America's schools*. New York: New Press.

This book provides a wealth of activities and suggestions that educators can use to detrack their schools. It provides multiple strategies to discuss detracking with parents, principals, and the community. Multiple representations and teaching to the top allows detracking to work, along with promoting unity for all students, regardless of ability, race, or status. This book provides a wealth of activities to detrack all classes, especially math, so it will be very beneficial to my final paper.