# Equitable teaching and learning: tracking and detracking of Mathematics for Minority and Low-socioeconomic students

Joselyn Hathaway

UW-Madison

## Abstract

Many science, technology, engineering, and mathematics (STEM) classrooms are faced with a common issue; lack of involvement from minority and low-socioeconomic students. Not only are these students not participating in STEM, but they are not receiving as much support when it comes to pursing STEM as an option for higher education or as a career. A major part of this pattern starts with a system used by many schools called tracking. "In the US, it has become obvious that tracking is causing inequality in students' mathematics levels" (Holm, 2013). Based on my findings, there is currently a presence of bias and discrepancy when involving minorities in not only mathematics, but STEM as a whole. The first step to addressing these issues is to evaluate current systems, interventions, and resources that are in place in schools. Also, other factors that will be discussed include parent involvement, peer influences, outside and additional influences, and educational collectiveness.


*Keywords:* tracking, stem, minorities, low-socioeconomic, inclusive teaching

## Introduction

Coming from a county that is known as a low-socio economic area, I have been around students that are minorities, like myself, and those who are considered to be in high poverty. I believe what has influenced my research topic was being able to go back into the same school district I attended, and observe the students. I did notice that there was a distinction between the separation of students based on how "smart" the teacher believed they were and how they viewed their capabilities. There were students who were considered "low performing" and were pulled out of class and taught differently. This included less work, shortened lessons, and isolation from the class as a whole. One promise that I have made to myself as a future teacher is to create a teaching environment that is inclusive of all students. Instead of labeling students based on how "smart" they are, it will be beneficial to recognize all of their individual talents and strengths, and build on them in the classroom. In order to do this, teaching should be inclusive of all students and classrooms should be detracked.

"Tracking is the most commonly used term for ability grouping, the practice of lumping children together according to their talents in the classroom. On the elementary level, the divisions sound harmless enough: Kids divided into Bluebirds and Redbirds. But in the secondary schools, the stratification become more obvious"…"as students assume their places in the tracking system" (Editorial, 2004). Children's' tracking begins in the lower grades of elementary school and builds as they progress through middle and high school. Based on the formal definition of tracking, the system of tracking communicates and supports the idea of discriminating and segregating students. This can be very contradictory to fact that many schools and classrooms communicate that settings are to be inclusive of all students and as least restrictive as possible. Tracking does have a few benefits such as "…it comes in different forms

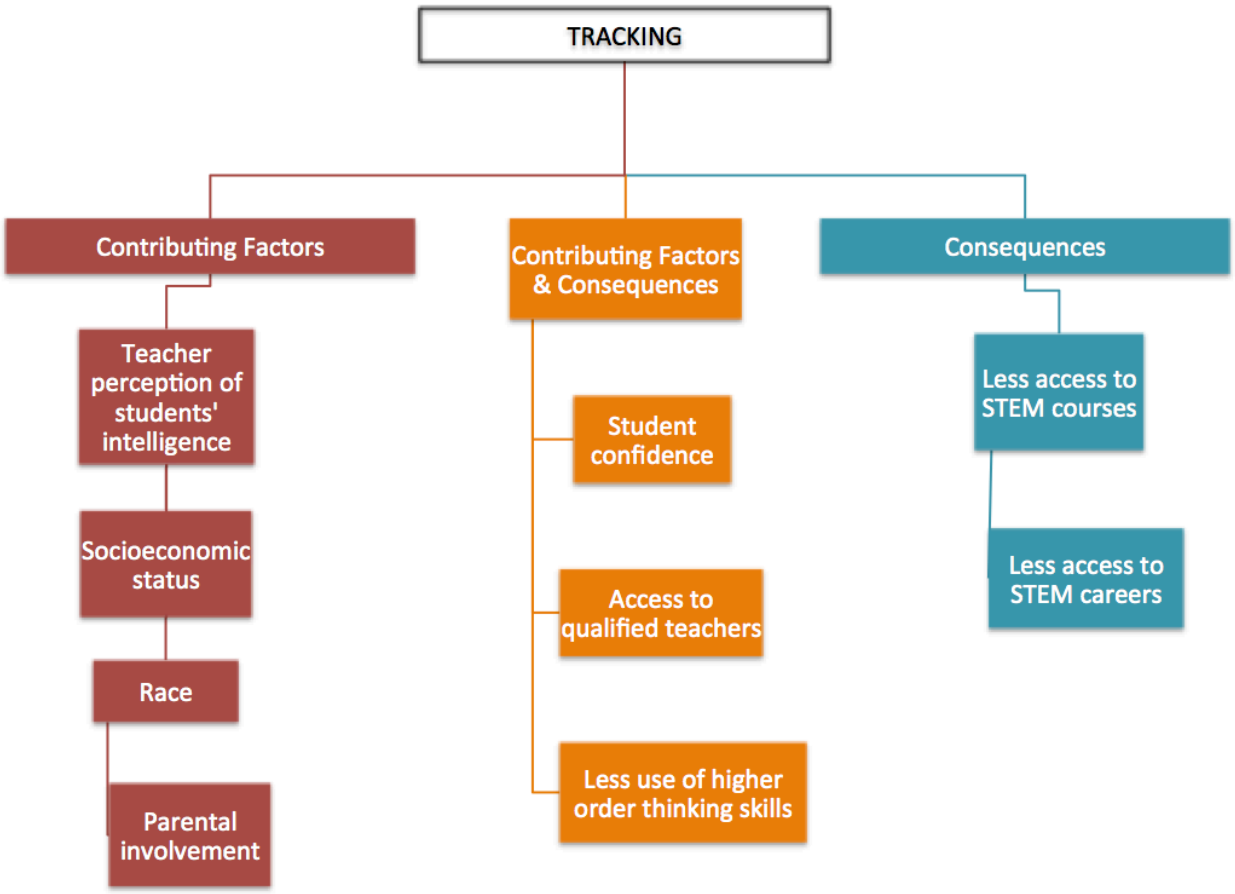
meaning there is no specific way of using the tracking approach," … "it allows teachers to modify their lesson in order to satisfy their students' ability level," … "it allows students' to receive targeted instruction, and it allows students to be placed in classes for their strengths and weaknesses" (Barrington, 2018). The problem that arises is that the tracking system is affecting students, primarily minority and low-socioeconomic, when they reach the secondary education level.

When students are being placed on an academic track using tracking, it has been noticed that a majority of minority students are being placed on lower tracks than their peers. The group of minorities includes a variety of ethnicities such as African American, Hispanic, and Native American. There are three ways that the tracking system is limiting as it relates to minority and low-socioeconomic students: "1) the students are receiving the teachers that have the least experience, 2) the students are assigned to a lower track (presumably intentionally), and 3) the students are assigned to tracks when ability is not fixed, innate, unidimensional, or easily assessed" (Watanabe, 2012). An obvious concern from the three points mentioned is that these students are being placed on a track without being fairly evaluated. Some of the students could very well be capable of being placed in a higher, faster paced track but due to their background they are not allowed that opportunity. Given this information, the purpose of this study is to evaluate all possible factors, including tracking, that contribute to the lack of inclusion and participation of minority and low-socioeconomic students' in STEM.

Research Question 1: Which types of students are placed on a lower/higher paced track than other students? Are they still placed that way today?

Research Question 2: How can teachers as educational facilitators influence minority and low-socioeconomic students to participate in detracked STEM classrooms?

**Conceptual Framework**




My theory on tracking is that it is a system used to categorize children, of school age, based on where administrators and teachers feel their students' academic abilities lie. Tracking segregates students, which is closely related to why minorities and low-socioeconomic students do not benefit from this system. The system is primarily meant to benefit those students who are higher performing, from high-socioeconomic areas, and not a minority. This is an issue because the separation of students can affect the environment as a whole and alter the quality of

education that minority and low-socioeconomic students are receiving. The main subject areas where negative effects are being seen are in all STEM classrooms, but mainly with mathematics. These subjects are where you can see there are less and less minorities being included and involved in the classroom, higher education, and careers. Along with the involvement of school administrators and teachers, parents are also a contributing factor to their children's' progress in school. It is common that support from home can play a role in how well a student performs in the classroom. In order for the student to be successful overall, it takes assistance from more than just school. Parent involvement is more commonly seen from those parents who are of higher socioeconomic status. In order to have more minority students active and succeeding in school and not falling victim to tracking effects, support from more minority parents is a necessity. As a side note, the single arrows pointing toward tracking are factors that contribute to the system, the single arrows pointing away from tracking are consequences due to the system, and the double ended arrows represent both contributions to and consequences of tracking.

## Methodology

My approach to this research project was based on literature reviews, reading articles, and prior knowledge. Even though my research does not include self-derived data, there has been literature that supports the claims and statements of my research topic. Another method that I have used is looking for gaps in the literature. Basically, before I read any literature I came up with research questions that were related to my major topic. My goal was to not only have my questions answered, but also see if there were other questions that may surface during my research. A third method was to address my views on tracking, and communicate why I am against the use of this method schools. It was not only important to express my disinterest in

using tracking, but to find resources that supported detracking and the benefits of this for students. It was important for me to find a detracked school and communicate that the change would be for the better. Also, I approached the research with a mindset of collaboration. Not only did my findings focus on students and the schools, but also collaboration and communication amongst parents, administrators, and the community as a whole.

## Literature Review

### Research Question 1: Which types of students are placed on a lower/higher paced track than other students? Are they still placed that way today?

Tracking can be known as an indirect way of segregating students and is based on what the teacher or facilitator believes is the students' academic ability. In a way, the system is labeling students as if some are "smarter" than others. This is a disadvantage to those students who may perform well artistically and not as well mathematically. A major concern that many people do not recognize with tracking is which types of students are being placed on lower tracks and vice versa, which students are being placed on higher tracks. According to research, there have been and still are many accounts of bias as it pertains to which classes students are placed in. In the 1980's, Jeannie Oaks came up with a theory highlighting how students are placed while using tracking. She proposed "many low-income and minority students were placed in lower tracks even when it wasn't a reflection of their academic abilities" (Barrington, 2018). It is not only the schools that are encouraging the segregation, but some of the parents as well. Many people, including parents, of those children who have been placed on higher tracks are opposed to a detracked classroom because they "fear that the transition to mixed-ability may hurt gifted and other high-achieving students who have done well in an accelerated program" and "do

not want to see their children's progress slowed down, as they perceive it would be, in order to accommodate slower learners" (Editorial, 2004). This seems to be an invalid argument due to other research that has contradicted the concern of students learning slowing down because of other students.

The major concern with tracking is not at the elementary level, but the secondary level. This is when students are older and able to identify that they are in a different class than their peers. This is primarily bad for students on lower tracks because seeing the difference in educational resources and materials "may cause those students to self-label themselves as inferior to upper track students" (Barrington, 2018). Schools are supposed to provide an environment that is as least restrictive and nondiscriminatory as possible, but tracking is allowing schools do the complete opposite.

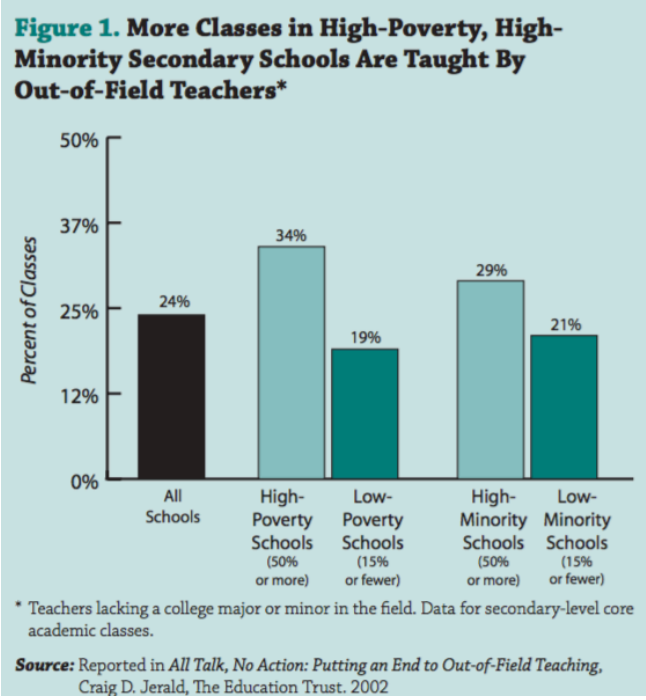
**Teacher Quality and Shortchanging of Education**

The quality of teachers that are in place in schools of high poverty versus low poverty have shown a distinct difference. Content-based teachers, meaning those who specialized in a specific subject such as mathematics, have some criteria that are placed on them in which they should have fulfilled in order to be considered a quality teacher. The four main criteria to look for are: "1) full certification, 2) content major, 3) content minor, and 4) teaching experience of three or more years" (Akiba, 2007). When you look at these four criteria, it doesn't seem like much until you compare teachers in low-socioeconomic schools and high socioeconomic schools. Research has proven that teachers in low-socioeconomic schools are less qualified than those who are not in those areas. When teachers are being hired for positions that require a significant amount of knowledge, especially science and mathematics courses, they are supposed

to be “highly qualified”. According to No Child Left Behind (NCLB), “highly qualified” is defined as “ fully certified, possessing a bachelor’s degree, and demonstrating competence in subject knowledge and teaching” (Akiba, 2007). The problem within high poverty schools is that they are not meeting the definition of having quality teachers.

A study done by Haycock and Peske (2018) evaluated the distribution of teachers in high poverty areas to those in low poverty areas to prove that students in high poverty are being shortchanged. Schools from three of the biggest cities were evaluated in their research: Cleveland, Ohio, Chicago, Illinois, and Milwaukee, Wisconsin. They compared the differences between the level of qualification of teachers in high-poverty and low-poverty areas and found distinct differences. They also compared the distribution of the quality of teachers in the U.S. Their results showed that students who needed higher qualified teachers were given teachers of the exact opposite; under qualified and not familiar to the content. When the data was analyzed, they found that “children in the highest-poverty schools are assigned to novice teachers almost twice as often as children in low-poverty schools. Similarly, students in high-minority schools are assigned to novice teachers at twice the rate as students in schools without many minority students.” The findings in Figure 1 compares all schools collectively that have out-of-field teachers and how minority and low-socioeconomic students are receiving more out-of-field teachers than the other students.

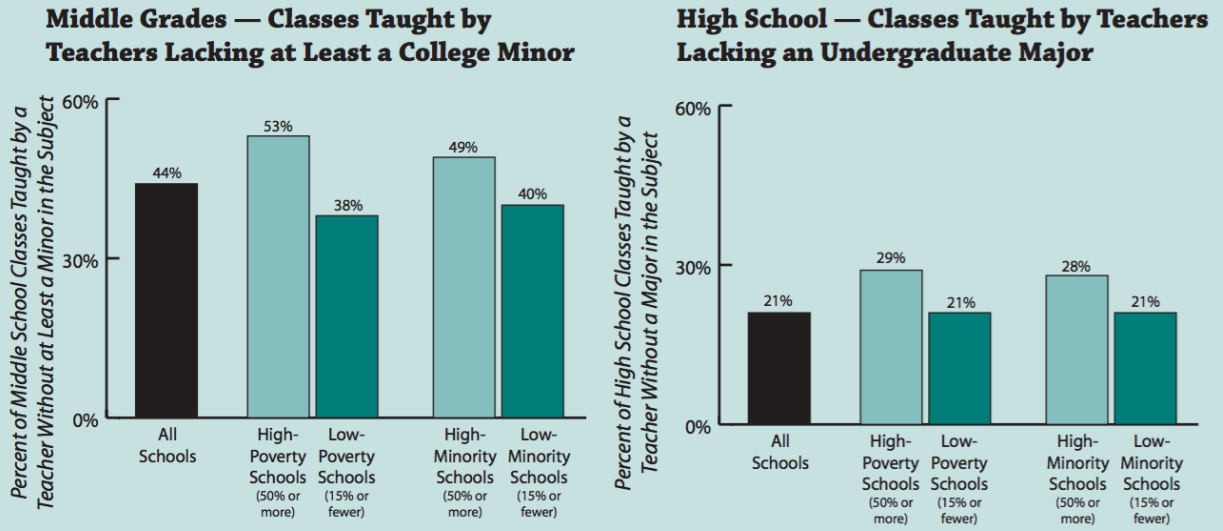
Figure 1: Out-of-Field Teacher Rates




When the data from figure 2 is broken down into middle school and high school, the results are more significant in middle school. "In high-poverty and high-minority middle schools, about 70 percent of math classes are taught by a teacher who does not even have a college minor in math or a math-related field" (Haycock&Peske, 2018). Figure 2 compares how there are more out-of-field teachers at the middle school level and how the pattern of less qualified teachers in high poverty areas still holds. The fact that there are fewer in-field mathematics teachers is concerning, considering that middle school is when students interest in mathematics and related classes either peaks or falls.

Figure 2: Teacher Qualification

**Figure 2.**




**NOTE:** Figures are for core academic courses only.

***Source:*** Reported in *All Talk, No Action: Putting an End to Out-of-Field Teaching*, Craig D. Jerald, The Education Trust. 2002

The results from both figure 1 and figure 2 can collectively be given the name "industrial school" from Jeanie Oaks in the 1980's. Her term suggests "upper-class students received more educational opportunities while lower-income students were funneled into vocational programs and given limited educational opportunities" (Barrington, 2018). If you consider the results from the study on the schools in Ohio, Illinois, and Wisconsin, this statement is highly true.

**Research Question 2: How can teachers as educational facilitators influence minority and low-socioeconomic students to participate in detracked STEM classrooms?**

**Parent Involvement**

The topic of how a parent is defined as "involved" in their childrens' education can be a touchy subject considering there are different situations between students' home life. There are some factors to consider when thinking about parents involvement in schools such as how the parents are perceived, availability to attend schools functions and meetings, defining what

"caring" means, communicating the importance of education, how teachers view parent involvement, and parents stance on tracking. "A challenge for educational systems is to seek collaboratively a process that increases parent involvement and effectively contributes to their child's success. Moreover, it becomes an ethical issue for educators to operate with a policy of high parental inclusion, for example, integrating all socio-economic, racial, and ethnic groups" (Sheppard, 2007). Basically what the statement is saying is that an underlying issue is getting more parents involved who are not white or Caucasian. According to Sheppard (2007), parents are responsible for their children's education. This is linked to the idea of "child-rearing" which means children follow and mimic what they see. For example if a young child sees their parent reading a book, they may begin the same behavior with a picture book.

One of the major misconceptions about minority parents is that they are not as involved as other parents, leading to an ethical issue of parental involvement in schools. A study done in Coffeyville, Kansas by Sheppard (2007) proved this misconception wrong by discussing how minority students' parents stay involved in their children's education. This study focused on Native Americans and African Americans. From the data he collected, he found six important pieces of information: 1) Native American parents identified involvement strategies to improve their child's education, 2) African American parents believed there were issues related to minority relationships within the school and community, 3) Native American and African American parents set expectations for their children, 4) Native American and African American parents expressed pride in their children's accomplishments, 5) Native American and African American parents linked family values to their role and responsibility as a parent, and 6) Native American parents linked teacher care and respect for their child to child's success. His results

showed that minority parents are involved with their children's education, but in a different way. They show their support through home values and motivation.

Sheppard (2007) stated that there is a growing emphasis for parents to be involved and participate in school functions, but it is difficult due to the diversity of families' lives. There can be a common misconception of parents' when it comes to their involvement in school activities and their children's' education. Parents are perceived differently due to how much they are "involved" in the school. Being an "involved parent" does not mean attending all of the school meetings such as the Parent and Teacher Association (PTA) meetings. They can be easily be part of their child's education outside of the school through showing support at home by helping with homework and projects. In order for teachers to ensure parent involvement, they should be aware of assumptions made about how involved a parent is and also become aware of the stereotypes placed on parents such as labeling them as not "caring" enough about their child's education.

## Teaching Inclusively

### *Closing Achievement Gaps: Goals for the Mathematics Classroom*

A major strategy for reducing and closing achievement gaps in mathematics is to focus on collaboration in schools to create an effective learning environment. This is an essential part of the book Mathematics for Equity by Nasir, Cabana, Shreve, Woodbury, and Louie. In a section in their book, Building and Sustaining Professional Community for Teacher Learning, the main idea is to create a setting that allows teachers to communicate as a team and work together to produce the delivery of a quality and inclusive lesson. The four key practices mentioned include: "1) doing math together, 2) working on "groupworthy"

department goals together, 3) distributing leadership, and 4) attending hiring and new teacher induction" (Nasir et al, 2014).

*Cultural Responsiveness*

**"**Culturally responsive teaching has been defined as an approach to teaching that uses students' cultural knowledge as a 'conduit' to facilitate the teaching-learning process" (Ukpokodu, 2018). A conduit can be defined as a channel or tube that connects one place or object to another. In terms of being a culturally responsive as a teacher, this means making connections with your students. This is important for all students, but it becomes very essential when working with minority and low-socioeconomic students. For these students, it can be more difficult to see the importance of a topic when they have not been exposed to the material. In order to keep their interest, having lessons that are relevant to their background and living area are highly essential. In an article by William F. Tate, he discussed that there has been a pattern in teaching mathematics to urban students. The pattern was "based on linear and dualistic thinking (right or wrong, one correct answer)"…"and views the teaching and learning of mathematics as solely objective and culturally-neutral"…"These conceptions and practices in mathematics do not meet the learning and problem-solving styles and process of most urban students and have immensely contributed to their low motivation and lack of interest and success in mathematics learning" (Ukpokodu, 2018). Changing the way teachers communicate mathematics to their students can change the students' perception of the subject, their willingness to participate, and the outcome of their success in mathematics. Ukpokodu (2018) also discusses five key methods to being a culturally responsive teacher: 1) belief in the learnability of students and their capability to do rigorous and high-level mathematics (high expectation), 2) providing

instructional scaffolding that supports student success, 3) knowing and caring about students; positive-student interaction and relationships in a learning community; promoting cooperative, collaborative and collective learning, 4) contextualizing teaching and learning by connecting what is taught to students' lives and communities, and 5) engagement in equitable and social justice practice; integrating students' culture into the official curriculum.

*Sensitivity*

Cultural sensitivity means recognizing the diversity of students in the classroom and honoring the diversity. This means considering "students' language, culture, and community as assets rather than liabilities and recognize that all racial/ethnic/cultural groups have contributed to our common mathematics knowledge base. These teachers increase the cognitive level of interactions with students of color using diverse and flexible assessments to determine students' strengths" (Holloway, 2004). Teachers who express cultural sensitivity are able to modify their lessons so that all students feel included. Another way to be culturally sensitive that many people do not recognize is being culturally sensitive when collaborating with parents and the community. In order to have a collaborative learning environment, teachers have to be culturally aware meaning understanding how other cultures function and communicate. Also, being able to efficiently communicate with other cultures will aid in raising awareness for minorities in mathematics.

*Curriculums*

Changing curriculums to satisfy all students can be slightly more complicated and requires advanced thought and planning. In a school that uses the tracking system, the system

separates the curriculums by high or low track. Instead of using high and low paced curriculums and having a more inclusive track, schools can create a more rigorous curriculum. Adjusting the rigor will encourage student derive questions and use higher order thinking skills. Increasing the rigor can be positive because it allows for more student feedback and gauges student understanding in the classroom. Another point to consider is culturally relevant curriculums. This is similar to the previous section on cultural responsiveness. According to Holloway (2004), the National Council of Teacher of Mathematics (NCTM) lists six principles that can be used during curriculum reform: 1) high expectations for student, 2) a coherent curriculum of important mathematics, articulated across grade levels, 3) teachers who understand what students need to learn and then challenge and support them, 4) instruction that builds new knowledge from experience and prior knowledge, 5) assessment that supports learning and provides useful information to both teachers and students, and 6) technology that influences the mathematics taught and enhances students' learning. Implementing these six principles is said to increase equity while teaching. In a study done in a Pennsylvania school district, when the regular curriculum was implemented, "…less than one third of minority students met or exceeded the skill standard of a reference exam. With the new curriculum in place, more than 50 percent of the minority students met or exceeded the standard. This standard concluded that to ensure improvement in mathematics instruction, schools must provide a high-quality curriculum, a stable, knowledgeable, and professional teaching community, and high-quality assessment aligned with the curriculum" (Holloway, 2018).

### *Expectations*

When people first hear the word "expectations", it is the natural assumption that it is implying the expectations that teachers have for their students. However, this is not always the case. The first level of expectation does focus on what the teacher expects from the students. This means they establish goals and criteria for their classroom. It also includes expecting the students to be active, collaborative, respectful, motivated, and supportive toward themselves and their peers. A second level of expectation is what the students expect from the teachers. It sounds uncommon for students to have expectations, but when the students enter the classroom they are following the lead of the teacher and planning to learn from him/her while they are in the classroom. The third level of expectation is what parents expect from the teacher. It is ideal that parents' stay involved in their childrens' education in order for them to ensure success. This means that parents communicate what they envision for their child to be successful. A fourth level of expectation is what the teacher expects from the parents. Teachers should keep in contact with parents and create an effective environment for expressing any concerns and methods for success not only in the classroom but at home as well. All of these levels together create the main idea of a collaborative and communicative environment for the success of students in the classroom.

## Conclusions

Overall, my research shows literature and previous research that supports my claim that schools should have detracked settings. There are still statements that support why to use a tracked setting, but other research proves that detracking is an effective alternative method that is inclusive of all students. The research shown also shows that there is a need for higher quality teaching of minority and low-socioeconomic students. In order to do so, it is going to take a

community effort. As mentioned before, minority students look for people who look like them. With this in mind, there is a need for more support of teachers of color to join the education field. This will be beneficial for students because they will have someone teaching them that can relate more to their cultural background. Along with these observations, there were also implications and limitations to my research.

**Implications**

My implications are not only focused on my views personally, but those that apply to others discussed in my research such as teachers, administrators, and parents. My main personal implication is based around my research; raising awareness of tracking as it relates to minorities. Throughout my research process, I was able to broaden my knowledge on what tracking is, and why it is so important for schools to transition to detracked classroom to benefit minorities. I knew that minorities and low-socioeconomic students in mathematics was rare, but when it relates to the schools I did not know that there was such a distinct difference in the quality of education that they are receiving compared to their non-minority peers. After realizing this, it became important for me to be able to express the benefits of detracking in schools to become more inclusive of minorities and low-socioeconomic students in the mathematics classroom.

The first implication for both administrators and teachers is that the policies should be written in a way that encourages making detracking successful. If the intent for schools is to be inclusive of all students, their policies should mirror that and be applied to the classroom. Another implication is for administration and teachers to include parents and raise awareness of changes in the classroom. In order for the process of detracking to work and be efficient, it takes a group effort and constant collaboration. This also means that when communicating with

parents and faculty, everyone should have the chance to explain their understanding as well as listen to others in the group as well.

### Limitations

One of the limitations to my research is that I did not work with data. My research was solely based on literature reviews, so it took a lot of reading and analyzing of passages. Also, I would have liked to been able to collect data in the form of surveys. If I had done a survey, it would be based on parents, teachers, and students opinions on tracking. As I was going through my research process and talking with other people about tracking, I received supporting and against stances on the matter. I think it would have been beneficial to see why people believe students should be placed in a tracked or detracked setting. I would have liked to discuss some of the statistics and see if the persons stance on tracking changed or stayed the same.

## Future Work

In the future, I can see my research going further in the sense of collecting data. The first goal that I have for this research project is to create a survey for parents, teachers, students, and administrators that will address their stance of having a tracked classroom or a detracked classroom. As I spoke with various people on my research topic, I noticed that I received feedback that both showed and did not show support for tracking in classrooms. It would be very interesting to expand the conversation to others that are the school system or have children in schools that use tracking. I could also take the survey a step further and provide a post survey. This survey would be given after having a conversation about my findings from my research.

This would be a very beneficial conversation for minorities and their families since that is where the resources are lacking. Having the pre and post survey would provide me with a way to compare others thoughts on the matter before and after knowing the consequences of having students in a tracked classroom. Another goal for the future would be to influence schools with the idea of doing a trial run of a detracked classroom. The data collected would compare student success rates in both settings and provided the teachers, administrators, and parents a reference to the benefits of transitioning to a detracked classroom. This would also show how coming together as a community and forming connections provides support from all directions.

**Acknowledgments**

I would like to thank the University of Wisconsin-Madisons' School of Education for providing the space to conduct research that will benefit future educators, such as myself. Also, I would like to thank the Summer Research Opportunity Program (SROP) and the Summer Education Research Program (SERP) staff for accepting me as a scholar for the summer and providing funding and a wonderful learning environment. Another massive thank you goes to my faculty Advisor, Dr. Nicole Louie, for her expertise in the education field as a teacher veteran. Without all of these knowledgeable faculty and staff, my progress would not have been possible.

**References**

Akiba, M., LeTendre, G., & Scribner, J. (2007). Teacher Quality, Opportunity Gap, and National Achievement in 46 Countries. *Educational Researcher*, *36*(7), 369-387.

Barrington, K. (2018). The Pros and Cons of Tracking in Schools - PublicSchoolReview.com.

Brown, F., & Hunter, R. (1998). School-Based Management. *Involving Minority parents in shared decision making*, *33*(1), 95-122.

Editorial Projects in Education Research Center. (2004). Issues A-Z: Tracking. *Education Week.*

Estrada, M., Burnett, M., Campbell, A., Campbell, P., Denetclaw, W., & Gutiérrez, C. et al. (2016). Improving Underrepresented Minority Student Persistence in STEM. *CBE—Life Sciences Education*, *15*(3).

Haycock, K., & Peske, H. (2018). Teaching Inequality: How Poor and Minority Students Are Shortchanged on Teacher Quality - The Education Trust.

Holloway, J. H. (2004). Closing the Minority Achievement Gap in Math. *Educational Leadership*, 61(5), 84-86.

Holm, A., Jæger, M., Karlson, K., & Reimer, D. (2013). Incomplete equalization: The effect of tracking in secondary education on educational inequality. *Social Science Research*, *42*(6), 1431-1442.

Nasir, N., Cabana, C., Shreve, B., Woodbury, E., & Louie, N. (2014). *Mathematics for Equity*. New York: Teachers College Press.

Sheppard, D. (2007). *Understanding how highly involved minority parents sustain their involvement in their child's education*. Wichita: ProQuest Dissertation Publishing.

Ukpokodu, O. (2018). How Do I Teach Mathematics in a Culturally Responsive Way?: Identifying Empowering Teaching Practices.

Watanabe, M. (2012). *"Heterogenius" classrooms*. New York: Teachers College Press.