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The National Consortium of Secondary STEM Schools (NCSSS) is an organization comprised of member high schools from across the country, some of which are residential schools in which students from across the state apply to gain admittance to advanced academic science, technology, engineering, and mathematics (STEM) programs. Underrepresentation of culturally, linguistically, and economically diverse (CLED) students in programming with selective admissions processes, such selective STEM schools, has been evident throughout their history, and there is a perceived tension between the goals of excellence and equity in discussions around addressing this underrepresentation. The purpose of this study is to explore, describe, and understand the purpose of chosen selective STEM schools while interrogating how this impacts whom they claim to serve.

I conducted a qualitative study focused on three residential selective STEM schools that are members of NCSSS using a critical race theory framework. My goal for this study was to gain insight about what elements can lead to more equitable outcomes. I reviewed publicly available documents including school website pages, school board documents, state statutes, school publications, and news articles. I additionally compared the school demographics for Asian, Black, Latinx, and White students to the general education population of the state.

While the admissions processes at the selective STEM schools I studied follow some of the practices that research suggests can mitigate underrepresentation of CLED students, the racial demographics at the schools do not reflect the racial demographics of the general education population of their state. Specific course requirements and emphasis on an applicant having taken the most advanced offerings available fail to consider structural issues that often

exclude CLED students. This along with lack of clarity and transparency are likely impacting racial equity at selective STEM schools. My recommendations center on gathering additional school data which can guide the selective STEM schools as they then modify admissions criteria and procedures, develop, or modify programming for younger CLED students, and develop intentional steps and goals for racial equity.

EQUITY AND EXCELLENCE: ADDRESSING UNDERREPRESENTATION

IN SELECTIVE STEM SCHOOLS

by

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CHAPTER I: INTRODUCTION

When determining who gets access to advanced academic opportunities, attention to equity has often been sidelined in the pursuit of excellence. This is evident as one considers both historical and current contexts of gifted programming (Davis et al., 2020; Ford, 2014; Mansfield, 2015). The National Association for Gifted Children (2019) challenges this false dichotomy, asserting that gifted students "come from all racial, ethnic, and cultural populations, as well as economic strata" (p. 1). Though discourse in gifted programming has evolved to include equity statements and goals, there remains substantial underrepresentation of culturally, linguistically, and economically diverse (CLED) populations. Interrogating the policies and other discourse impacting such programming is an important step towards understanding and addressing this continued underrepresentation.

Gifted programming is a broad umbrella of educational opportunities, and the equity-related challenges vary depending on the format of these opportunities. Some gifted programming involves students taking separate classes within their school or engaging in extracurricular activities outside of the school day. Alternatively, there are gifted programs in which a student attends school at a different location, either in their home community or at a residential school. For some gifted programs there are no explicit restrictions on who can attend, while for other gifted programs selection or admittance is required for participation.

Though there have been studies focused on equitable admissions policies and studies concerning equity in gifted programming, little research has been done regarding equity at institutions that provide residential gifted or advanced programming. The National Consortium of Secondary STEM Schools (NCSSS) is an organization comprised of member high schools from across the country, some of which are residential schools in which students from wide

geographic areas apply to gain admittance to advanced academic science, technology, engineering, and mathematics (STEM) programs. The residential schools within NCSSS provide venues in which policies and discourse can be analyzed through an equity lens across similar programming offered in different local contexts.

Problem Statement

Underrepresentation of CLED students, particularly Black, Latinx, and low-income students, in gifted education programs is well-documented (Crabtree et al., 2019; Davis et al., 2020; Ford, 2014; Ford et al., 2021; Mansfield, 2015; Mun et al., 2021). Crabtree et al. (2019) adopt the phrase "Gifted Gap" to describe the disparity between the percentage of each underrepresented group in gifted programs as compared to the group's proportional representation in the population from which the program participants are drawn. Analyzing the demographics of gifted programs, specifically those at the NCSSS schools, shows that they do not match those of the general education population from which they draw their students. I was an instructor at one of the NCSSS residential schools for over fifteen years. The school is a public high school that serves juniors and seniors from across the state. At this school, the student population is primarily composed of White and Asian American students. For example, in the 2020-2021 academic year approximately 49% of students were White and 27% were Asian American. Though the percentages of Black and Latinx students have increased some in recent years, each of these groups represented only about 8% of the student body in the 2020-2021 academic year. For comparison, these groups represented approximately 24.8% and 19.8%, respectively, of the state public education population for 2020-2021 (North Carolina Department of Public Instruction, 2020). My observations of trends at this school and my studies into

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evidence of inequities within the foundations of gifted education have led me to be particularly interested in studying the lack of racial diversity at schools in NCSSS.

Developing a deeper understanding of school philosophy, purpose, and admissions at schools within NCSSS can help shed light on how these impact identification of students from underrepresented groups for these residential STEM schools. Each of the NCSSS residential schools has their own policy and procedures for admission. For example, students are selected for admittance at the NCSSS school I taught at based on an application with multiple components and on a state mandate to admit a certain percentage of qualified applicants from each congressional district.

Research suggests that policy is not necessarily enacted equitably and can differentially impact students based on their race (Gillborn, 2005; McNeil & Coppola, 2006). Kendi (2019) also notes that policies are not neutral. "Every policy in every institution in every community in every nation is producing or sustaining either racial inequity or equity between racial groups" (p. 18). While some hold the belief that schools and school systems are neutral organizations, underlying biases can impact how education services are delivered (Jackson, 2020). While school policies may not be created with the intent of sustaining inequity, they may be perpetuating it. Centering the principle that policies are not neutral and can perpetuate inequity can help lead educational institutions toward greater equity.

Purpose of the Study & Research Questions

The purpose of this study is to explore, describe, and understand the purpose of chosen selective STEM schools while interrogating how this impacts whom they claim to serve. To examine this, I gathered information from three such schools guided by the following research questions:

1. What is the philosophy, mission, and vision at these schools?

2. What are the admissions policies at these schools and what information about admissions procedures do they share?

3. How do the racial demographics of students at these schools compare to the racial demographics of the general education population in their state?

Exploration of a school's philosophy, mission, and vision helps me understand the purported purpose of the school. As I investigate the other questions, I consider how well the school is meeting its purpose and how the admissions policies and procedures might be helping or hindering the meeting of this purpose, as well as what connections exist between written policies, governing documents, and admissions procedures. By considering the demographics of each school, I consider whether each school has a problem with racial diversity when compared to the state at-large.

The goal of my study is to describe and understand selective STEM schools and gain insight about what elements can lead to more equitable outcomes. The restriction to discourse related to school philosophy and admissions provides a focus to the consideration of equity in the NCSSS schools. However, it is important to note that improving equity through admissions policies will not address all equity-related problems at these schools. There are many other issues that need to be addressed to improve equity, such as adapting the curriculum to meet the needs of a diverse student body and increasing staff diversity, that fall outside the scope of this study. Additionally, I did not consider all NCSSS members schools, instead I focus on a small subset of the residential schools in the consortium. I hope to add to the body of research on selective STEM schools and help move toward improved identification and access for CLED students to engage in such programming.

<center>**Background Context**</center>

Since my study focuses on selective STEM high schools, it is useful to understand how STEM education and STEM schools have developed in the United States. I also provide some information on the formation and aims of NCSSS. To further contextualize my study, I then share the current controversies surrounding admissions to selective high schools.

STEM Education and STEM Schools

In a critique of what they perceive as an overemphasis on STEM education, McComas and Burgin (2020) note that there is no consensus on what "STEM education" means. McComas and Burgin share that some in education use this term to refer to any educational experience that involves any one of science, technology, engineering, or mathematics while others insist that "STEM education" must involve the merging of more than one of these fields. The acronym "STEM" only emerged in 2001, preceded by "SMET" which seems to have first been used in the 1990s (McComas & Burgin, 2020). Along with the varied definitions of STEM education, there is not a clear definition of what it means for an educational institution to be a STEM school (Casto & Williams, 2020; Rogers-Chapman, 2014). Since my research does not consider curriculum within STEM schools, I only briefly mention these controversies as part of the backdrop of the schools involved in my study.

In an overview of the history of specialized STEM schools, Thomas and Williams (2010) assert that the creation of these specialized STEM schools was in response to concerns raised in the early twentieth century regarding the United States' economic competitiveness and a growing need for a skilled workforce. Attention to STEM education also grew in response to military threats (Basile & Lopez, 2015; Mansfield et al., 2014). The association of STEM schools with gifted education came later when those involved in gifted programming and in the scientific

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community saw an increased need for high-quality STEM education (Thomas & Williams, 2010). The connection between STEM education and the economic competitiveness of the country has persisted in more recent government policy. In 2010, the U.S. President's Council of Advisors on Science and Technology submitted a report calling for the creation of at least 200 "highly-STEM-focused high schools" over the following decade (Executive Report to the President, 2010, p. 8).

History of NCSSS

Opening its doors as a residential STEM high school in 1980, the North Carolina School of Science and Mathematics (NCSSM) is cited both internally and externally as the first "school of its kind" (North Carolina School of Science and Mathematics, 2022; Sayman, 2015; Shi, 2020). However, Stuyvesant High School which opened in New York City in 1904 was the first non-residential specialized STEM school (Thomas & Williams, 2010). In 1988, NCSSM, Thomas Jefferson High School for Science and Technology, Louisiana School for Math, Science, and the Arts, and Illinois Mathematics and Science Academy organized a meeting to create a consortium of schools with similar programs (National Consortium of Secondary STEM Schools [NCSSS], 2020a; Thomas & Williams, 2010). These four schools along with eleven others established the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology which would later be renamed the National Consortium of Secondary STEM Schools (NCSSS). NCSSS is now comprised of 100 member schools across 32 states (NCSSS, 2020a). To be eligible for membership, a school must "prepare students to be leaders in global innovation by engaging them in rigorous, relevant, and integrated learning experiences, with a science, technology, engineering, and mathematics focus and specialization that include authentic research and/or project-based focus school-wide" (NCSSS, 2020a). Notably, the

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consortium does not govern the member schools. The consortium provides professional development, offers opportunities for students and schools, and informs policy all with the goal of advancing STEM education (NCSSS, 2020b).

Recent Controversies in Selective School Admissions

Though not a STEM school, Lowell High School is a selective high school in San Francisco that was featured in the 2021 documentary *Try Harder!*. This documentary gave viewers a glimpse of gifted students in a rigorous high school environment as they negotiated the college application process (Lum et al., 2021). Seemingly unrelated to its release, but occurring at about the same time, Lowell garnered national attention in the wake of controversy around decisions made by the San Francisco Board of Education (Granitz, 2022). The Board of Education changed admissions at Lowell from a selective process to an open lottery system. According to Granitz (2022) and Heller (2022), some felt this would be a positive change to adjust the demographics to match more closely those of San Francisco, given that approximately half of the school's population was Asian American, while others felt this change would compromise the academic integrity of Lowell. This change, along with statements made by one of the board members that were viewed as racist against Asian Americans, sparked outcry, protests, and threat of lawsuits from parents, students, and alumni (Heller, 2022). The fallout from this and other decisions led to a recall election in which three of the board members were voted out (Granitz, 2022).

Lowell is not the first selective high school in recent years to consider or implement admissions changes to ensure a more diverse and representative student body. For example, Thomas Jefferson High School for Science and Technology, a selective STEM school in Virginia and member of NCSSS, recently attempted to modify its admissions criteria by eliminating

standardized testing and accepting the top students at all eligible middle schools (Heller, 2022; Riley, 2021). The network of selective schools in New York City has been under fire in recent years for inequities in its admissions processes, with legal challenges and calls to modify their admissions criteria (Corcoran & Baker-Smith, 2018; Riley, 2021). However, as Lewis-Durham (2020) observed, there are those who argue against the removal of selective measures. In some cases, proponents of the status quo assert that changes, particularly those that take race into account, will exhibit a different kind of unfairness (Riley, 2021). Indeed, a judge struck down the proposed changes to the admissions policies at Thomas Jefferson High School stating that the changes that were intended to address a racial imbalance had a disproportionate impact on Asian American students (Heller, 2022). However, this decision was later overturned (Woolsey, 2024). Although the group seeking to prevent the admissions changes from occurring petitioned the Supreme Court to hear the case, the Supreme Court denied the request (Woolsey, 2024). Proponents of maintaining highly selective admissions criteria may acknowledge inequities in the systems but caution against changes that would compromise the excellence of the academic program (Heller, 2022).

The recent controversies surrounding selective admissions processes and changes to them illustrate how nuanced this issue can be. Given these controversies, further exploration of selective admissions to gifted and advanced academic programs is warranted. A qualitative study that analyzes the policies, practices, and discourses surrounding admissions at such selective programs can provide insight into the perceived tension between excellence and equity.

<center>**Description of Methods**</center>

Methodology

Given that my goal is to explore, describe, and understand a subset of the residential selective STEM schools rather than generalize, a qualitative study is aligned with my studies purpose. Qualitative research allows for "in-depth inquiries within a small sample of population" (Bhattacharya, 2017, p. 18). According to Bhattacharya, a qualitative study may be used to understand, interrogate, and/or deconstruct (p. 19) and these purposes may be blended or combined. A qualitative study aimed at understanding would focus on depth rather than generalization. Workable solutions and policy decisions can be impacted by qualitative studies designed to interrogate. Finally, a study with the goal of deconstruction allows a researcher to identify structural problems without necessarily providing the solutions. (Bhattacharya, 2017)

As Creswell and Baez (2020) observe, qualitative researchers "study a small number of people who are, in and of themselves, of interest" (p. 7). For my study, I was interested in exploring the different residential STEM schools themselves. My study also focused on understanding the purpose and policies of the schools I focused on. However, I also interrogate the policies as I consider their impact on racial demographics at the school in comparison to the overarching racial demographics of the schools' service areas. Although the main purpose of my study is to understand, my research generated more questions than answers that made possible additional meaning-making, recommendations for schools, and areas for future research. Therefore, in the final chapter I incorporate a critical evaluation as I make meaning of my findings.

As I reviewed my findings, I wrestled with how to best analyze the impact of the school discourse and policy. This led me to incorporate some tenets of a critical policy analysis (CPA)

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in my analysis. In a CPA, researchers seek to interrogate policy more deeply, particularly in the context of power, to understand the nuances and unintended consequences of established and proposed policies (Diem & Young, 2015). Diem et al. (2014) share five typical foci for a CPA:

- the difference between stated policy and implementation,

- the development and changes in policy over time,

- how power and resources are distributed,

- the policy's effect on the "relationships of inequality and privilege" (p. 1072), and

- the ways in which members of non-dominant groups resist or support a policy.

In my analysis, I consider the distribution of power and resources by the creation of the state-run selective STEM schools. I further consider how the school policies impact privilege and inequity. I also include some comparisons of the discourse stated in policy and that used in other documents and interviews. Since I consider only publicly available documents, as described later in this chapter, I was unable to consider how policy was resisted or supported by marginalized groups. Though I mention some changes in policy, I do not consider this in my analysis.

Setting and Unit of Analysis

I focus my study on residential schools within NCSSS. STEM programs historically have failed to have student populations that are racially, economically, and gender diverse (Basile & Lopez, 2015; Davis et al., 2020; Jackson, 2020; Mansfield et al., 2014). However, the residential NCSSS schools under consideration have roughly equal numbers of dormitory spaces for male and female students, avoiding much of the historic marginalization of female students in STEM. Additionally, the residential schools draw students from across the state allowing comparison with the entire state. Although location may still have some impact, there is less restriction on attendance based on location than for day-schools in which families would need to consider daily

travel to the school. Further, research suggests that outcomes from attending STEM schools may vary at those that are residential compared to those that are non-residential (Shi, 2020). These considerations along with my background at a residential STEM school motivated my focus on residential schools within NCSSS.

It must be acknowledged that fixing the Gifted Gap in STEM will require consideration of students' intersectional identities and how this impacts their experiences (Johnson & Sondergeld, 2020). Still, I chose to focus on racial inequity guided in part by a caution from Welton et al. (2018) in an article discussing an anti-racist change framework. According to their research,

> frameworks that are generically inclusive of multiple inequities and overuse concepts like diversity and multiculturalism and even equity and social justice might lead educational leaders to "depoliticize," "soften," and in essence water down the critical work needed to promote long-lasting change for racial equity (p. 3).

In a chapter focused on the experiences of Black gifted students from rural areas, Davis et al. (2020) observe that when scholars consider the needs of high achieving students from rural areas, they tend to focus on White rural students despite the unique needs of Black high achieving students in these areas. This illustrates both how intersectionality impacts experience in gifted programming and how attempting to consider all inequities can lead some to be overlooked. I do not seek to minimize the inequity experienced by the myriad groups who have been excluded from advanced STEM programs. Rather, I choose to focus on racial inequity to give focus to my study and take strides towards improving racial equity. As shared in more detail in the next chapter, a lack of racial diversity in gifted and STEM programming has detrimental

impacts. Therefore, a focus on racial equity in these programs will provide an important step in dismantling structural inequities.

I chose three NCSSS residential schools to focus on using a criterion sample approach (Marshall et al., 2022). Of the approximately 100 NCSSS member schools, only sixteen are residential. Historically, racial diversity and segregation has been perceived to vary based on geographical region (Siegel-Hawley, 2013; Wright et al., 2014). In an analysis of census data regarding racial diversity and segregation, Wright et al. (2014) note the importance of considering geography in research on race and racism. Siegel-Hawley (2013) specifically interrogates how housing segregation has impacted schools in the Southern United States. As she notes, it is important to consider the "South's painful legacy of slavery and Jim Crow—as well as the breadth and scale of school desegregation efforts in the region" when considering trends in school demographics (p. 19). With this in mind, geographical region was one component that I considered in school selection. Notably, there are no NCSSS residential schools west of Texas. All sixteen residential schools are in the following locations:

- Midwest: Illinois and Kansas

- Northeast: Maine and Massachusetts

- South: Alabama, Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, and Texas

While most of these states have one NCSSS residential school, there are three in Alabama and two in Kentucky. I intentionally chose schools from different geographical regions of the United States: Illinois Mathematics and Science Academy (IMSA), the Maine School of Science and Mathematics (MSSM), and the Mississippi School for Mathematics and Science (MSMS). For clarity throughout this paper, I expand the schools' commonly used acronyms to Illinois MSA,

Maine SSM, and Mississippi SMS, respectively. I did not choose the schools in Kansas and Massachusetts because their format was substantially different than the format of the other schools: Students at those schools take classes at a college rather than having a separate high school class environment. When selecting the schools, I also considered how much the school websites mentioned equity and chose schools that varied in the prevalence of equity discourse. The Illinois MSA website contained detailed information about their commitment to equity, diversity, and inclusion. On the other hand, information about how equity, diversity, and inclusion were related to the school's philosophy was not readily apparent from the website for Mississippi SMS. The website for Maine SSM contained some mention of equity, diversity, and inclusion but with little detail.

Having identified three schools on which to focus, I next selected artifacts to analyze. McNeil and Coppola (2006) emphasize the importance of understanding both the formal and informal statements. Therefore, I consider admissions policy statements, school mission statements, and formal statements on equity as well as looking at less formal communication. The less formal communication includes statements made in news articles, interviews, meeting minutes, and reports.

Data Collection & Analysis

Qualitative data can be in the form of "interviews, observations, or document analysis" (Merriam & Tisdell, 2016, p. 24). My data collection approach was influenced by the lingering health and safety concerns of the Covid-19 global pandemic. Observations and in-person interviews were not feasible due to this and the disparate locations of the schools. This first led me to consider doing a document analysis.

As discussed in more detail in Chapter II, a common barrier to student access in advanced academic programs is lack of awareness about the program (Casto & Williams, 2020; Jackson, 2020; Johnson & Sondergeld, 2020; Valencia & Suzuki, 2001). So, focusing exclusively on publicly available documents allowed me to consider what information is available to families interested in each school and how easy that information was to find. Some of this information is available from the schools' websites, such as the school mission statements and admissions communications. Gathering additional information required looking at documents from the state legislature since each school was established via a state statute. Additionally, I searched news articles, board documents, and downloadable school files. Table 1 shows a summary of the documents I collected for each school.

The data collection took longer than anticipated as I worked to gain as accurate and detailed information as possible. I began by searching on the schools' websites using the menu to identify relevant pages such as "About" and "Admissions." I also used each school's website search option and general web searches using specific terms. I determined some of the search phrases in advance then generated others as I came across terms in results that gave promising results. The search terms that led to relevant information included the following, paired with each school's name for general web searches: admissions, mission, philosophy, purpose, enrollment, equity, president, governance, strategic plan, admissions policy, admissions team, and admissions criteria. My search for documents was an iterative process. As I came across a resource at one school, I then searched to see whether a similar resource was available at another school. For example, after finding that the Mississippi SMS student handbook contained policy and governance information, I reviewed the student handbook for the other two schools. As I gained more information from reviewing documents, I would also search for other mentions of

those terms. For example, when I found mention of an "Admission Review Committee" at Maine SSM in one document, I searched using this term to find what additional information about the committee was available.

Table 1. Summary of Documents Collected for Each School

Illinois MSA	Maine SSM	Mississippi SMS
Legislative Statute	Legislative Statute	Legislative Statute
School website pages	School website pages	School website pages
Local/national news articles	Local/national news articles	Local/national news articles
School application	School application	School application
State education data	State education data	State education data
Communication to legislators	Communication to legislators	Mississippi Encyclopedia
board policies	Management reports to board	Student handbook
School strategic plan	School strategic plan	State Reports and Policies
Student newspaper interviews	Open house video	Student newspaper interviews
Article published by school leaders	School profile documents	Mississippi University for Women archives document
School profile documents		

Qualitative data analysis involves "identifying recurring patterns that characterize the data" (Merriam & Tisdell, 2016, p. 25). Using a qualitative approach allowed me to explore the school leaders' understanding of their school and interpret meaning from how the schools are described and how admissions processes are conducted. After organizing and reviewing the documents, I began with open coding of the documents. This was followed by reflection and interpretation that incorporated a theoretical framework of critical race theory (CRT), which I describe later in this chapter, and the findings from my review of existing literature. I then engaged in axial coding, looking for patterns in the codes and identifying broad categories. I followed this with additional review and coding of the documents, looking for more examples and identifying contradictions, while identifying key themes in the data.

Ford (2014) codifies representation using a measure she refers to as the "Relative Difference in Composition Index (RDCI)" (p. 144). The RDCI is the ratio of the difference in

percentage representation in the selected population, in my case the residential STEM school, with the percentage representation in the general education population, in my case the state, to the percentage representation in the general education population. For example, if a certain group represents 8% of the school population and 25% of the state population, the RDCI for that group would be $(8 – 25)/25 = - 0.68$, or negative 68%. This calculation provides a numeric value that captures how severe the underrepresentation of that group is. In comparison, an RDCI of zero would indicate that the school population perfectly matches that of the state population. I gathered racial demographic data for the schools and for the general education population of the state across multiple consecutive academic years. I then calculated the mean and median for these data for each school and each state. Using these mean and median data, I calculated the RDCI.

Creswell and Baez (2020) highlight what they view as the essential elements of a qualitative research approach (pp. 6–8). I include some of these below along with an overview of how I incorporated this into my study.

- "Report the voices of participants." In my documentation, I include quotes from meetings and interviews with school leaders and stakeholders as they describe their school, students, school purpose, and admissions procedures.
- "Focus in on a small number of people or sites." I chose three residential selective STEM schools, providing rich detail to convey my understanding of these sites.
- "Develop a complex understanding." Consulting a variety of sources and observing the trends established a foundation of this understanding. Drawing on aspects of CPA, CRT, and observations from my review of literature, added complexity to this understanding.

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- "Contrast different views of the phenomenon." In Chapter VI, I analyze how the ways in which the schools describe students and select students for admission can differentially impact students. I also consider the importance of what is not stated by the schools.

- "Reflect on our own biases and experiences." Later in this chapter, I share my experience and background in more detail. In Chapter VI, I revisit this as I share my conflicted feelings and my lingering questions regarding selective STEM schools.

In Chapters III, IV, and V, I report on what I discovered through this qualitative approach to data collection. Then in Chapter VI, I elaborate upon the understanding I gained and draw on my learnings from literature, including that related to CPA, to move beyond description. In this final chapter, I expand my understanding, probe my findings more deeply, and build towards recommendations using a critical lens.

Trustworthiness and Ethical Considerations

The use of multiple stages of coding, including reflection in between, helped me track how my analysis varied in the iterative data collection and analysis process. In addition to keeping records of this process, I used a reflexivity journal to make note of my observations and reflections throughout. Since I spent more than fifteen years in an NCSSS residential school, including participating in admissions selection processes, I had to consider how my experience may have influenced my perception of the policies. For example, through critical self-reflection I considered how my own experience with members of an admissions review committee from outside the school impacted how I viewed the inclusion of such committees in the admissions process at the schools I included in my research study.

Using multiple forms and sources of data along with reflection enhances the credibility of a study (Marshall et al., 2022). Marshall et al. describe this process as crystallization, a similar

yet less rigid approach to that of triangulation. According to them, crystallization will provide a

"full and balanced representation of findings" through a "methodology that demands self-critique

or self-reflexivity" (Marshall et al., 2022, pp. 52 – 53). As shown in Table 1, I searched the

school's websites, news articles, student communication, and board documents to obtain variety

in my sources. As noted above, I engaged in multiple rounds of searching, updating my search

terms and locations to identify more potential sources of information. In Appendix A, I provide a

sample showing two pages of a coded document to demonstrate my process.

Limitations

There are limitations about what I was able to garner from the documents since I did not

interview to seek clarity from those who made the statements. Still, an advantage of using

documents as the unit of analysis is that they are not changed by the investigation of a researcher

(Merriam & Tisdell, 2016). As mentioned earlier in this chapter, the deeper exploration of a

small number of schools means that my qualitative approach gives cannot be generalized across

all residential selective STEM schools. There are also limits to the demographic information that

I gathered. Using broad race categories is consistent with how schools and state education

departments collect data. However, not breaking down by gender, location, or socioeconomic

status, I do not get as detailed an analysis as possible as to where the schools have the largest

discrepancies in representation.

Data Reporting

For each of three residential NCSSS schools that I have chosen, I will provide

calculations of the RDCI. I share quotes and summaries of relevant statements to convey the

mission, vision, and philosophy of the schools. I have included longer excerpts from policies and

other documents in the appendix to help support my statements about mission, vision,

philosophy, and admissions. As noted above, I have also included a sample coded document in Appendix A to further illustrate my process. Much of the data is presented separately for each school followed later by a comparison between the schools. For descriptors of the students served, I give details about the frequency of codes and the themes I observed. I also present outliers to the identified patterns where observed. After addressing my three research questions separately, I organize the reporting of my findings using my theoretical framework as a guide.

Theoretical Framework

I embed my research in a framework of critical race theory (CRT). CRT is a body of scholarship aimed at understanding and disrupting racism and oppression. It consists of a complex web of varied ideologies and various branches that focus on different demographic subgroups. However, there are common themes and assumptions that underlie CRT. Those who subscribe to CRT categorize racism as ordinary rather than aberrant and as a difficult to remove feature since the results of racism benefit the dominant group. Critical race theorists further argue that race is a social construction, one that shifts throughout time leading to different experiences for various minority groups at different times. Advocates of CRT emphasize that change is driven by interest convergence. That is, racism serves the dominant group, and change happens only when it is in the dominant group's interest for that change to occur. (Delgado & Stefancic, 2017)

CRT offers tools to understand the systemic issues that have arisen because of racism and confront them in structured discourse, such as in the courts, in policy decisions, or in research, and in less formal dialogues, such as between friends, family, or colleagues (Delgado & Stefancic, 2017). CRT challenges notions of deficit thinking and meritocracy. The consideration of the historical roots of racism and the structural issues that have resulted help provide a basis

on which to understand the pervasiveness of oppression, the notion of "Whiteness as property" and the detriment of a color evasive mentality.

Studies often credit problematic historical roots, deficit thinking, and mistaken belief in meritocracy for contributing to the underrepresentation of CLED students in gifted programming (Ford, 2014; Mansfield, 2015; Valencia, 1997). As Basile and Lopez (2015) note, a researcher using CRT can "uncover and consider the implications of some of the racialized structures embedded in the STEM education policy documents" (p. 523). I saw parallels between what Basile and Lopez (2015) observed in their analysis of STEM policy documents and the documents I collected for this study. As they observed, I noticed language evocative of racial commodification and essentialism.

Researcher Experience and Perspective

I am approaching this study as a researcher who spent many years within the NCSSS network of schools. As an instructor and member of the school leadership team at one of the NCSSS schools, I saw discrepancies in how admission was determined compared to how the senior school leaders discussed the importance of equity, diversity, and inclusion. This firsthand view motivated me to look for solutions to this problem. As a White woman who was educated primarily in environments with little racial diversity, I simultaneously recognize the value of diverse learning environments while having little direct experience of these environments as a student. I believe I can use what I have learned while working in an NCSSS school as well as drawing on previous research to help highlight the importance of racial equity in such schools.

After leaving the NCSSS school, I served for a time as a principal in a charter school, which gave me a different perspective on this issue. As a school leader, I had to evaluate how my decisions, new policies, new procedures, and my messaging aligned with the school's mission

and vision. This led me to be particularly interested in considering the interplay between school philosophy and admissions policies at these NCSSS schools. Addressing any misalignment of such policies with school philosophy has the potential to help mitigate equity issues within a school.

As I conducted my research, my daughter determined that she wants to attend an NCSSS school. If so, she will be applying during the next school year. This additional perspective added to the lens with which I viewed the schools' webpages. As I conducted my research, transparency, and the lack of it, emerged as a notable factor. I reflected on how easy or difficult it was to find information about the school admissions process and criteria from a parent's perspective.

I approach research with an epistemology that is most closely aligned with pragmatic and transformative viewpoints. I believe there is no objective truth and that people experience truth in different ways. These experiences and understandings of truth are informed by socially constructed hierarchies and power structures. An individual's positionality will impact how they view an experience, and it is particularly important to provide avenues for hearing the truth of those who have often been silenced or marginalized. A transformative approach to the research will provide a means to challenge deficit viewpoints that have contributed to underrepresentation in gifted education. But coming from a place of power as a member of a dominant group, I will need to be mindful that I do so in a way that respects the voice of those who have been marginalized and reflect on how my own positionality will impact how I view others' truths.

Significance of the Study

Current researchers highlight the importance of additional research into underrepresentation in gifted programming (Crabtree et al., 2019; Ford, 2014; Siegle et al.,

2016). For example, Mun et al. (2020) write that the "problem of CLED student underrepresentation indicates a need to reexamine leadership and systemic processes, including the building of systemic capacity at the district level where policies for gifted programs often are constructed and implemented" (p. 132). Crabtree et al. (2019) support the need for stakeholders to be aware of and address systemic issues in gifted education.

While even a cursory review of research studies leads to numerous qualitative and quantitative studies troubling equity in gifted programming, literature regarding equity in STEM schools seems much less prevalent. Johnson and Sondergeld (2020) note the lack of sufficient literature focused on STEM school outcomes and they point to a need for more studies focused on equity for underserved students in STEM programs. Additionally, most studies focused on selective STEM schools seem to be quantitative in nature. Thus, current research supports that further qualitative research regarding the Gifted Gap in the context of STEM schools will provide an important contribution to education research.

This study can help scholars and educators to pinpoint the ways in which discourse impacts identification of students from underrepresented groups for these residential STEM schools and provide a step towards addressing existing inequities. This information will also be valuable in efforts to diversify gifted programs in general, including those at non-residential schools.

Overview of Chapters

In this chapter, I have explained the motivation and aims of my study to analyze the admissions policies at NCSSS schools. I have further detailed qualitative methods and how I will employ a CRT framework in the analysis. Situating it within the context of recent controversies surrounding selective admissions processes and calls for more policy analysis of gifted

education, I have established the significance of my study while also acknowledging its limitations.

In Chapter II, I share my analysis of existing research falling within the intersection of gifted education and selective STEM schools from an equity perspective. I organize this chapter into four parts. In the first part, I share research findings about the impact of underrepresentation in gifted and advanced education programming. Next, I consider what scholars have said about problematic mindsets that began at the foundation of gifted education and persist today. Narrowing the focus, I then describe recent research into selective STEM schools. Finally, I detail the suggested approaches for overcoming the barriers for students from underrepresented groups to participate in gifted and advanced educational opportunities.

I follow this literature review with my findings and analysis. Chapter III includes the details of my findings for my first research question regarding mission, vision, and philosophy for each of the three schools I studied. In Chapter IV, I focus on the admissions policies and shared procedures at the schools. Then, in Chapter V, I compare the demographics of each school to the demographics at the state level. Finally, in Chapter VI I analyze what I found during my study in the context of CRT to revisit my purpose and goals for this study. In Chapter VI, I also share the questions I am still troubling over as I critically discuss my findings.

CHAPTER II: LITERATURE REVIEW

Since placement in gifted programming can lead to improved access to advanced STEM programming (Casto & Williams, 2020; Collins et al., 2019; Ford et al., 2021; Sayman, 2015), this research study considers issues that fall in the intersection of gifted programming and selective STEM schools. In this chapter, I consider what current research reveals about the impact of underrepresentation in gifted programming, barriers to underserved students' participation in gifted and STEM programming, and recommendations for redressing this underrepresentation. Additionally, I share findings from research into NCSSS member schools and other selective STEM schools.

Impact of Underrepresentation in Gifted Programming

The persistence of underrepresentation in gifted programming represents a roll back of earlier successes in combatting oppressive policies and continues to uphold racism. There are impacts on individuals and on society. This includes legal issues with past court cases, implications for students' future endeavors, and the reinforcement or development of detrimental mindsets.

Ford (2014) connects the Gifted Gap with the court cases of *Brown v. Board of Education* and *McFadden v. Board of Education for Illinois School District U-46*. The latter case allows Ford to demonstrate that segregation within a school for the purpose of gifted education was deemed unlawful. Ford also incorporates notions of degrees of prejudice, microaggressions, and White privilege to explain contributions to underrepresentation in gifted programming. In her analysis of gifted programs, Mansfield (2015) reviews online material for educators and parents in addition to the historical writings of Lewis Terman and Leta Hollingworth, considered by many to be the founders of gifted education. The framework Mansfield uses for her analysis is

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based on the notion of "Whiteness as property" (p. 3). In a later article, Mansfield (2016) continues to share the findings from this policy genealogy, exploring how Terman's and Hollingsworth's ideas influenced the development of gifted education policies. Mansfield (2015) notes that underrepresentation in gifted programming "reinforces a social hierarchy in schools, despite the fact that de jure segregation is no more" (p. 11). Although perhaps adhering to the letter of the legal interpretation established by *Brown v. the Board of Education*, the underrepresentation in such programs is creating segregation within schools that violates the spirit of that legal interpretation (Ford, 2014; Mansfield, 2015; Michael-Chadwell, 2010).

Some scholars (Casto & Williams, 2020; Collins et al., 2019; Crabtree et al., 2019; Jackson, 2020) note that underrepresentation has impacts for CLED students' future opportunities and experiences. Crabtree et al. (2019) analyze the participation in gifted education within one southeastern U.S. school district, comparing participation at low poverty schools to that at high poverty schools. Crabtree et al. found that race and socioeconomic status of a student, as well as the poverty level of the school, impacted participation in gifted programs for this school district. In an article centered on addressing the underrepresentation of gifted Black girls in STEM, Collins et al. (2019) touch on the interplay of race, gender, gifted programming, and STEM education. Jackson (2020) considers a similar issue, analyzing how school segregation in New York City impacts Black girls' participation in STEM education. STEM performance was perceived to be inhibited by lack of availability of rigorous courses, less qualified teaching staff, and internalizing of negative stereotypes. The lack of participation of CLED students in gifted education programs decreases the likelihood those students will enroll in advanced STEM education (Collins et al., 2019; Crabtree et al., 2019; Jackson, 2020). Casto and Williams (2020) evaluated diversity in North Carolina's designated "STEM High Schools of

Distinction" through a critical theory lens to consider what they referred to as North Carolina's STEM pipeline. Casto and Williams assert that enrolling in advanced STEM courses increases the likelihood that students will go on to careers in STEM or STEM-related fields. Failure to enter this STEM pipeline in turn can lead to decreased likelihood of economic mobility (Crabtree et al., 2019).

While this focus on student progress through a STEM pipeline seems to consider the impact of underrepresentation from a more neoliberal lens, research also points to how underrepresentation in gifted and advanced STEM programming impacts individual and societal perspectives. The lack of representation of CLED students in gifted education programs reinforces deficit-thinking and racial bias (Casto & Williams, 2020; Crabtree et al., 2019). Conversely, increased diversity in STEM programming benefits everyone within a classroom since a greater variety of ideas and perspectives will be shared (Casto & Williams, 2020). The Gifted Gap also reinforces White privilege, including a problematic belief in meritocracy (Ford, 2014; Mansfield, 2015). Mansfield (2015) explains that the existence of the giftedness label grants additional privilege to wealthy White students since the label is disproportionally applied to that group. The absence of students of color in gifted programs does nothing to help cultivate positive identities for these students, nor does it help others recognize their capability for brilliance. Ford (2014) supports the idea that the statistically significant underrepresentation of marginalized groups further fuels social inequality, and thus it cannot be ignored.

Problematic Mindsets: Then and Now

The perception of giftedness, including how it is defined, how it manifests, and who can exhibit it, have had major impacts on the development of the field of gifted education. Mansfield (2016) notes how policies show that "correlation of giftedness and privilege is assumed, but

never problematized" (p. 303). While the history of gifted education demonstrates this lack of focus, some recent studies grapple with how mindsets impact policy and practice regarding gifted programming (Ezzani et al., 2021; Ford et al., 2021; Mun et al., 2021; Siegle et al., 2016).

Ezzani et al. (2021) explore how policies and practices for identifying CLED students for gifted education were impacted by a district-wide cultural proficiency goal. In their analysis, they used a culturally relevant leadership framework to consider political, pedagogical, personal, and professional aspects of gifted placement and programming. They found that advocacy efforts within the district, approaches to communication, and the understanding of what it means to be gifted all influenced changes to the district's policies and practices (Ezzani et al., 2021). After sharing some of the history on inequity within gifted education, Ford et al. (2021) highlight some of the continued barriers and conclude by sharing ten characteristics of "culturally responsive, equity-minded allies" (p. 176) who are interested in addressing underrepresentation in gifted and advanced academic programming. These characteristics serve as a call to action for allies, encouraging advocacy and collaboration with communities of color. Further, Ford et al. noted the need for targeted professional development and anti-biased policies and procedures. Mun et al. (2021) employ focus group interviews and thematic analysis to assess the impact of one district's improved gifted identification procedures. They consider this in the context of systemic changes and in perceptions of giftedness. According to the major themes identified through their analysis, "building systemic capacity and shifting conceptions of giftedness share a reciprocal relationship in leading to more equitable gifted identification practices and inclusive programming" (Mun et al., 2021, p. 138). Siegle et al. (2016) describe barriers to CLED student participation in gifted programs, share research on effective programs, and offer a "model of talent development to optimize underserved students' growth" (p. 105). Elements of this model along with other

relevant findings from these studies will be shared in more detail later as I delve into the recommendations for overcoming the barriers for CLED participation in gifted and advanced STEM programming. For now, I focus on what these and other studies share about how problematic mindsets create barriers to CLED student involvement. The literature reveals three themes: deficit-thinking, problematic mindsets from students and parents, and issues with conceptualizing giftedness.

Deficit-Thinking

Though attention to equity in gifted education has gained more prominence in gifted education discourse, research suggests that current mindsets have been influenced by those espoused during gifted education's beginnings. That is, the roots of the Gifted Gap in large part lay in the racist foundation of gifted education (Dixson, 2022; Ford et al., 2021; Mansfield, 2015, 2016; Valencia & Suzuki, 2001). Turning to the writings of Terman and Hollingworth, Mansfield (2015, 2016) details the eugenicist beliefs that underpin the rhetoric of these influential founders of gifted education. Terman and Hollingworth advanced the idea that intelligence is purely hereditary and that students of color are not capable of abstraction that would enable them to benefit from gifted education. These and other comments provide evidence that deficit-thinking framed attitudes about students of color as the field of gifted education began.

In a book delving into how deficit thinking has evolved throughout the history of education and education studies, Valencia (1997) describes deficit-thinking as a framework that "holds that poor schooling performance is rooted in students' alleged cognitive and motivational deficits, while institutional structures and inequitable schooling arrangements that exclude students from learning are held exculpatory" (p. 9). Deficit-thinking positions opportunity gaps

as the fault of the student (Ford, 2014). Deficit-thinking may also lead to teachers setting low expectations for CLED students (Davis et al., 2020; Ford, 2014). Indeed, in some cases Black students are not recommended for gifted programming despite performing the same as some White students who are referred (Davis et al., 2020). The power imbalance between those making education decisions, such as in recommending students for gifted programming, and CLED students is illustrative of what Valencia (1997) describes as the oppressive nature of deficit-thinking. Michael-Chadwell (2010) describes a phenomenological study she developed to ascertain reasons for the underrepresentation of Black students in gifted education and to generate suggestions to educational leaders for improvement. Parents of Black students who were not selected for gifted education programs and teachers from non-gifted classrooms, all from San Antonio, TX, were interviewed. "A structural analysis of the participants' responses in this study suggests a linkage to the mindset known as deficit thinking as a factor perpetuating the phenomenon" (p. 112). This study reinforces what others (Ford, 2014; Mansfield, 2015, 2016; Mun et al., 2021; Valencia & Suzuki, 2001) contend: deficit-thinking persists and is a major barrier to CLED student participation in gifted programming.

Student and Parent Mindsets

In addition to problematic mindsets from educators, students and parents may have mindsets that prevent their engagement in gifted programming. At predominantly White high schools, Black students may be reluctant to engage in advanced course work because of lack of encouragement, limited information on what the course work will be like, or a reluctance to be the only person of color in a classroom (Crabtree et al., 2019). For similar reasons, CLED students are sometimes disinclined to be identified as gifted (Siegle et al., 2016). Further, students and parents may be worried about the impact on a student's GPA and may lack clarity

about the potential benefits of inclusion in gifted programming (Ezzani et al., 2021). Collins et al. (2020) share that a student of color may have an underdeveloped "STEM identity," which incorporates their "sense of belonging, perceived competence and abilities, personal interest, and cultural values" (p. 58). Davis et al. (2020) support the importance of a sense of belonging and acceptance for students of color in academically challenging settings. Thus, an underdeveloped STEM identity can create a barrier for students of color to become involved in advanced STEM programming.

Conceptualizing Giftedness

The conceptualization of giftedness is yet another element of the problematic mindsets in gifted education. Several sources point to the lack of a common definition of giftedness as a troubling aspect of gifted education (Crabtree et al, 2019; Mansfield, 2015; Michael-Chadwell, 2010). The definitions that have been established often lack specificity and measurability. For example, Crabtree et al. (2019) share the definition from Title IX of the No Child Left Behind Act (2001) which defines gifted and talented as

> students, children, or youth who give evidence of high achievement capability in areas
> such as intellectual, creative, artistic, or leadership capacity, or in specific academic
> fields, and who need services or activities not ordinarily provided by the school in order
> to fully develop those capabilities.

Problems with the definition from the National Association for Gifted Children (NAGC) are also identified (Crabtree et al., 2019; Mansfield, 2015). The NAGC (2019) describes gifted and talented students as those who

perform – or have the capability to perform – at higher levels compared to others of the

same age, experience, and environment in one or more domains. They require

modification(s) to their educational experience(s) to learn and realize their potential.

Notably the NAGC definition (2019) also includes a position statement reflecting that the

disparities in race and socioeconomic status of those identified as gifted often result from faulty

assumptions and lack of awareness.

While these national definitions exist, some state and local agencies use their own

definitions and their own ways to determine giftedness (Crabtree et al., 2019; Mansfield, 2015).

Since there is no widespread agreement on a definition of giftedness (Crabtree et al., 2019;

Mansfield, 2015, 2016; Michael-Chadwell, 2010; Mun et al., 2021), educators and families can

have varied understandings of giftedness. This can be helpful if an educator selecting students

for gifted programs is aware of the different ways giftedness can manifest but it can be

problematic if such an educator has a narrow perception of what being gifted is.

Giftedness can manifest itself in a variety of ways, particularly across different cultural

backgrounds (Mun et al, 2021; Siegle et al., 2016). Siegle et al. (2016) share that "defining gifted

students as a single population neglects the vast diversity among student populations" (p. 104).

Dixson (2022) supports that viewing giftedness as a general characterization rather than domain-

specific perpetuates inequities in the gifted programming. In an article advocating for the

elimination of the gifted label, Dixson notes multiple problematic aspects of labeling students as

gifted. In discussing one of these problems, he emphasizes that conceptualizing giftedness in this

general way leads to many students from underrepresented backgrounds not being served in

gifted programming. Another concern that Dixson raises is that the gifted label is viewed as

conferring social status on students. The incentive of gaining social status can lead to students

from well-resourced families getting preparation for identification, which obfuscates the ability

of the identification measure to better compare students. Further, once students gain the gifted

label, they stay in the gifted program whether they continue to have advanced academic needs.

Also, students who are not identified as gifted initially often do not have future opportunities to

be evaluated for inclusion in the gifted program. Thus, while a lack of common definition can

lead to subjectivity in identification procedures, creating a common definition could lead to

inequities if it does not account for variations in giftedness. Furthermore, the institutionalized

creation of the dichotomy of gifted and non-gifted may inhibit equity and inclusion from being

realized within gifted programming.

NCSSS and Selective STEM Schools

Consistent with underrepresentation in gifted programming, there is evidence of

underrepresentation in selective STEM schools. For example, the three highest profile selective

high schools in New York City, Stuyvesant High School, Brooklyn Technical High School, and

The Bronx High School of Science, have been the subject of scrutiny for lack of racial and

gender diversity (Corcoran & Baker-Smith, 2018; Riley, 2021). In addition to looking into what

studies reveal about the demographics of selective STEM schools, I consider what studies have

found about the impact, both positive and negative, of attending selective STEM schools.

Demographics in Selective STEM Schools

Corcoran and Baker-Smith (2018) analyzed data from eight specialized high schools in

New York City, quantifying access for students from underrepresented groups. Though none of

these schools are residential, several of them are members of NCSSS, including Brooklyn

Technical High School and The Bronx High School of Science which are founding members.

Stuyvesant High School was also a founding member of NCSSS but no longer appears among

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the list of member schools. The New York City specialized schools exemplify just how competitive admission can be with on average only 5,000 out of 25,000 applicants gaining admittance each year (Corcoran & Baker-Smith, 2018). Corcoran and Baker-Smith simulated seven different admissions procedures to compare with the current system in which admittance is determined solely by the score on a single test taken during eighth grade. Consistent with the concerns raised regarding diversity, Corcoran and Baker-Smith found that CLED students and female students were less likely to qualify for admittance to New York City's specialized schools. Among students with similar performance in math and ELA during eighth grade, "Black and Hispanic students were significantly less likely to be admitted" (Corcoran & Baker-Smith, 2018, p. 268).

In a geographically broader look at STEM schools, Rogers-Chapman (2014) examined access at 52 selective and 221 open-admission secondary STEM schools across the country, some of which are members of NCSSS. The study compared these STEM schools to schools in the same neighborhood or district. Rogers-Chapman excluded the state-run residential schools that are members of NCSSS because of elements of the dataset she used to conduct the comparisons. In contrast to other analyses, Rogers-Chapman found that Black students were overrepresented in the STEM schools that she investigated. However, she notes that this overrepresentation may be a consequence of the higher concentration of STEM schools in urban areas. Casto and Williams (2020) also noted that demographics varied depending on the location of the STEM school, with those in more urban areas seeing a larger proportion of Black students. Rogers-Chapman did find evidence of underrepresentation of Latinx students and students from lower socioeconomic status in both selective and open admission STEM schools. A further confounding factor in analyzing demographics across STEM schools is the lack of common

definition of what constitutes a STEM school as well as the different organizational structure and admissions policies at these STEM schools (Casto & Williams, 2020; Rogers-Chapman, 2014).

Impact of Attending a STEM School

Attending a STEM school is viewed as affording certain benefits to students, adding another reason the underrepresentation of CLED students at these schools is seen as problematic. Three studies help to show the benefits such schools offer. Sayman (2015) conducted interviews and observations at a residential school that is a member of NCSSS, focusing her analysis on the self-esteem and motivation of four Latina students at the school. Frazier et al. (2012) used a similar qualitative approach to develop an understanding of nine Black males' mindsets at another NCSSS residential school. Shi (2020) analyzed data from one of the NCSSS residential schools in a quantitative study designed to determine the impact of attending such a selective STEM school. The faculty at STEM schools are considered to provide a benefit to students attending because of their comparatively greater expertise, the advanced curricula they offer, and their ability to provide valuable mentorship to students (Frazier et al., 2012; Sayman, 2015; Shi, 2020; Thomas & Williams, 2010). Access to technology and well-equipped laboratories are additional advantages available at STEM schools (Sayman, 2015; Shi, 2020). A strong peer group is considered yet another benefit of attending a selective STEM school (Frazier et al., 2012; Shi, 2020). For students, attending the STEM school "appeared to have been an important first step in affirming their potential, academic and otherwise" (Frazier et al., 2012, p. 387). Thomas and Williams (2010) found that "graduates of specialized STEM schools rated their high schools more favorably than their college experiences" and "rated the development of their research skills very highly" (p. 20). Students overall felt they had a more positive view of mathematics and science after attending their STEM school (Frazier et al., 2012; Sayman, 2015).

Shi found that "high achieving students from disadvantaged backgrounds benefit in meaningful ways from attending a selective secondary school" (p. 17). Shi notes that these findings differ from other studies on the impact of selective schools, citing the residential nature of the school as one possible explanation for the difference. Shi concludes, in part, that the positive effect for CLED students warrant increased inclusion in selective schools.

Attending a STEM school is not the solution to all problems, however. While positive effects were observed, Sayman (2015) found that the Latina students in her study experienced lowered self-esteem after matriculating at the school. This came from comparisons with peers as well as class placement. Frazier et al. (2012) noted that some of the students in their study had to navigate racial stereotypes at their school. One student attributed this to the small number of Black students at the school. Although the creation of new STEM schools is often touted as a solution to increasing the number of people working in STEM fields (Executive Office of the President, 2010; Rogers-Chapman, 2014), evidence suggests that attending a STEM school does not make students more likely to pursue STEM careers (Frazier et al., 2012; Shi, 2020). However, Shi did observe that students attending the STEM school were more likely to attend colleges associated with a higher "STEM-intensity" (p. 11), though this label is not precisely defined. These findings provide conflicting information about how attending a STEM school could impact the STEM identity, as described by Collins et al. (2020), of a student of color.

Recommendations for Overcoming Barriers

Overcoming and removing existing barriers to CLED student participation in gifted and advanced academic programming is not a straightforward endeavor. Ford et al. (2021) support this, cautioning allies attempting to address the Gifted Gap that "the current move to dismantle gifted and talented programs and overhaul admissions processes to specialized secondary school

programs have the potential to create more gaps in academic outcomes than are currently experienced" (Ford, 2021, p. 176). Ezzani et al. (2021) emphasize that policy formation can perpetuate and generate inequities and inform how pedagogy is implemented. While there is some agreement about practices that create barriers and those that allow for improvement, research shows there are lingering questions about the effectiveness of the suggested changes. Though it will be important to shift problematic mindsets and conceptions of giftedness, this alone will not eliminate the Gifted Gap. It will also be necessary to evaluate policies and procedures regarding gifted education.

Shifting Mindsets

Problematic mindsets create barriers to CLED students' participation in gifted programming. Further, "decisions focused on deficiency-based interventions rather than equitable opportunities impede serving the needs of underrepresented students" (Ezzani et al., 2021, p. 112). Helping all stakeholders shift their mindsets will help address the resulting detrimental effects. One possible solution is offering culturally responsive professional development that emphasizes different ways giftedness can manifest (Collins et al., 2020; Davis et al., 2020; Ford, 2014; Ford et al., 2021; Jackson, 2020; Michael-Chadwell, 2010; Mun et al., 2021). Ezzani et al. (2021) note how impactful a conceptualization of giftedness can be in crafting policies. Honoring the different manifestations of giftedness can also be addressed by offering services that develop domain-specific talent rather than lumping together students under the "gifted" label (Dixson, 2022; Mun et al., 2021; Peters et al., 2020; Siegle et al., 2016).

Along with developing a better understanding of giftedness, steps to impact student and family mindsets will be helpful. Casto and Williams (2020) suggest that including more culturally relevant curriculum in classes, particularly those that are STEM-related, can increase

CLED student preparation for advanced STEM programming and help them "see" themselves in the field. Mentorship experiences, positive relationships with educators, and giving students voice in their educational experience can also help shift the mindsets of students and families (Siegle et al., 2016). Forming students into cohort groups can further positively impact students' mindsets, giving them the sense of belonging they need to be able to focus on overcoming academic challenges (Davis et al., 2020).

Inclusive STEM Schools

In addressing the barriers to participation in selective STEM schools, some recommend the development of more inclusive STEM schools (Rogers-Chapman, 2014). Rogers-Chapman defines inclusive STEM (I-STEM) schools as "open admission schools focused on preparation for and engagement in STEM fields" (p. 719). This is consistent with how Means et al. (2021) describe I-STEM schools in their quantitative analysis of the impact of attending an I-STEM high schools. Means et al. (2021) analyze five large datasets, including surveys, test scores, and course information, to determine how attending an I-STEM school affected a student's likelihood of entering the STEM pipeline. They found that students who attended an I-STEM high school were more likely to have greater interest in STEM careers. Means et al. report that other studies on the impact of I-STEM have results that conflict with this. However, Means et al. believe their use of multiple large datasets improves the trustworthiness of their results. Johnson and Sondergeld (2020) compared EOC and ACT test scores of students at an I-STEM high school to those of the feeder schools. They describe the I-STEM schools they studied as combining contextual elements from the humanities and fine arts within "a framework that emphasizes the teaching of STEM disciplines by infusing practices of scientific inquiry,

technological and engineering design, mathematical analysis, and 21st century interdisciplinary themes and skills" (p. 5).

The I-STEM model demonstrates positive outcomes for students' college-readiness across the diverse student body (Johnson & Sondergeld, 2020; Means et al. 2021). Johnson and Sondergeld (2020) posited that the more diverse population in the I-STEM program they evaluated resulted from the program being interest-based and allowing for any student to opt-in. They believe that the I-STEM model is successful in decreasing the gap in representation. Similarly, Rogers-Chapman (2014) found that compared to the selective STEM schools, enrollment of White, Black, and Latinx populations was more equal at the I-STEM schools she studied. In the I-STEM schools that Means et al. (2021) studied, students from traditionally underrepresented groups represented a larger proportion of the school than of the population from which they were drawn. According to Means et al., the success of the students in these schools demonstrates that "a much broader cross-section of students can experience sustained, advanced instruction in STEM if given the opportunity and suitable support structures" (p. 16). This further supports the idea that equity and excellence are not mutually exclusive and need not be positioned as opposing aims.

Modifications to Admissions and Identifications

In line with the call for more I-STEM programs, several recommendations for expanding CLED participation in gifted and advanced programming involve widening the pool of students being considered. Specific recommendations include providing multiple pathways into the program (Mun et al., 2021; Siegle et al., 2016; Peters, 2022; Peters et al., 2020), implementing universal screening (Mun et al., 2021; Peters, 2022), or even allowing all interested students to participate in advanced programming (Mansfield, 2016). Still, Johnson and Sondergeld contend

that opt-in programs can also perpetuate the exclusion of CLED families so additional steps must be taken to address related barriers. Factors affecting this could include lack of information or resources to opt in or the inability of students to see themselves in STEM fields (Johnson & Sondergeld, 2020). Peters et al. (2020) insist that broadening the pool of students needs to be accompanied by an increase in funding lest some students are prevented from participating as more students are included in the process.

The selective measures used to determine admittance to programs can inhibit CLED students' access to gifted and advanced STEM programming (Corcoran & Baker-Smith, 2018; Johnson & Sondergeld, 2020). The founders of gifted education advocated for the use of measures such as the Stanford-Binet IQ test, ignoring research pointing to its bias towards those who are White and wealthy (Mansfield, 2015, 2016). In a chapter on intelligence testing and gifted minority students, Valencia and Suzuki (2001) mention an early gifted program that used the Stanford-Binet IQ test in determining eligibility. Although "Mexican American and African American children constituted a growing segment of the public school enrollment" over a five-year period, there were no students from those groups in the program during that time (p. 210). Current identification measures vary and still often rely on test instruments that are culturally biased (Mansfield, 2015; Michael-Chadwell, 2010). For example, the use of standardized tests, sometimes with high test score cutoffs based on national norms, is an ongoing exclusionary practice in identification of gifted students (Ezzani et al., 2021; Peters et al., 2020; Siegle et al., 2016). This is supported by Corcoran and Baker-Smith's (2018) exploration of alternate admissions procedures for New York City specialized schools. Including other components of a students' academic background such as state test scores and course grades from the year prior to matriculation led to some improvement in diversity, although these simulations still resulted in

significant underrepresentation of CLED students. However, Corcoran and Baker-Smith (2018) highlight that the simulations could not account for how altered admissions procedures might impact who chooses to apply to the schools. Conversely, some believe that eliminating standardized testing is not the answer. In an article tackling the reasons for the persistence of underrepresentation in gifted programming, Peters (2022) asserts that focusing on flaws within the testing instruments has contributed to continued inequity. According to him, such efforts "attack the mirror that is simply a reflection of the inequality in American society" (Peters, 2022, p. 87). In a short article responding to Peters (2022), Flynn and Shelton (2022) agree that larger societal factors impact gifted programming but maintain the importance of seeking alternative identification measures for admittance.

Whether or not standardized tests are included as part of the identification process, a common thread for changes to policy and procedures is to have identification processes that allow for more contextualized strategies. Schools have seen some success when they use local instead of state or national norms (Mun et al., 2021; Peters, 2022; Peters et al., 2020). Peters (2022) even suggests instituting building norms since this will emphasize that every school has gifted students. However, some caution that using local or building norms will not fix underrepresentation (Warne & Larsen, 2022). In a quantitative study, Warne and Larsen (2022) share the results of a mathematical simulation designed to examine the interplay of racial integration of schools and racial diversity in gifted programs that use local norms. According to their analysis, the use of building or local norms will be most effective in school districts that are highly segregated. "As schools become more integrated, the ability for local norms to select a representative sample of gifted students becomes more limited (unless there is no achievement gap between groups)" (Warne & Larsen, 2022, p. 285). Echoing the sentiment of Peters (2022),

Warne and Larsen implore scholars and educators to shift their focus to problems outside of gifted programming itself. They state that addressing the "achievement gap" is the best solution to eliminating the Gifted gap. Despite this, Warne and Larsen do still support the use of building norms as a short-term solution to addressing underrepresentation noting that these norms are an improvement on district or national norms even though they do not result in proportionality that perfectly matches that of the school.

Flynn and Shelton (2022) offer a caution for the use of local norms but for a different reason. They note that using a standardized test but using local norms for different demographic groups can reinforce deficit-thinking by sending the message that students from historically marginalized groups are not as academically capable. Instead, they advocate for alternative measures that can "help build more comprehensive, inclusive, and accurate conceptualizations of academic ability" (Flynn & Shelton, 2022, p. 144). Identification criteria based on multiple assessments including non-verbal components and portfolios could be effective alternatives (Michael-Chadwell, 2010; Mun et al., 2021, Siegle et al., 2016). Conversely, Peters et al. (2020) express the concern that such assessments are more subjective and thus introduce the potential for additional bias in the process. Peters et al. also warn against the subjectivity of relying on teacher and parent referrals. Though not necessarily agreeing with these cautions, Mansfield (2016) recognizes that alternative assessment measures may be criticized for introducing too much subjectivity in the selection process.

Impacting Students Prior to Identification

Other recommendations focus on the need to consider impacts on students prior to the identification process for gifted programming. CLED students may lack access to engaging, culturally relevant experiences that provide opportunities for them to demonstrate their potential

(Davis et al., 2020; Ford et al., 2021; Jackson, 2020; Johnson & Sondergeld, 2020; Mun et al., 2021; Peters, 2022; Rogers-Chapman, 2014; Sayman, 2015; Siegle, 2016). Corcoran and Baker-Smith (2018) found that most students admitted to the New York City specialized high school came from a relatively small group of middle schools. This seems to support the idea that the opportunities provided prior to matriculation are quite impactful. Sayman (2015) emphasizes that a lack of cultural capital further hinders some CLED students' access to gifted programming and selective STEM schools. Additionally, high-ability students from diverse backgrounds may have experienced the detrimental impact of years of academic disengagement prior to attending selective secondary STEM schools (Frazier, 2012; Sayman, 2015). To combat this and increase diversity in STEM, schools should create opportunities for CLED students to engage in STEM enrichment programs and increase students' awareness of various STEM opportunities (Collins et al., 2020; Jackson, 2020). Davis et al. (2020) highlight that online and distance education can provide learning opportunities in places where students do not otherwise have access to advanced educational experiences. Siegle et al. (2016) suggest a multi-phase approach for successfully diversifying the gifted population: "pre-identification, preparation, identification, intervention, and outcomes" (p. 116). Mentorship and classroom enrichment offered during the pre-identification and preparation phases will provide experience that will help students in future advanced programs. Collins et al. (2020) also note that mentorship opportunities, particularly with mentors from culturally diverse backgrounds, can help develop a Black student's STEM identity.

Intentionality and Coalition Building

According to Mun et al. (2021), success will only be realized when equity, diversity, and inclusion are at the forefront of a program's mission and work. Others support the idea that

intentionality in seeking equity is a key ingredient in successful initiatives (Ezzani et al., 2021; Ford et al., 2021; Peters et al., 2020). Ezzani et al. assert that this can lead to other positive steps such as data-driven decision-making and adaptation of school processes. Specifically, they recommend that leaders establish an equity policy to guide the processes and policies in gifted and advanced academic programs.

Ezzani et al. (2021) also mention the need for communication with stakeholders and coalition building in establishing equitable programming. Michael-Chadwell (2010) agrees that improved communication to parents and educators is a critical component to include. Sayman (2015) further recommends that schools identify strategies for successfully recruiting students of color into gifted programming and residential STEM schools. Casto and Williams (2020) encourage schools to reach out to community liaisons from culturally diverse organizations to accomplish this. Jackson (2020) suggest that schools offer information sessions for parents starting in elementary school so that parents, particularly those from underrepresented groups, can be well-informed about the benefits of STEM schools and the steps necessary to apply. Ford et al. (2021) also emphasize the importance of engaging with families, community members, educators, and scholars of color when making policy changes. Valencia and Suzuki (2001) specifically note that their review of literature indicates that "the role of parents of gifted minority students needs to be considered as an additional principle in the identification" process (p. 247). These findings emphasize that successful initiatives will not be possible alone. Educators who seek to improve equity in selective programs will need to work to build a coalition of community members to help.

Establishing and Evaluating Measurable Goals

Incorporating ongoing evaluation of policies and their impact on CLED student inclusion will also be essential (Ezzani et al., 2021; Michael-Chadwell, 2010). Educational leaders and policy makers should establish concrete, measurable goals by which progress can be evaluated. For example, Crabtree et al. (2019) suggest that selecting the top ten percent of the high achievers at each school could help address disparity based on the poverty level of the schools within a district. Supporting this, Corcoran and Baker-Smith's (2018) simulation that gave priority to students whose scores were among the top ten percent at their middle school was the only variation that led to a racial and ethnic distribution that closely matched the general education population. Ford (2014) describes an equity index as a measure by which educational leaders can establish equity goals. This can help leaders identify representation targets while also allowing for variations that may prevent strict proportional representation from being attainable. However, some assert that larger societal problems, particularly related to poverty, prevent true equity from being achievable (Peters, 2022; Peters et al., 2020). They therefore caution against aiming for gifted populations that perfectly match the representation in the general education pool.

Conclusion

Underrepresentation of CLED students in programming with selective admissions processes, such as gifted education and selective STEM schools, has been evident throughout the history of these programs. This Gifted Gap is due in large part to deficit-thinking framing attitudes towards students of color and students from other marginalized groups. We see this in the writings of the founders of gifted education as well as in statements from current educators. A lack of access to the cultural capital needed to engage in gifted programming coupled with

existing gaps in representation in such programming have further contributed to barriers for families of color to enter gifted programming and the STEM pipeline. The Gifted Gap is not without consequences. In addition to perpetuating deficit mindsets, the Gifted Gap has led to segregation within schools and increased segregation in school districts. Scholars also perceive not participating in gifted programming as limiting future opportunities for students.

While scholars agree that the Gifted Gap is problematic, there is not widespread agreement about the best solutions to address it. Some suggest education aimed at changing mindsets and helping educators develop a more nuanced understanding of how giftedness can manifest. Other suggested measures focused particularly on admissions processes and procedures. But there is a broad spectrum for what these modifications might entail, with solutions ranging from small changes to how admission elements are used to allowing for completely open admission. Many scholars suggest that educational opportunities prior to student admission are of paramount importance. So, steps taken during the time leading up to admissions process can be impactful.

Additional studies about admissions to selective STEM schools would add to the body of scholarship regarding these schools. Current studies regarding selective STEM schools include those that analyze admissions and those that focus on the impact on students while they are in attendance. However, while studies concerning the impact on students include both quantitative and qualitative approaches, there seems to be limited qualitative studies regarding admissions.

Several scholars (Ezzani et al., 2021; Michael-Chadwell, 2010; Mun et al., 2021; Plucker et al., 2017) emphasize the importance of educational leaders along with the policies they craft and implement in addressing underrepresentation in gifted and advanced academic programming. To move towards reducing the Gifted Gap, intentional consideration of equity is

necessary (Michael-Chadwell, 2010; Mun et al., 2021). My study addresses this gap in the existing body of literature, adding a qualitative study to literature on selective STEM schools. Given the stated importance of an equity focus on selective programming, the understanding developed through my study can inform future crafting of selective STEM school admissions policies and procedures that forefront equity.

CHAPTER III: THE WHO, WHAT, AND WHY

In this chapter, I describe the overarching structure of each school to contextualize the results that follow in this and subsequent chapters. I also present my findings regarding my first research question: What is the philosophy, mission, and vision at these schools? As noted in Chapter I, my description of my findings relies on a qualitative approach in which I deeply explored documents for the schools through an iterative process. After reporting on my findings in this and the following chapters, I will provide an analysis in Chapter VI. The school philosophy, mission, and vision were communicated in a variety of ways in the publicly available documents that I reviewed. Along with explicit mission statements, this information is communicated through other means including formal and informal statements on the schools' website pages, in interviews for news articles, and in board documents. Through these sources, each school conveyed its philosophy, mission, and vision by describing who the school is for, what purpose the school is meant to serve, and why the school takes the approaches it does.

School Structure

As noted in Chapter II, STEM schools may have different organizational structures which will in turn influence their stated purpose and policies. Therefore, I begin by describing the structure of each of the three STEM schools on which I have chosen to focus. The structure includes the governing bodies, number and grades of the students served, student fees, and other logistic elements.

Illinois Mathematics and Science Academy

Illinois Mathematics and Science Academy (IMSA or Illinois MSA) was established in the late 1980s via Illinois statute 105 ILCS 305, referred to as the "IMSA Law" (IMSA Law, 1985 & rev. 2019). Illinois MSA is governed by a board of trustees with the IMSA Law dictating

the composition of this board. Some of the board members are appointed by the Governor or State Superintendent of Education while others are ex-officio members. The IMSA Law also stipulates that the board-selected school director will "administer the rules, regulations, and policies adopted by the Board" (section 4, para. e). The day-to-day operations are indeed governed by a "President" who is selected and evaluated by the board of trustees. The Illinois MSA board of trustees is overseen and funded by the Illinois Board of Higher Education rather than the Illinois Board of Education like traditional public schools.

Located in the city of Aurora, Illinois MSA includes tenth through twelfth grade students from across the state. As seen in Figure 1, Aurora is a suburb close to Chicago. Aurora has a higher-than-average Latinx population and Spanish-speaking population for Illinois, and an above average median household income compared to Illinois (United States Census Bureau, 2024a). Illinois MSA student enrollment remains consistent at approximately 650 total students (IMSA, 2023a). While state residents who are admitted do not pay tuition, the school began accepting a limited number of out-of-state students who pay tuition in 2023-2024. This followed a 2019 update to the IMSA Law (1985 & rev. 2019) that allowed for this change (Lin, 2018). Though there is no fee for tuition or room and board for in-state students, there are application fees and student fees. These fees are on a sliding scale and can be waived for those who are eligible for free or reduced-price lunch. For a student attending tenth through twelfth grade, the current overall fees during the total time of enrollment range from approximately $2,000 to approximately $20,000 (IMSA, 2023b), thus averaging between around $667 and $6,667 per year. I found no details on the website that might help a family readily determine what their fees would be.

Along with their residential program, Illinois MSA has multiple other initiatives designated as "Youth Outreach" (IMSA, 2023c). These include summer and weekend programming for kindergarten through ninth grade as well as an online research experience for high school students during the academic year. Additionally, Illinois MSA's grant-funded program called PROMISE, first started in 1995, is "designed to support Black or African American students, Latinx students, students who qualify for the national free or reduced-price meal program, as well as students from rural Illinois counties" (IMSA, 2023d). According to Miller and Coleman (2014), PROMISE is a "pipeline program" (p. 2) unique to Illinois MSA designed to encourage Illinois students from underrepresented backgrounds to attend Illinois MSA and pursue STEM careers. The PROMISE program "addresses the unique challenges of culturally, linguistically, and economically diverse (CLED) students who have an interest in STEM education by providing academic enrichment programming at low to no cost" (IMSA, 2023d). Students in seventh through ninth grade can apply to participate in the PROMISE programs held on weekends during the school year or for the summer program. According to the Illinois MSA President, "seventy-eight percent of PROMISE participants eventually apply to and are admitted to the school" (Wright et al., 2022, p. 5).

The Maine School of Science and Mathematics

The Maine School of Science and Mathematics (MSSM or Maine SSM) was established by the Maine legislature in the mid-1990s and is governed by its board of trustees (MSSM, 1993 & rev. 2011). Like Illinois' IMSA law, the Maine state statute describes the composition of the board with most positions appointed by the Governor. The board of trustees reports directly to the Governor and the state legislature. The day-to-day administration of the school is overseen by the school's "Executive Director."

Maine SSM includes ninth through twelfth grade students from across the state with enrollment varying between approximately 120 and 140 total students (MSSM, 2023a). The financial page indicates that they offer some spots to students outside of Maine (MSSM, 2023b). Maine SSM is in Limestone, a rural area in northeast Maine; its remote location appears to be unique among NCSSS residential schools (Hart Consulting, 2020). Limestone, Maine is roughly due north of Fort Fairfield and east-northeast of Caribou (see Figure 2). The small town of Limestone has slightly under 900 residents, with a median household income just over half of the median household income of Maine and a slightly larger proportion of people who identify as White than Maine (United States Census Bureau, 2024b). The school was established at its location when an Air Force based closed down and discussions about how to use the space generated interest in a STEM-focused school (MSSM, 2023a) There is no tuition for state residents, however there is a room and board fee of approximately $10,000 per year (MSSM Board of Trustees, 2021). The exact amount had previously been shared on the website but was removed with a recent update to the website. Now, this page notes that there is a yearly fee, but it does not provide the amount (MSSM, 2023b). Families can complete a financial aid process similar to that of college financial aid processes to decrease these fees (MSSM, 2023b).

In addition to their residential school year program, Maine SSM offers residential STEM summer camps for either one or two weeks for students ages 10 to 14. According to an internal research paper comparing Maine SSM to other NCSSS residential schools (Hart Consulting, 2020), between seventy and ninety percent of Maine SSM students attended one of Maine SSM's summer camps before matriculation, demonstrating just how impactful these other offerings can be for access to the institution. In a letter to the Maine legislature in March 2021, the Maine SSM board of trustees noted that the limited financial support from the state prevents them from

engaging in other outreach activities unlike many other NCSSS schools (MSSM Board of Trustees, 2021). Maine SSM had received grant funding to provide a STEM-focused professional development during the summer of 2020, but it was rescheduled due to the COVID-19 pandemic (Hart Consulting, 2020).

The Mississippi School for Mathematics and Science

The Mississippi School for Mathematics and Science (MSMS or Mississippi SMS) was also established in the late 1980s via a state code but is governed by the Mississippi Board of Education (MSMS 1987 & rev. 2020). The code states that the board may delegate governance decisions to a school director. This has historically been the case with the position titled, "Executive Director." According to the Mississippi SMS student handbook, the Mississippi Board of Education appointed an advisory board "that provides the Executive Director and the State Superintendent with thoughts, ideas, and suggestions on matters relating to the effectiveness and efficient operation of the school" (MSMS, 2023a, p. 2).

Mississippi SMS includes both eleventh and twelfth grade students from across the state with an enrollment of approximately 240 total students. The state statute stipulates that Mississippi SMS will share the campus of the Mississippi University for Women (MSMS, 1987 & rev. 2020, §37-139-3), which is in Columbus, Mississippi. As seen in Figure 3, Columbus is in northeast Mississippi near the border with Alabama. The median household income of Columbus is slightly lower than the state median, and the racial demographics show a larger percentage of Black residents and smaller percentage of White residents compared to Mississippi (United States Census Bureau, 2024c). While tuition to Mississippi SMS is covered by funding from the Mississippi Board of Education, students are charged a yearly $1,000 room and board fee (MSMS, n.d.-a).

Like Illinois MSA and Maine SSM, Mississippi SMS offers summer programs. They have three different weeklong summer camps (MSMS, n.d.-b). The African American Youth of Mississippi Excelling Camp is "for 8th – 10th grade students who identify as African American and demonstrate potential for high academic achievement" (MSMS, n.d.-b). Mississippi SMS also hosts an ACT workshop during the summer open to any high school student with a current ACT score, a "STEM Carnival" for second and third grade students, "participates in a variety of traveling STEM carnivals through partnerships with various school districts, local businesses, and non-profit organizations" (MSMS, n.d.-c), and hosts a math competition and a science bowl for middle school students. An "Energy Awareness Day" event is cited as drawing over "1,000 Mississippi students, teachers and consumers" (MSMS, n.d.-d). Mississippi SMS also provides a distance learning program in which a Mississippi SMS teacher leads an algebra course for eighth grade students in another school district (Skinner, 2019).

Summary of Governance and Structure

A summary of the governance and structure information for the three schools is shared in Table 2. The size of the student body and the exact grades served vary for each institution with all serving at least eleventh and twelfth graders. Although the governance structure is different at each school, in each case there is an onsite administrator tasked with the day-to-day operations and policy enforcement while another body is charged with developing these policies. The main variation in governance is what those bodies are. Both Illinois MSA and Maine SSM have a school-specific board of trustees while Mississippi SMS is governed by the state Board of Education, as other public high schools in the state are. Mississippi SMS does have an advisory board appointed by the Board of Education. However, it is unclear the extent to which the advisory board is involved in decision-making or policy enforcement. Although all three schools

assert that they are tuition-free, the yearly fees can be quite steep. Each school mentions financial

aid or a flexible scale, but there is little detail readily available about how this is determined or

about what specific decreases in fees are possible. All three schools offer programs in addition to

the residential programming for admitted students, with both Illinois MSA and Mississippi SMS

offering summer opportunities specifically for CLED students.

Table 2. Summary of School Governance and Structure

School	State	Grades	Size [a]	Yearly Fees	Governing Bodies
IMSA	Illinois	$10^{th} - 12^{th}$	650	$667 – 6,667	IMSA President IMSA Board of Trustees Illinois Board of Higher Education
MSSM	Maine	$9^{th} - 12^{th}$	120 – 140	$10,000	MSSM Executive Director MSSM Board of Trustees Maine Governor/Legislature
MSMS	Mississippi	$11^{th} - 12^{th}$	240	$1,000	MSMS Executive Director MSMS Advisory Board Mississippi Board of Education

[a] Size refers to the approximate number of students enrolled in the residential program.

Figure 1. Map of Illinois (Source: Nations Online Project, 2024a)

Figure 2. Map of Maine (Source: Nations Online Project, 2024b)
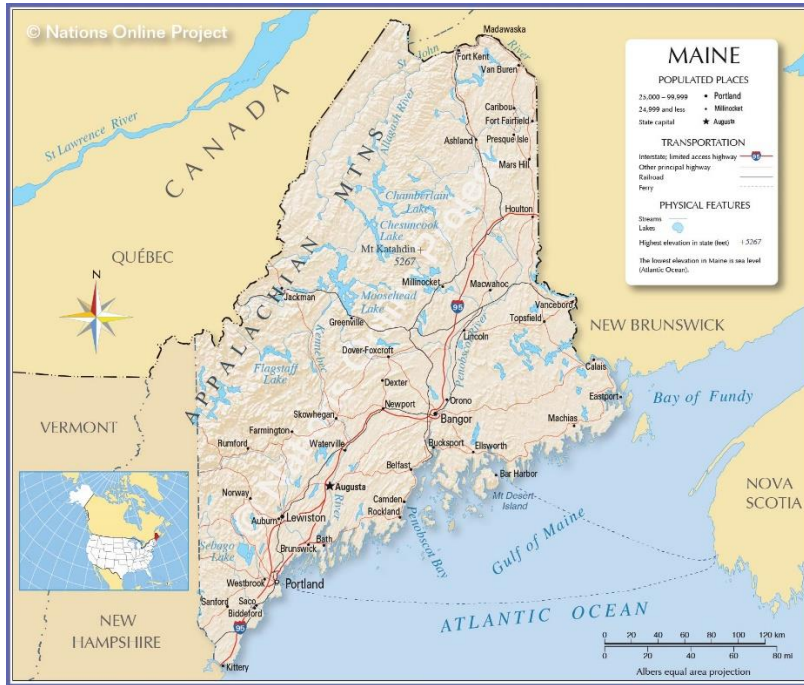
Figure 3. Map of Mississippi (Source: Nations Online Project, 2024c)
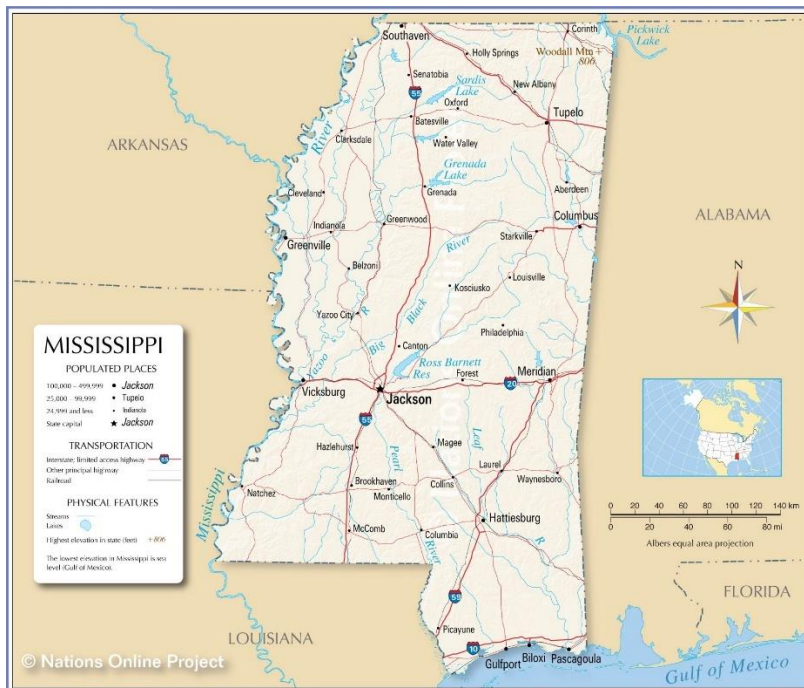
<center>**School Purpose**</center>

On each school's website, the school mission is prominently displayed, often along with vision statements, beliefs, school history, and other contextual information about the school. The state statute that established each school also has information about the intended purpose of the school. This is expanded upon in later communications, both those published on the school websites and those included in interviews with school leaders. The purpose at each institution encompasses serving students who attend the school as well as impacting the state more broadly.

Illinois MSA: A Learning Laboratory

The IMSA Law (1985 & rev. 2019) begins with a multiple paragraph section detailing the purpose of Illinois MSA. According to this statute, Illinois MSA was established to serve the people of the state and act as a "catalyst and laboratory for the advancement of teaching" (section 1, para. 1). It goes on to say that the school's main purpose is to "offer a uniquely challenging education for students talented in the areas of mathematics and science" (section 1, para. 2) but that it has an additional "responsibility to stimulate further excellence for all Illinois schools in mathematics and science" (section 1, para. 3). The statute then offers some specific actions that could be taken to achieve the latter purpose. In these statements, we see the mixed purpose of the school was evident from its founding: Illinois MSA has a responsibility to serve the students who attend but also impact STEM education throughout the state.

Illinois MSA's stated mission is "to ignite and nurture creative, ethical, scientific minds that advance the human condition" (IMSA, 2023a). The mission is accompanied by a list of beliefs which are broad statements about people's worth and responsibility, relationships, and the nature of both learning and life. Language related to acceptance and inclusion is incorporated in statements such as "All people have equal intrinsic worth," "commitment to the common good,"

<center>55</center>

and "Diverse perspectives enrich understanding and inspire discovery and creativity" (IMSA, 2023a). The full list of Illinois MSA beliefs is provided in Appendix B. In a recent addition to its website, the vision of Illinois MSA is outlined via five "themes" and is prefaced by a statement of Illinois MSA's "unwavering pursuit of both excellence and equity" (IMSA, 2023f). These themes include a focus on infrastructure and technology. In particular, the initiatives include improved facilities for residential students, development of an artificial intelligence center, and both online and statewide "hubs" (IMSA, 2023f).

In slides linked from the vision page, more information is provided about Illinois MSA's purpose (IMSA, 2023g). The slides speak to innovation, inquiry, "transcending educational boundaries," providing "challenging education," and assisting in "excellence in STEM for all Illinois schools" (slide 2). An additional belief statement is provided here as well: "we believe in challenging the status quo by customizing the learning experience so that all students can excel, especially those from culturally, linguistically, and economically diverse backgrounds" (slide 2). In a document outlining the Illinois MSA 2022 strategic improvement plan, the school's "North Star" states that Illinois MSA is "devoted to changing the trajectory of teaching, learning, and life experiences" (IMSA, 2022a, p. 1). Illinois MSA's admissions page states that the school was formed to "develop talent and leadership" in STEM (IMSA, 2023e, para. 2). Additionally, the page states that Illinois MSA is "designed to foster a love of lifelong, learning, problem-solving, and critical thinking" as well as help students "pursue a meaningful, worthwhile career path" (para. 8).

Articles written about the school also speak to the Illinois MSA's purpose. Illinois MSA is frequently described as a "learning laboratory" (IMSA, 2022b; Ni, 2021; Krishnamurthy, 2014). In an article addressing equity and excellence in selective high schools, the Illinois MSA

President and a member of the Illinois MSA board of trustees describe Illinois MSA's purpose as "identifying and preparing students with interest and talent in science, technology, engineering, and mathematics (STEM) education to become innovative leaders in those fields, and ultimately to become contributors to solutions for major societal problems" (Wright et al., 2022, p. 3). A "WIRED" article about Illinois MSA mentions Illinois MSA's mixed purpose as well: According Finley (2013), the school was created to be "a boarding school that focuses on math and science for gifted youth, providing them with resources other public schools couldn't" (Finley, 2013, A Birth of IMSA). Later, the article notes that the school is "tasked not just with educating its already elite students but improving math and science education across the state" (Finley, 2013, Can it be Cloned? section). Finley does not directly indicate what makes Illinois MSA students elite but seems to tie this to the students' advanced academic interests in areas such as "string theory, fluid dynamics, or other scary subjects" (Finley, 2013, Can it be Cloned? section). Another news article describes the goal of Illinois MSA's creation as being "to prepare a workforce of engineers, researchers, and computer programmers that could serve Illinois" (Loewus, 2014, Legislative Charges section).

The Illinois MSA 2022 strategic implementation plan priorities help identify what the leaders consider to be important elements of the school's purpose as well. There are four identified priorities (IMSA, 2022a) which are provided in Appendix B. These priorities again address actions within the residential school community as well as those aimed at serving educators throughout the state and students outside of the state. The first priority listed is to "close equity gaps of excellence in STEM" (IMSA, 2022a).

The attention to equity and diversity is also noted in an article published on the Illinois MSA website to announce the appointment of the current school President (IMSA, 2021). The

chair of the board of trustees emphasizes Illinois MSA's "vital initiatives in STEM innovation and diversity, equity, and inclusion" (para. 5). This commitment is echoed in the board's equity and excellence policy which states that the school leadership is "committed to advancing equity in STEM education and representation and creating a diverse, inclusive community of global citizens who can realize their full potential, and execute our mission" (IMSA 2018, para. 1).

Maine SSM: Leader in Curriculum & Community

In contrast to the extensive IMSA Law, the Maine statute (MSSM, 1993 & rev. 2011) provides limited details about the school purpose. According to the statute, Maine SSM's purpose is "providing certain high-achieving high school students with a challenging educational experience" (§8201). The statue also stipulates that the curriculum should "exceed existing state educational standards" (§8202). According to the local superintendent at the time the school was being established, Maine SSM was intended to eventually become "a resource for all Maine schools" (Clark, 1993, p. 14) though this is not specifically stated in the Maine statute. The statute does indicate that the plan for the school "must include, but is not limited to, offering short courses, workshops, seminars, weekend instructional programs, distance learning and various other programs of short duration for teachers and students" (§8206, section 2). In an article discussing funding challenges of the school, the then Executive Director noted that from the founding, "the vision was to make the school accessible to all Maine families" (Lizotte, 2023, para. 23).

Maine SSM's mission statement is longer than that of Illinois MSA and is accompanied by both a vision statement and a philosophy statement. The mission states that Maine SSM:

> [B]rings together and helps a group of Maine's most academically motivated high school students become innovative, well-rounded scholars with the ability to develop,

investigate, and communicate critical ideas that improve the human condition and benefit

the state of Maine. The school builds and shares a rigorous curriculum that exceeds state

educational standards while emphasizing connections between science, mathematics, and

the humanities. MSSM extends its mission by fostering a statewide, year-round

community of innovative learners that includes many of Maine's students, educators, and

the general public. (MSSM, 2023c)

Another page of the website states that the mission of Maine SSM is "to create educated citizen-

leaders who will benefit their communities in the state of Maine and beyond" (MSSM, 2023d,

Portrait of the Graduate section).

The full vision statement is provided in Appendix C. According to the vision statement,

Maine SSM's mission will be achieved through the curriculum, opportunities, and environment

the school provides for its students (MSSM, 2023c). The vision statement also includes an item

about providing programming to "inspire younger students" and being a "professional

development partner" for other educators in the state (MSSM, 2023c). Extrapolating from the

"Portrait of a Graduate," it seems that Maine SSM is intended to help students develop mastery,

resilience, and self-awareness while engaging with community and developing a sense of

purpose (MSSM, 2023d). The underlying beliefs of the Maine SSM stakeholders are expressed

in a philosophy statement rather than in a bulleted list of beliefs as was seen on the Illinois MSA

website. The full statement is also provided in Appendix C. The statement reiterates some of the

points included in the vision statement including the importance of the curriculum and the

community developed (MSSM, 2023c). However, the philosophy statement focuses more on the

expectations of the students. The statement asserts that attendance at Maine SSM is a "privilege"

that requires students to be "dedicated to the academic and residential programs" and

"responsible for taking advantage of the academic and extra-curricular pursuits available at Maine SSM and for supporting community members in both their academic and personal development" (MSSM, 2023c, Philosophy section).

In slides expressing a vision for Maine SSM included in the 2021 annual report draft, the vision of Maine SSM is as a "residential high school providing a nationally recognized academic experience in a safe and supportive environment for many of Maine's highest achieving students, which actively shares its expertise and resources with other schools around the State of Maine" (MSSM, 2021, p. 30). In an equity and diversity letter from the board of trustees, faculty, and staff, the groups express "dedication to providing an equitable, safe, dynamic community for our current students, our future students, and the diverse communities we serve" (MSSM, 2023e, para. 1). It is further stated that "the Board of Trustees and the Administrative team plan to review our admissions process to ensure that we are reaching as many of Maine's underserved and underrepresented students as possible" (MSSM, 2023e, para. 6).

In the 2020 annual report addressed to the Maine Governor and a legislative committee, the chair of the board of trustees states that the school is "focused on answering the question of how MSSM can better meet the needs of the State of Maine regarding the STEM education of high school students" (MSSM, 2020a, p. 1). An additional belief is also expressed in the executive summary of that report when it is stated that Maine SSM students "have demonstrated that all students, when given the opportunity, can compete and excel on both national and international stages" (p. 4). According to that report, Maine SSM's purpose is both to be "the STEM high school for Maine's high-achieving students" and to focus on "helping all Maine's local districts provide their students with the most advanced science and math classes" (MSSM, 2020a, p. 4). In these statements, we see an echo of Illinois MSA's mixed purpose. This report

goes further in stipulating that the goal of this is, at least in part, to "seed [Maine's] STEM economy" (p. 4) From this we see a further purpose: Maine SSM will not just help improve education in the state but will also positively impact Maine's economic future.

The 2020 annual report also contains the Maine SSM 2019 strategic plan. A summary statement for the strategic plan indicates that "MSSM shall be a recognized leader in the delivery of secondary STEM education, a vital partner to Maine public schools, and a valued, accessible resource for students and instructors across the state" (MSSM, 2020a, p. 124). This is broken down into three categories of initiatives, provided in Appendix C, delineated as "strengthening its on campus program," "expanding its impact across Maine," and "enhancing its faculty/staff and facilities" (p. 124). The strengthening of the on-campus program is noted to include reaching students "no matter their socio-economic circumstances or geographic location" (p. 125).

Mississippi SMS: An Economic Engine

As with Maine SSM, the code (MSMS, 1987 & rev. 2020) establishing Mississippi SMS is brief. The code stipulates that the purpose of Mississippi SMS is "to educate the gifted and talented students of the state, and its curriculum and admissions policies shall reflect such purpose" (MSMS, 1987 & rev. 2020, §37-139-3). An entry in the Mississippi Encyclopedia explains that a committee tasked with devising a plan for the school stated that Mississippi SMS "would recognize the unique value, needs, and talents of academically advanced students" and serve as "an economic engine for the state by attracting more educated families and helping to produce better-educated and more highly skilled workers" (McCaleb, 2018, para. 3). The plan also said students would "come from across Mississippi without regard for racial, social, or economic background" (para. 3).

The stated mission of Mississippi SMS is to:

[E]nhance the future of Mississippi in the global society by meeting the individual needs of gifted and talented students through providing innovative learning experiences and leadership development in a residential environment. In addition, we will provide quality educational leadership for other educators and aggressive outreach programs that impact students across Mississippi. (MSMS, n.d.-e)

The tagline throughout the website and promotional materials is "An opportunity for excellence" (MSMS, n.d.-e). There are no additional explicit statements about Mississippi SMS's beliefs, vision, or philosophy directly posted on the website. However, the student handbook available under student resources on the site contains a list of beliefs and a statement of philosophy, both provided in Appendix D. While Illinois MSA's belief statements seem to reflect the philosophical underpinnings of the school's perspective, Mississippi SMS's list of beliefs enumerates what Mississippi SMS gives stakeholders (MSMS, 2023a). These beliefs address the courses, technology, and "living-learning environment" (p. 11) provided by the school as well as actions Mississippi SMS takes to enhance education in the state and include members of the community. It is not clear whether "community" refers to the interior school community only or is inclusive of the broader state community. The multi-paragraph philosophy statement addresses Mississippi SMS's belief about students, asserting that Mississippi SMS will meet the needs of students with a variety of backgrounds and interests to help each "progress to reach their maximum potential" (p. 11). The philosophy statement also mentions the importance of the faculty and staff and the desire for them to be creative and to seek professional development as they support student growth.

I did not find a strategic plan for Mississippi SMS. The lack of a strategic plan may be related to Mississippi SMS being governed by the state Board of Education rather than a school-specific board of trustees. The Mississippi Board of Education strategic plan contains state-wide and broad goals with nothing specific about Mississippi SMS (Mississippi Board of Education, 2023). The Mississippi Department of Education also has a "state plan to ensure equitable access to excellent educators" (Mississippi Department of Education, 2015) and a plan for the implementation of the *Every Student Succeeds Act* (Mississippi Department of Education, 2017). Neither of these plans mention initiatives about Mississippi SMS. Additionally, the long list of stakeholders for the former did not include any representatives from Mississippi SMS.

Although Mississippi SMS did not have a strategic plan available, the student handbook includes a list of goals similar to those found in strategic planning documents at the other schools. These are provided in Appendix D. The goals include statements about the nature of the residential community and coursework provided to its enrolled students as well as ensuring awareness of the school outside its walls and providing resources for educators and students throughout the state (MSMS, 2023a). On a page dedicated to legislative outreach, Mississippi SMS's value to the state is outlined (MSMS, n.d.-f). The values fall under three categories: Mississippi SMS "enhances collective prosperity," "ensures the future economy," and "promotes opportunity regardless of zip code" (MSMS, n.d.-f, MSMS's Value to Mississippi section). The full statements, provided in Appendix D, contain considerable overlap with the philosophy and goals by addressing opportunities for the "gifted and talented students" and the work Mississippi SMS does throughout the state. The legislative outreach page also states that "MSMS serves students across the state with STEM-based learning experiences, such as distance education,

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summer enrichment camp, middle school science bowl, math tournament, and science carnival"

(MSMS, n.d.-f, MSMS Priorities section).

Along with these statements intended to convey the purpose and beliefs of Mississippi

SMS, the purpose of Mississippi SMS is addressed in a variety of other articles in which

expressing this was incidental to addressing another point. In a statement posted on the

Mississippi SMS website that address the "current situation that causes us to reflect on the unjust

treatment of humanity, in particular African Americans," a former Mississippi SMS Executive

Director expresses "hope that our graduates will serve as future leaders of this state" and that the

Mississippi SMS community is "committed to learning, growing, and changing together until

there is justice for all" (MSMS, n.d.-g, para. 1). In a 2014 news article about the school in "The

Atlantic" administrators express a "vision for improving not only the lives of each and every

student, but reaching far into the state of Mississippi" (Fallows, 2014, para. 14). The Mississippi

University for Women's archive inventory contains a statement that Mississippi SMS was

created "to serve as an economic development tool to attract gifted students and produce highly

educated workers" (MSMS Records, n.d., p. 1). In a Mississippi SMS student newspaper article

about a new head of the Mississippi SMS Foundation, a fundraising body for the school, the new

head of the Foundation is said to believe "MSMS presents an opportunity to increase literacy for

STEM learning and to promote more viable industry job options in Mississippi" (Sanders, 2014,

para. 6). In a 2016 news article, the Executive Director is described as seeing Mississippi SMS as

contributing to the STEM pipeline (Harris, 2016). In that same article, an alumnus of Mississippi

SMS focuses on a different perceived purpose. According to the article, this alumnus views

Mississippi SMS as providing "a gateway to success for students in the state who are

economically, locationally and educationally disadvantaged" and that this is at the core of why

the school was established (Harris, 2016, para. 1). The Mississippi SMS 2002 annual report states that Mississippi SMS was "created to enhance the future of Mississippi" (Mississippi Department of Education, 2002, Overview section). On a page describing the history of Mississippi SMS, the legislator who introduced the legislation for the creation of Mississippi SMS is quoted as having said that Mississippi SMS would provide:

> [A]n opportunity to help ourselves by pinpointing the really, really bright students in our state and taking them out of a normal secondary education and putting them in a highly competitive environment of their own, where they could challenge each other and develop their knowledge and skills to the ultimate degree (MSMS, n.d-h, para. 4).

Student Portraiture

Throughout the documents I reviewed, the schools communicate attributes of current students or prospective students. This is addressed to some extent in the mission, vision, belief, philosophy, and purpose statements that I shared above but is included in other statements as well. Maine SSM also does this explicitly with a webpage devoted to describing a "Mission Appropriate Student" and "Portrait of a Graduate" (MSSM, 2023d). Even when not as overt, the school or those writing about the school often provide descriptions of students or graduates. Themes emerged in these descriptions that convey messages about who the school is intended to serve and include. While there is some overlap between the schools, the prevalence varies from school to school. In this section, I share an overview of these characteristics and then revisit them in connection with my other findings in Chapter VI.

Academic Ability

Although Mississippi SMS is the only school to include "gifted and talented" in their mission statement, all three schools' students are frequently described as gifted, talented, or

academically advanced. Those who specifically show talent in mathematics and science are identified as particularly well-suited to attend Illinois MSA. The Illinois MSA admissions policy also notes that "behaviors consistent with research on gifted students in math and science" are considered in the selection process (IMSA, 2023h, section 6B). The term "gifted" is not used much in the Maine SSM documents I collected, however a 2020 pamphlet available online includes the tagline "MSSM gives the gifted a peer group" (MSSM, 2020b).

Illinois MSA and Mississippi SMS students are both referred to as "high achieving." Maine SSM documents often seem to tie high achievement to performance on standardized tests (Hart Consulting, 2020; MSSM, 2020a). Though a draft of the Maine SSM 2021 annual report states that Maine SSM has "expanded its definition of success in academics beyond test scores" (MSSM, 2021, p. 7). In a similar vein, there is a perception that Mississippi SMS "seeks out Mississippi high school sophomores with strong grades and standardized test scores" (Skinner, 2019, The admissions process section). Students at Mississippi SMS are also frequently referred to as the "best and brightest" in the state. This phrase is also used to describe Illinois MSA students (Yue, 2018, para. 2). Mississippi SMS is also specifically noted as good for those who were "not appropriately challenged" at their previous school (McCaleb, 2018, para. 1).

Student Mindset Attributes

While academic ability was emphasized at all three schools, there were many additional characteristics that were attributed to successful applicants or students. While some can be correlated with academic achievement, such as motivation or dedication, I viewed these characteristics as falling under a student's mindset in their approach to life and learning. Even though the exact descriptors varied, many fell under the categories of academic motivation, independence, curiosity, and uniqueness.

Both Illinois MSA and Maine SSM frequently refer to the high level of motivation of their students. Illinois MSA uses the term "highly motivated" while Maine SSM calls their students "academically motivated." Mississippi SMS does not mention this, but students are said to be "selected for their work ethic" (Fallows, 2014, para. 15) and as having "the desire to work for what they want to achieve" (MSMS, n.d.-e, Who can attend? section). Maine SSM also deems its students to be hard-working, dedicated, and committed to learning. Illinois MSA further mentions the resilience of their students.

Given that the schools are residential, a certain level of independence, maturity, and responsibility are expected of the students. Maine SSM frequently describes students as responsible and mature. Illinois MSA mentions maturity less often but frequently refers to students as independent. Mississippi SMS also notes that students are mature and responsible. When describing the "Mission Appropriate" student, good candidates for Maine SSM are said to be "independent yet community minded" (MSSM, 2023d, Mission Appropriate Student). Attending Maine SSM is described as a privilege with students responsible for their success and involvement in opportunities while there (MSSM, 2023c). The Mississippi SMS student handbook prominently features a statement that attending Mississippi SMS is "a privilege not a right" (MSMS 2023, p. 6). Tied to maturity, Maine SSM students are described as honest and respectful.

Illinois MSA describes the passion, creativity, and curiosity of its students frequently, particularly within STEM subjects. In a news article, a Maine SSM mathematics department leader is quoted as saying the students are "intensely clever" and "very curious" (Greenberg, 2019, para. 6). The curiosity of Maine SSM students is noted elsewhere as well (MSSM, 2021).

Mississippi SMS's students are described as having "passionate curiosity" (MSMS, n.d.-e, Who can attend? section). Mississippi SMS also mentions the creativity of its students.

Uniqueness was mentioned as characteristics of students at all three schools. "Unique" is also a very common phrase for describing both Maine SSM and Mississippi SMS as schools. For example, in a 2019 article celebrating Maine SSM being named as second in U.S. high schools, the dean of enrollment is quoted as saying the students seek "inquiry, camaraderie, and a unique high school experience" (Dwyer, 2019, para. 7). The schools and students at all locations are referred to as innovative (MSMS, n.d.-e; MSSM, 2023c; Wright et al., 2022, p. 3).

Some other common attributes ascribed to Illinois MSA students are problem-solvers, collaborative, and ethical. Illinois MSA also touts the strong leadership shown by its students. For example, in a 2022 article about Illinois MSA accepting out-of-state applicants, the school President is quoted as describing the student body as having "cross-cultural students who are thoughtful inquirers, integrative thinkers, ethical leaders, and problem solvers inspired to invent and test new ideas" (IMSA, 2022b, para. 4).

Defining Diversity

The diversity of the student body was mentioned and described in different ways by the three schools. In some cases, diversity was spoken of in terms of race or ethnicity, geographical location, gender, or identity. In other cases, statements spoke to diversity of thought or interest. I have included statements here that also speak to a limit in that diversity.

Illinois MSA materials frequently speak of their diverse student body in various communications and multiple pages on the website. The admissions policy and procedures, provided in more detail in the next chapter, mention ethnic, geographic, and gender diversity as well as diversity of thought (IMSA, 2023h). One of the attributes Illinois MSA notes that they

look for when selecting students is someone with the "potential to contribute to diverse discourse" (IMSA, 2023h).

Maine SSM identifies its students as regionally and academically diverse (MSSM, 2023c) but does not specifically mention racial diversity. In a 2019 article celebrating Maine SSM's recognition as the "no. 2 high school in the nation," a White student is pictured lounging on a couch in casual attire on his computer (Russel1, 2019). Russell states that the student saw "a lot of people who looked like him" upon coming to Maine SSM (Russell, 2019, para. 45). This student found an attractive element of Maine SSM that "everyone here shares a lot of the same interests" (Russell, 2019, image caption). Maine SSM students are noted in other places as "sharing similar interests" (MSSM, 2023c) and as being "like-minded" (MSSM, 2021, p. 36).

Mississippi SMS does not specifically mention diversity of its student body on its website. However, in a news article about the school, two students who were interviewed stated that they liked the "diverse environment" at Mississippi SMS (Fallows, 2014, para. 6). In a student newspaper article about a new Director of Academic Affairs, a teacher is quoted as describing Mississippi SMS having a "very diverse population" (Sharp, 2021, para. 6). In a 2019 news article, the Executive Director is quoted as saying that Mississippi SMS is "not for everybody" (Skinner, 2019, The admissions process section).

Conclusion

As I gathered and reviewed the documents through an iterative process, I found that identifying the mission, vision, and philosophy of each school was not as straightforward as reading the statements that were created with the intent of conveying those directly. Rather, relevant information was shared in a variety of documents and statements as detailed above. Some of these statements reinforced one another while others added new components to the

purpose of the school. Drawing on all this information reveals details about each school's view

of what they should be doing and who they should be serving. While I have focused on reporting

my findings in this chapter, in Chapter VI I share my critical analysis of these findings,

synthesizing and comparing across schools, along with recommendations to move toward greater

equity.

CHAPTER IV: ADMISSIONS POLICIES AND PROCEDURES

I next share the findings for my second research question: What are the admissions policies at these schools and what information about admissions procedures do they share? This chapter provides an overview of the understanding I gained while exploring admissions at each of these schools. I will revisit these in Chapter VI as I synthesize the school information, compare across schools, and critically examine my findings. As noted in Chapter III, each school was established via a state statute. These statutes contain some information regarding eligibility for admission. Each school also has some more specific guidelines regarding admissions and eligibility. This includes the components of the admissions packet shown in Table 3. The schools have admissions pages on their websites, and additional information about the work of the admissions team and the admissions process is shared via internal school articles, student newspaper interviews, and reports to the board. I have organized this section by school since sources and approaches vary.

The applications requested demographic information including student address, parent contact information, current school information, student gender, state residency status, and student race/ethnicity. For Illinois MSA, the student fills out most of the application, but the parents are instructed to provide their contact information, the student's race and ethnicity, languages spoken at home, whether the student qualifies for free or reduced-price lunch, and answer a few short questions about their child. For the Maine SSM application, providing the languages spoken at home, race, and ethnicity is optional. Maine SSM and Mississippi MSM have the students fill out all aspects of the application except for the teacher and counselor evaluations. The Maine SSM application also asks about U.S. citizenship and parents' occupations. The teacher and counselor evaluations are forms filled out online by the teachers

and counselor. At Maine SSM, students can also print off the evaluation forms to give to their teachers and counselors. The counselors also send the students' transcripts or share details about students' courses.

Table 3. Components of the Admissions Packet by School

Application Element	Illinois MSA	Maine SSM	Mississippi SMS
Demographic/family information	Required	Required	Required
List STEM activities & achievements	Required	Not included	Required
List general activities/achievements	Not included	Required	Required
List planned activities if accepted	Not included	Required	Not included
Math teacher evaluation	Required	Required	Required
Science teacher evaluation	Required	Required	Required
English teacher evaluation	Not included	Required	Not included
School counselor evaluation	Required	Required	Contact information required
Additional statement from an adult	Optional	Not included	Required
Transcript/grade report	Required	Required	Required
SAT/ACT/PSAT scores	SAT or ACT required	SAT, ACT, or PSAT for rising eleventh graders	ACT required
School-specific admissions test	Not included	Required for rising ninth or tenth graders	Not included
Attendance at an open house	Optional	Required	Optional
Interview	Not included	Two required	Required
Essays	Two required	Two required	Two required
Additional statement	One optional	Three required	One required

Illinois Mathematics and Science Academy: A Holistic Process?

According to the IMSA Law (1985 & rev. 2019), admission at Illinois MSA "shall be determined by competitive examination" (section 2, para. 1). Further, this statute states that the board of trustees shall "establish criteria to be used in determining eligibility of applicants for enrollment. Such criteria shall ensure adequate geographic representation of this State and adequate sexual and ethnic representation" (section 4, subsection 2). Under a section titled "Geographic, Gender, and Ethnic Representation," the Illinois MSA board of trustees' admission policy states that this will be accomplished by "approximating the diversity of the applicant pool from among eligible applicants" and that "recruitment strategies will include targeted programs for historically underrepresented groups relative to state demographics" (IMSA, 2023h).

The board policy also provides eligibility requirements for admission. These are repeated on the Illinois MSA admissions website page (IMSA, 2023e). To be eligible to apply to Illinois MSA, students must be in either eighth or ninth grade and must "be enrolled in or have completed the equivalent of Algebra 1 and a high school equivalent science course" (IMSA, 2023i, para. 3). Although eighth graders are eligible to apply, they must demonstrate that they have completed at least half of the equivalent of ninth-grade coursework in mathematics and science. The application elements are summarized in Table 3 based on the information provided on the admission's webpage (IMSA, 2023i). The board policy notes that ACT scores can be used instead of SAT scores though only SAT scores are listed on the admission webpage (IMSA, 2023h). Applicants have the option to submit an additional evaluation from an adult "who can speak to a student's ability to succeed at IMSA, as well as their interest/ability in the areas of STEM" (IMSA, 2023i, para. 6) and a statement with additional explanation regarding the student's application or needs. Although the application is completed through an online form, a

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copy of the application is available for download from the website (IMSA, 2023j). The application page of the website contains a link directly to the board policy on admissions, detailed information about the steps of the admissions process, and a timeline. In addition to STEM and other activities, the application has a space for students to enter any Illinois MSA activities or programs they have participated in (IMSA, 2023k, p. 4). One essay question asks about student's reasons for applying and how they would contribute to the school community (p. 5). The other asks the student to elaborate on a challenge they have faced (p. 5).

Applications open towards the beginning of October and close towards the beginning of March. The suggested timeline shows that students are encouraged to contact the admissions office to ensure all their materials have been received in February. The admissions team hosts virtual and in-person opportunities to visit the Illinois MSA campus or hear from staff and students. Recordings of these events are also available on the website. (IMSA, 2023j)

The board policy includes extensive detail about the selection criteria for applicants. The criteria for selection are in Appendix E as quoted directly from the admissions policy. These criteria include both academic achievement, interest in mathematics or science, and other qualities (IMSA, 2023h). The policy also notes that the demographics of those already selected will be part of the decision. There is a review committee that includes internal and external volunteers, members of which work in teams to assign a score to each applicant called the "RCE score" (IMSA, 2023h, section 4C). According to the policy, this score is "contextually based, recognizing the differences in opportunities available to students from different districts and regions of the state" and should be based on "the applicant's demonstrated evidence of strong interest and talent in mathematics and/or science, a desire to pursue a Science/Technology/Engineering/Mathematics (STEM) career, and qualifications for the IMSA

environment" (IMSA, 2023h, section 4C). The review committee does not have access to applicants' test scores or GPAs. Further, the committee members receive training to help them understand Illinois MSA's mission and students (Yue, 2018).

After scoring by the review committee, a selection committee, chaired by the Director of Admissions and comprised of Illinois MSA staff, then determines who is admitted and who is placed in a "waitpool." Applicants are "ranked numerically in accordance with SAT-Math in descending order from 800, recalculated GPA, RCE, and SAT-R+W, respectively. ACT-Math and ACT R+W scores will be converted using the College Boards ACT Concordance table" (IMSA, 2023h, section 6A).

The admissions eligibility webpage states that selection is a "holistic process that incorporates classroom performance, participation in extracurricular activities, and leadership history with more traditional indicators of talent such as test scores and grades" (IMSA, 2023i, para. 2). SAT scores and GPA are each said to "not be interpreted as a precise measure" (IMSA, 2023h, section 4A). The GPA is recomputed based on only English, mathematics, and science courses without any extra weight based for honors or advanced courses. In an article for the student newspaper, "The Acronym," the Illinois MSA Executive Director of Enrollment Management Systems noted that the review committee evaluates the applicant "from a qualitative perspective, making notes about their potential future fit at IMSA" (McTaggart, 2022, para. 4). It is stated elsewhere that geographic and demographic information is "also considered to promote a diverse student population and enhance the learning of all students" (IMSA, 2023i, para. 2). Another article from "The Acronym" includes data from 2016 showing that Illinois MSA's racial demographics of admitted students very closely matched the percentage of students who applied across those racial groups (Yue, 2018). Indeed, approximating this distribution is

stated as an aim in the admissions process (Yue, 2018). This article compares the previous

admissions process to the updated process. One of the major updates is that the holistic approach

was incorporated throughout the process rather than filling half of the spots first based solely on

those scores. The other significant update is that "IMSA amended its admissions policy to give

more weight to 'highly predictive indicators'" (Yue, 2018, The Holistic Process section)

including SAT math scores. This was said to be based on a study identifying a correlation

between such scores and "future success in STEM." This somewhat contrasts with the research I

have encountered that focuses on the bias identified in measures such as SAT scores (Ezzani et

al., 2021; Peters et al., 2020; Siegle et al., 2016).

The professional judgment of multiple committees is viewed by the Executive Director of

Enrollment Management Systems as a strength of the Illinois MSA admissions process.

> An important factor in the admissions process is making certain there are multiple eyes
>
> looking over every application, using an equity lens, and looking through the specialized
>
> circumstances and factors that surround each potential student's background, available
>
> opportunities, and the like. (McTaggart, 2022, para. 10)

The consideration of what is available to an applicant is echoed by the Illinois MSA President as

he described the admissions process in an article (Wright et al., 2022). He states that the

academics are "considered in light of the local norms of their school or district" (p.4). In this

article, the Illinois MSA President also shared questions considered as applications are reviewed:

> Is the applicant performing well in their local region on their exams and in their courses?
>
> Are they choosing challenges in STEM based on what is available to them? Is the student
>
> demonstrating involvement and interest in STEM outside of school, which may include

watching STEM related videos online, engaging in free enrichment opportunities, or

participating in a tuition-based summer program and extracurricular clubs? (p.4)

It is noted that students with varied backgrounds can be supported at Illinois MSA due to

multiple programs in place: a summer bridge program, an additional support period for students

in certain math courses, a writing center, and assigned adult mentors (Wright et al., 2022).

Maine School of Science and Mathematics: Process without Policy?

The Maine statue that established Maine SSM (MSSM, 1993 & rev. 2011) indicates that

the Maine SSM board of trustees is tasked with developing "criteria to be used in determining

eligibility of applicants for enrollment. The criteria must include methods of ensuring gender

equity for students selected" (§8205, section 11) and the admissions policy must "ensure that

students from all over the State have an equal opportunity to attend the school" (§8205, section

13). Neither race nor ethnicity are mentioned in the statute.

The Maine SSM application is completed through an online form, which is listed as the

first step of the application process (MSSM, 2023f). Once you have navigated to the second step

of the admissions process, there is a link to download a copy of the application with a note that

indicates the forms may instead be printed and filled out instead. The application elements are

summarized in Table 3. Applicants must complete three short answer questions and two essays

(MSSM, 2023g). For the short answer questions, applicants share what they think are important

qualities for success in a residential setting, share something they did "for the pleasure of it," and

elaborate on a challenge they have faced (MSSM, 2023g, p. 2). The application references the

"Mission Appropriate Student" statement (MSSM, 2023d) and lists a few key attributes. Then

applicants are asked to "describe the qualities you feel you have that will make you a successful

student at MSSM" for the first essay. For the next essay question, applicants are instructed to

describe how their home, school, or local community has "shaped your dreams and aspirations" (p. 2).

In a video clip from a 2023 virtual open house (MSSM, 2023h), admissions staff members shared more information about the two required interviews. The admissions team emphasizes in the video that applicants should not stress about the interviews. The first interview is with the Director of Admissions who explained the purpose of the interview is a chance to get to know the applicant. The second interview is with a faculty member who will ask the applicant why they want to attend Maine SSM. According to the Director of Admissions, "we are looking for people who are running to us, not running away from something" (MSSM, 2023h, 2:14). The Director of Admissions went on to say that they seek "academically motivated students with a pattern of wanting more and getting more" (2:32). He clarified that evidence of this would be students requesting extra work or seeking out additional resources online. He also emphasized that a lower grade in a more advanced class would be viewed better than a higher grade in a less accelerated class.

The comments in this video also provided additional information as to what the admissions team would consider when reviewing students for admission. The two-hour admissions test, required for rising ninth and tenth graders, focuses on Algebra I topics with some questions covering Algebra II content and includes reading comprehension questions (MSSM, 2023h). The admissions team reported that they "come down state" (4:01) to administer the test but noted that they were not sure how they would administer the admissions test for out-of-state applicants. The Director of Admissions said that applicants need a strong foundation in Algebra I since Algebra II is the lowest mathematics course offered at Maine SSM. He indicated that it is preferred for students to also have taken Geometry. This is also indicated on the

admissions process webpage (MSSM, 2023f). The Director of Admissions acknowledged that Algebra I might not be available for students depending on their school especially for schools in more rural areas of the state, but that they are "working on a solution for that" (MSSM, 2023h, 5:58). The Executive Director at the time, no longer employed at Maine SSM, suggested that students should consider whether they should wait to apply until they have had access to Algebra I since students can apply in eighth, ninth, or tenth grades.

The Maine SSM board of trustees' webpage contains board bylaws, policies, meeting minutes, and an archive of materials from previous years. Notably, no admissions policy is provided despite policy groupings showing policies related to "Board Governance and Operations", "General School Administration", and "Students" (MSSM, 2023i). The materials for each board meeting include a management update from various school staff members. In each of these reports, the head of the admissions team provides an update, which sometimes includes information relevant to admissions policies and procedures. The current interview format and testing requirements were stated as being new in the management report for the September 2022 meeting (MSSM, 2022a). In the management report for the September 2023 board meeting, the director acknowledges "that our current admission process and evaluation could improve to assess student student [sic] readiness for our whole program, including residential life" (MSSM, 2023j, p. 8). In the March 2023 report, the director shared that, in a change of the admissions process, the "Admission Review Committee makes all decisions and only the Executive Director will overturn decisions" (MSSM, 2023k, p. 21). This is stated without explanation of why this is necessary and what the intended impact of this change is. While this demonstrates that there is a committee tasked with reviewing applicants, no information is provided about the membership of that committee. The Admissions Review

Committee is also mentioned in the Maine SSM 2022-2023 School Profile (MSSM, 2022b). According to that profile, the Admission Review Committee "considers academic performance, accomplishments, and extracurricular activities, looking for patterns of intellectual curiosity and a sophisticated grasp of world events and technical knowledge as well as a demonstrated passion in various disciplines" (MSSM, 2022b, p. 3).

In the May 2022 management report, the Director of Admissions identifies that the future focus of the admissions team will be on "rural schools for underserved students and high schools" (p. 4). He also notes that the admissions team conducts multiple optional information sessions in addition to the required open houses for applicants and provides the planned communication at these events.

> The Admissions department will be more transparent on what is a good fit and what is not. We will not discourage students from applying, but explain that if their primary interest in life is athletics, music, or art or they simply do not like their sending school, then we may not be the best place. We will put an emphasis on our rigorous academics. (MSSM, 2022c, p. 5)

The Director of Admissions also indicates that the team would describe a "Motivated Prospective Student" as one who

- Submits coherent, complete application with well-written essays
- Applies before the deadline of February 1st
- Exhibits maturity, independence, motivation
- Has taken highest level classes at sending school (MSSM, 2022c, p. 5)

In the March 2022 report, it is mentioned that one of the admissions team follows up with those who have inquired about the school to try to ensure they complete their application

(MSSM, 2022d). Statements and data in many of the reports indicate that Maine SSM has historically been challenged to find enough applicants who the admissions review committee finds qualified for admissions (MSSM, 2022a; MSSM, 2022c, MSSM, 2023k). In a news article from 2019, the Dean of Enrollment is cited as saying that Maine SSM has an acceptance rate of about seventy-five percent (Greenberg 2019).

Mississippi School for Mathematics and Science: Hidden Details?

The Mississippi code (MSMS, 1987 & rev. 2020) states that the Mississippi Board of Education shall develop "an equitable and reasonable plan for student recruitment without regard to race, creed or color" (§37-139-3). According to a 2002 annual report from the Mississippi Department of Education (2002), an "interest in mathematics, science, and technology is considered as well as past academic performance, standardized test scores, extracurricular interests, and accomplishments" (p.1). Furthermore, recommendations, essays, and interviews help "develop as accurate a picture as possible" (p.1).

The Mississippi SMS website lists the criteria for admission (MSMS, n.d.-i). Then the student handbook has a general policy section which includes an admissions policy. The admissions policy in the handbook includes the requirements listed on the admission webpage and includes additional criteria for students (MSMS, 2023a). The criteria from the admission policy are included in full in Appendix F. Along with being in the tenth grade, being a resident of Mississippi, and submitting the required application materials shown in Table 3, applicants are required to have completed certain coursework described in terms of "Carnegie units" (MSMS, n.d.-i; MSMS, 2023a). I was not familiar with the term "Carnegie unit" so I looked for additional detail regarding it. The term is not defined on the Mississippi SMS website nor in the student handbook. Other sources (Great Schools Partnership, 2013), describe a Carnegie unit as a

measure of contact time a student has with the teacher of the course. The term is also used on the Mississippi Department of Education's website (Mississippi Department of Education, n.d.) without definition. It is possible that this term is prevalent in secondary schools in Mississippi but, if not, this could add some confusion for students interested in applying. Along with required coursework, interest in mathematics and science, success in classes especially in STEM subjects, and interest in attending Mississippi SMS are listed as criteria (MSMS, 2023a).

To access the application, a PowerSchool account must be created. Once demographic and school information is entered, downloadable forms are provided for longer responses. For the "personal narrative," students are directed to share their "interest in STEM" and why they think they are a "good fit for MSMS" (MSMS, 2023b, Personal Narrative section). Finally, an applicant picks two of the four provided essay prompts. As with the Illinois MSA and Maine SSM essay questions, one of the prompts asks students to elaborate on a challenge they have faced. The other three options provide more variety and, perhaps, creativity in the responses. In one, an applicant is told to describe the impact a piece of literature has had on them and explain what feedback they "would give the author as a result" (MSMS, 2023b, Student Essays section). For another prompt, the applicant describes a problem whose solution is significant to them and "what steps you might take toward a solution" (MSMS, 2023b, Student Essays section). The final prompt asks students to explain how being a part of a diverse community such as Mississippi SMS might "prepare you for life after high school" (MSMS, 2023b, Student Essays section).

The application opens in late September and closes at the beginning of February. Interviews and placement tests occur in March after the scoring of the admissions materials. Final decisions are shared at the beginning of April. The admissions team hosts "Super Nights"

(MSMS, n.d.-j) throughout the state for interested applicants who are unable to come to campus. Admissions recruiters are cited as going throughout the state, "working particularly hard in the impoverished delta region" (Fallows, 2014, para. 7).

Though no information on the school's website describes the application review process, the admissions policy mentions an "Application Review Committee" that scores applicants' materials (MSMS, 2023a, p. 14). Only those applicants who receive a score of nine or higher are invited for an interview. The policy does not provide additional details about the Admissions Review Committee. A 2019 news article states that the application is reviewed by a committee of "one MSMS faculty member, an educator and a non-educator" (Skinner, 2019, The admissions process section) to select those who will be invited for an interview. This article also states that the interview phase includes a math placement test and an in-person essay.

Conclusion

All three schools provide detailed information about what applicants are required to submit and there is considerable overlap in the application materials. For Illinois MSA, these elements were outlined in a board policy that clearly described how the application materials would be used and how selection of applicants would proceed. Information about the selection process was less clear for Maine SSM and Mississippi SMS. While statements about qualities sought after in applicants were shared, it was not obvious to me how those and other elements would factor into the admissions selection process. All the schools mention additional events and willingness to communicate so there are potentially other avenues for applicants to gain clarity on the process. After delving into these admissions procedures, I was left with many questions about the processes and concerns about their impact. I address the differences in the transparency of the selection process, how well aligned the selection criteria are with the purpose of the

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school, how these criteria might be impacting demographics, and other elements of the

admissions process in Chapter VI.

CHAPTER V: DEMOGRAPHICS COMPARISON

In this chapter, I address my final research question: How do the racial demographics of students at these schools compare to the racial demographics of the general education population in their state? This chapter contains a description of the demographic data and calculations based on that data. Following this, I consider how details shared in Chapters III and IV have impacted these data. As with other school information shared thus far, the presentation and visibility of demographic information varied for each school. I present demographic information for four racial groups: Asian, Black, Latinx, and White. Each of these groups were present in the demographics for each school allowing for comparison across all schools. As noted in Chapter I, Asian and White student groups are often overrepresented in selective STEM schools motivating my inclusion of them here. Historically underrepresented groups other than Black and Latinx either appear in very small numbers or are not presented. I decided to look at racial demographics across multiple academic years: 2019-2020, 2020-2021, 2021-2022, 2022-2023. This was done to ensure the data did not reflect an anomalous year and to account for missing data.

Illinois MSA shared their racial demographic data via a yearly profile on their website. They keep a digital archive of past profiles which allowed me to find the data for previous years (IMSA, 2020; IMSA, 2022c; IMSA, 2023l). Notably, Illinois MSA did not have a profile that gave demographic information for the 2021-2022 academic year, possibly due to the disruptions caused by the COVID-19 pandemic. I found the racial demographic information for the general Illinois education population on a website hosted by the Illinois State Board of Education (Illinois State Board of Education, 2023).

The Maine SSM website did not include information about racial demographics at the school. Though the Maine SSM profile for 2022-2023 had the racial demographics for the graduating class (MSSM, 2022b). However, the Maine Department of Education provides this information for Maine SSM along with other Maine public schools via an online dashboard for the most recent complete year (Maine Department of Education, 2023a) and a warehouse of previous years' data (Maine Department of Education, 2023b). This contained demographic information for all the academic years I considered. From this website, I was also able to find the racial demographic information for the general Maine education population.

The Mississippi SMS website also did not include racial demographic information for the school. The Mississippi Department of Education had this information available on a website along with that of the general Mississippi education population (Mississippi Department of Education, 2023). However, in each academic year, there were values missing for Mississippi SMS in at least one of the four racial groups. It was not clear why certain values were omitted. For the 2021-2022 academic year, I found the full demographic data for Mississippi SMS on a data warehouse site (National Center for Education Statistics, 2023).

School and State Demographics

For each school, I share the mean and median for the data I found. Given that there were almost no repeated values, I did not include the mode for these data. Since some values were missing, the calculations vary depending on the data available. For example, I divide by three for Illinois MSA mean values but four for Maine SSM mean values. The full data sets for each school are provided in Appendix G. Table 4 shows the mean and median values for each school. In most cases, the mean and median were very similar. The most substantial difference is in Illinois MSA's mean and median for Latinx students. This was due to a dramatic increase in the

proportion of Latinx students of 9% in 2019-2020 up to 17.1% in 2020-2021. As noted above, the data was not available for 2021-2022. However, this higher proportion was sustained in 2022-2023 with Latinx students comprising 17.2% of Illinois MSA students.

Table 4. Mean and Median for Racial Demographics at Each School as Percentages

Race	Illinois MSA [a]		Maine SSM [b]		Mississippi SMS [c]	
	Mean	Median	Mean	Median	Mean	Median
Asian	37.6	37.2	12.2	12.05	20.4	20.3
Black	10.1	10.1	0.7	0.9	23.3	22.5
Latinx	14.4	17.1	5.6	5.1	1.29	1.29
White	30.1	29.3	75.8	75.9	50.7	50.9

[a] (IMSA, 2020; 2022c; 2023l)
[b] (Maine Department of Education, 2023a; 2023b)
[c] (Mississippi Department of Education, 2023; National Center for Education Statistics, 2023)

Even though Illinois MSA and Maine SSM include out-of-state students, the admission process is separate for out-of-state applicants, Illinois MSA did not start accepting out-of-state applicants until 2023-2024, and the number of Maine SSM students from out-of-state was described as a small number (MSSM, 2023b). This along with every student in the corresponding state being eligible to apply makes it reasonable to compare the school demographics to the state general education population. The full data for each state is also given in Appendix G. Table 5 shows the mean and median of the demographics for the state general education population for each of the corresponding states. It should be noted that state data by grade level was not available, so this data reflects the demographics for kindergarten through twelfth grade in each state. The mean and median for the state general education demographic data were identical in almost all cases. In the few cases that they were not the same, the difference was at most half a percentage point.

Table 5. Mean and Median for Racial Demographics of Each State's General Education

Population as Percentages

Race	Illinois [a]		Maine [b]		Mississippi [c]	
	Mean	Median	Mean	Median	Mean	Median
Asian	5.3	5.3	1.7	1.4	43.1	43.1
Black	16.6	16.6	4.0	4.1	47.4	47.4
Latinx	26.8	26.8	2.9	2.9	4.5	4.5
White	47.1	47.1	87.2	87.7	50.7	50.9

[a] (Illinois State Board of Education, 2023)
[b] (Maine Department of Education, 2023a; 2023b)
[c] (Mississippi Department of Education, 2023)

Relative Difference in Composition Index

As described in Chapter I, the "Relative Difference in Composition Index (RDCI)" (Ford, 2014, p. 144), is the ratio of the difference in percentage representation in a selected population with the percentage representation in the general population to the percentage representation in the general population. Using the data from Tables 4 and 5, I calculate the differences between the school population and the general education population for each racial group. I have included an example showing the differences between the means for Illinois MSA's demographics and that of the state general education population in Appendix G. Negative values represent that the percentage representation in the school is smaller than that of the general education population, as for White, Black, and Latinx student groups, whereas positive values indicate that the percentage representation in the school is larger than that of the general education population, as for Asian students. The RDCI is calculated by dividing these differences by the corresponding general education population and then multiplying by 100. Table 6 shows the RDCI for each of the schools using the mean data and the median data. Figures 4 and 5 show visualizations of these RDCI using mean and median values, respectively. The vertical axis shows each of the

four race categories. The bars represent the RDCI at each school with negative RDCI going to the left and positive RDCI going to the right.

Table 6. RDCI using Mean and Median Values at Each School

Race	Illinois MSA		Maine SSM		Mississippi SMS	
	Mean	Median	Mean	Median	Mean	Median
Asian	612.2	601.9	640.9	760.7	1713.8	1717.0
Black	-39.0	-39.2	-82.3	-77.8	-50.9	-52.5
Latinx	-46.1	-36.2	93.9	77.2	-71.4	-71.4
White	-36.0	-37.8	-13.1	-13.5	17.5	18.0

Note. The columns labeled "Mean" represent the RDCI calculated using the mean values for each school and the corresponding state, not the mean of RDCI values calculated for each year. The columns labeled "Median" are calculated analogously.

Figure 4. RDCI Using Mean Values at Each School
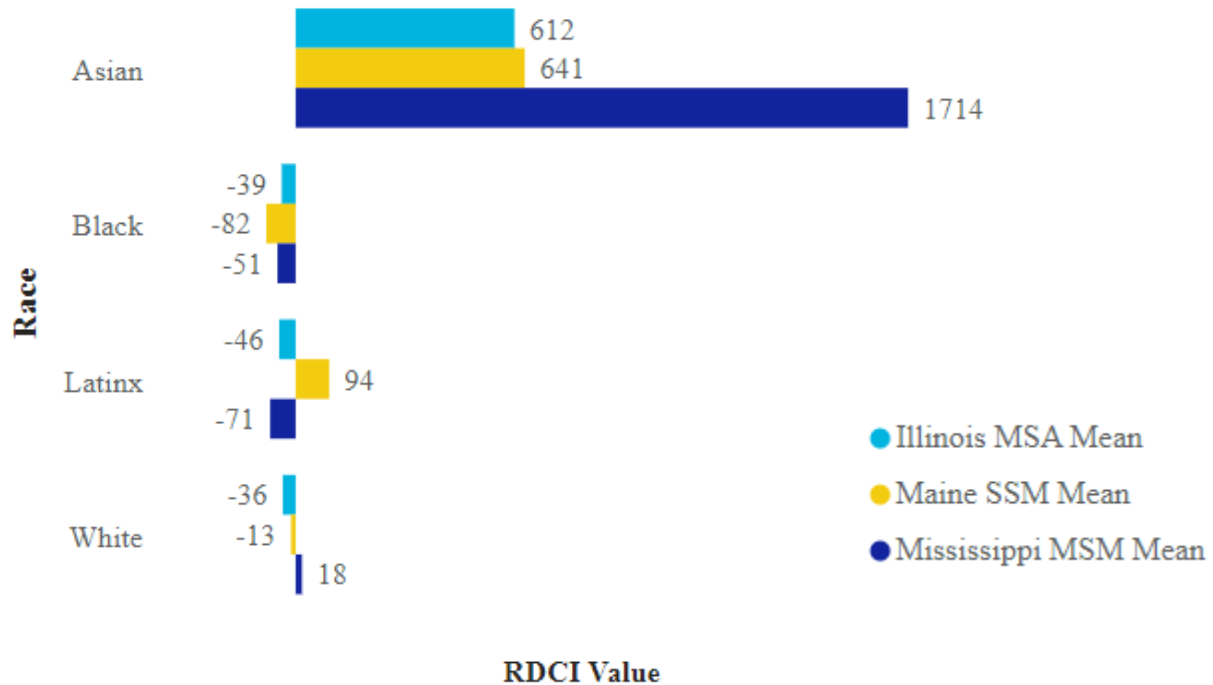
Figure 5. RDCI Using Median Values at Each School
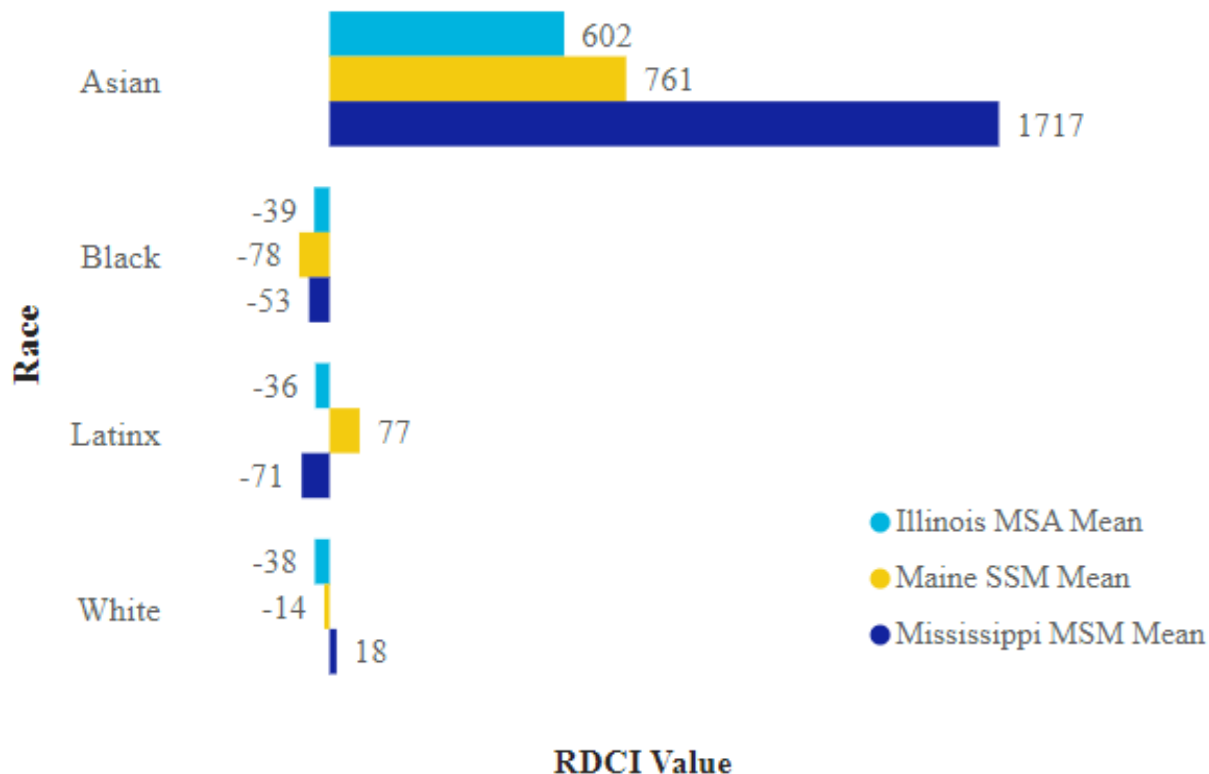
Ford (2014) describes a negative RDCI as the percentage of underrepresentation. Using

this language, Black students are approximately 39% underrepresented at Illinois MSA, 78%

underrepresented at Maine SSM, and 52% underrepresented at Mississippi SMS using the

median values as compared to the general education population of their state. For Latinx

students, it is approximately 36% underrepresentation at Illinois MSA and 71.4%

underrepresentation at Mississippi SMS using the median values. The positive value of 77.2 at

Maine SSM represents that Latinx students are overrepresented in the Maine SSM population

relative to the Maine general education population by approximately 77%. White students are

underrepresented at Illinois MSA and Maine SSM by approximately 38% and 13%, respectively,

but overrepresented at Mississippi SMS by approximately 18%. Asian students are

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overrepresented at all three institutions compared to the general education population of their state, ranging from around 600% overrepresentation at Illinois MSA to approximately 1700% overrepresentation at Mississippi SMS.

Conclusion

As noted above, there were limitations to the data available that should be kept in mind when reviewing the data. This includes that there were missing data points and that the state data is for kindergarten through twelfth grade as I mentioned above. Additionally, I did not see information about how the data was collected. The format of questions used to determine race and ethnicity can also impact what data are gathered. Despite these limitations, some trends can be observed in the data.

Consistently, Black students are underrepresented at the schools and Asian students are overrepresented compared to the general education population. I was surprised to find that White students were underrepresented at both Illinois MSA and Maine SSM. Though Latinx students are underrepresented at Illinois MSA and Mississippi SMS, this group is overrepresented at Maine SSM which was unexpected based on literature regarding STEM schools (Rogers-Chapman, 2014). Still, the data show that all three schools have demographics that vary substantially from that of their state's general education population. Now that I have described the schools and reported on demographics, I will share my interpretation, meaning-making, and recommendations in the following chapter.

CHAPTER VI: ANALYSIS

My research into these selective STEM residential schools and my time working at one have left me with more questions about the schools' role. Though I have seen the positive experience students can have at these schools and benefited from the professional opportunities working at one provides, I am conflicted. Considering how power and resources are distributed and the effect on the "relationships of inequality and privilege" (Diem et al., 2014, p. 1072), these state funded schools draw funding and, potentially, highly effective educators from other schools in the state. The admissions selection criteria seem to advantage those who have already been advantaged. There is a mismatch between who the schools purport to serve in the state statutes, who the schools describe as those who would be welcome at their schools, and who is admitted through the current process. Even if racial demographics were to closely match that of the state, can such schools serve to improve education in the state? Do these selective STEM schools merely continue to perpetuate a hierarchical education system and serve to weaken the potential for diverse discourse at the schools from which they draw their students? Would it be better to focus efforts and funding on differentiation within classrooms and schools rather than separating out those students? What advantage does this separation provide? Can and do these selective STEM schools lead to improved education outcomes and economic growth across the state? Should they? If the selection process is revised in such a way that the racial demographics do closely reflect the composition of the general education population, would that achieve equity? Or would maintaining this separation still be problematic for other reasons?

As I ponder these questions and struggle with what role these schools should play in their state, I am also mindful of cautions that dismantling them could cause harm (Ford et al., 2021).

[W]e adamantly disagree with dismantling programming, but we do support

reconstructing gifted, talented, and advanced learner programming to be accessible

students [sic] from all demographics. Dismantling and withdrawing funding from such

programs in the name of equity will hurt the very students that equity-minded and

culturally responsive leaders advocate for. (Ford et al., 2021, p. 176)

Still, the residential STEM schools provide a different context for this programming, one in

which students and funding are drawn away from one school and sent to another. Therefore,

additional questioning of the schools' existence and role seems warranted. As I wrestled with

this conflict, I turned my reflection to what the schools are doing well and what else they could

do to improve equity. I critically examined my findings through a lens guided by the tenets of

critical race theory (CRT), relevant literature, my own experience, and certain elements of a

critical policy analysis. In this chapter, I share my observations and analysis. I also offer

recommendations based on my research and share suggestions for future research related to

selective STEM schools.

Discussion

As I related what I had observed in the documents to other literature and research, I

grappled with several themes. These encompass similarities and differences between the schools

regarding the three-fold mission of the schools, the schools' perceived understanding of the

relationship between STEM interest and giftedness, the reinforcing of hierarchies, who the

schools welcome and include, and how color conscious the schools are. I first discuss these

themes before presenting more implications and recommendations.

The Three-Fold Mission

The schools all communicate a three-fold mission: to serve a certain category of students, to improve education throughout the state, and to bolster the state workforce or economy. Different emphasis is placed on these for each school, however. The schools seem to each view themselves as a leader in the state as well as viewing their students as leaders. Though there is some language of partnerships and community, the relationship between the school and educators in the rest of the state seems very top down, with the STEM school providing the expertise and resources rather than a reciprocal relationship. Along with this, Maine SSM statements frequently emphasize their advanced curriculum (MSSM, 1993 & rev. 2011; MSSM, 2023c), with curriculum mentioned in each of the mission, the vision, and the philosophy statements as well as in the state statute. Developing and sharing this curriculum seems to be a major focus for Maine SSM along with serving the "most academically motivated" (MSSM, 2023c, mission section) Maine students. However, evidence is never given as to how education or curriculum in the state would be best improved by allotting resources to a selective STEM school rather than through other initiatives.

This top-down approach to relationships seems to further centralize power and privilege in the STEM schools. The STEM schools are viewed as deliverers of excellent education and hubs from which curriculum and professional development are provided. Funding, space, and publicity are afforded to the schools along with a carefully selected student population. In addition to affording those schools these benefits, the top-down mindset could alienate the other schools in the state thereby making them reluctant to engage with the schools, recommend students, or buy in to the curriculum they share. Indeed, I recall the school I worked at noticing some of this reluctance. When I helped run a workshop for mathematics instructors drawn from

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across the state, multiple participants expressed doubt that what worked with our students could work at their school. I found success approaching such discussions with the foundation that all educators there would be learning from each other. Still, the cultivated student body at the selective STEM schools could mean the curriculum and pedagogy might not translate to other schools or might be doubted by those at those other schools. So, even if these schools develop content and pedagogy that are effective, it remains doubtful that this would positively affect education throughout the state.

I found the incorporation of a mission to improve the economy and the workforce of the state problematic, though I can understand how this would help generate wide-spread support for a school that ostensibly would be for a small portion of the state's students. I disagree with what this conveys: that the purpose of the STEM schools, or perhaps of schools in general, is to create a viable workforce. The economic/workforce impact is only mentioned once in connection with Illinois MSA, and it was an external article from approximately ten years ago (Loewus, 2014). The enhancement of the STEM economy is more frequently mentioned about Mississippi SMS (Harris, 2016; Mississippi Department of Education, 2002; MSMS, n.d.-f; MSMS Records, n.d.; Sanders, 2014) than in statements about the other two schools. This focus on the STEM economy of the state reflects the impetus for the initial focus on STEM education and STEM schools (Basile & Lopez, 2015; Mansfield et al., 2014; Thomas & Williams, 2010) and the more recent calls for STEM-focused high schools in the United States (Executive Report to the President, 2010) that I mentioned in Chapter I. Understanding why this would be more prevalent in Mississippi than in Illinois or Maine could be an illuminating area of future study. Continuing to focus on the schools as a vehicle for improving the STEM economy or workforce could lead to

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racial commodification (Basile & Lopez, 2015) when paired with language about inclusion of students of color.

To avoid this racial commodification, school leaders and stakeholders should work towards greater inclusion of students of color in selective STEM schools "regardless of their current or future potential to create economic benefits to the STEM enterprise" (Basile & Lopez, 2015, p. 541). However, if the perceived value of a selective STEM school is that it "enhances collective prosperity" and "ensures the future economy" (MSMS, n.d.-f, MSMS's Value to Mississippi section), racial commodification is unavoidable. As Mansfield, Welton, and Grogan (2014) observed when reviewing STEM policies using a feminist critical policy analysis, such discourse around STEM schools is "largely defined by one-sided arguments driven by self-interests and capitalistic/economic rationales" (p. 1177). An interrogation of what role a selective STEM school should serve and how it can improve education throughout the state is a necessary component of seeking greater racial equity. In fact, there is not a clear indication that STEM preparation leads to improved economic outcomes (Hytten & Stemhagen, 2020; Mansfield, Welton, & Grogan, 2014). Rather than focus on enhancing economic growth, I encourage the schools to shift to the "democratic-civic mission" that Hytten and Stemhagen advocate for as they critique the shift in educational focus to STEM schools and programs (p. 30). The interrogation of the purposes of the schools and how these relate to STEM begs the question as to what role STEM plays in these schools.

STEM Interest and Giftedness

Each of the state statues establishing the three schools includes language related to serving high achieving students. As I observed in Chapter III, the language that Illinois MSA, Maine SSM, and Mississippi SMS use to describe their students either directly uses the terms

"gifted" and "talented" or uses language parallel to that used in the gifted education literature that I shared in Chapter II. Thus, the wealth of gifted education research can be drawn on to identify approaches to increase racial equity. However, the use of giftedness language raises the question about the relationship between STEM interest and giftedness, and what these schools convey about that relationship and their understanding of it.

Hytten and Stemhagen (2020) posit that the creation of STEM schools represents a departure from the democratic purpose of schooling and demonstrates a move away from courses such as civics that help cultivate it. However, from my experience at the selective STEM school I taught at, I know the humanities are not necessarily de-emphasized at such schools. Indeed, the one required course for all students at the school I taught at was a combination of history and literature studies in which students view American history from multiple lenses and engage in discussion around it. One of the first courses developed for the school's artificial intelligence center was a course on the ethics of artificial intelligence and was taught by a Social Sciences instructor. At the three schools I researched, course requirements and letters of recommendation included non-STEM subjects. Notably, interest in STEM is not specifically identified as a criterion in the Maine SSM admissions selection process. Similarly, Mississippi SMS's statute, mission, beliefs, philosophy, and stated goals also do not mention STEM specifically. "STEM programs" and generating "STEM interest" are mentioned in Mississippi SMS's value to the state (MSMS, n.d.-f). STEM is also mentioned in other comments about Mississippi SMS (Harris, 2016; Mississippi Department of Education, 2002; Sanders, 2014), and success and interest in mathematics and science are included as admissions criteria (MSMS, 2023a). Unlike Illinois MSA and Mississippi SMS, Maine SSM does not have a separate list of STEM activities as a part of their application nor do the mission or philosophy directly address STEM. Though

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attention to STEM education is mentioned in their 2020 annual report and 2019 strategic plan (MSSM, 2020a). Although seeking students with interest and talent in mathematics, Illinois MSA documents convey a wide range of characteristics when describing their students. Attributes such as creativity, passion, and a desire to help society further communicate, as research suggests (Mun et al, 2021; Siegle et al., 2016), that giftedness can manifest in different ways.

But then, why were these designated as STEM schools when they were developed and what distinguishes them as STEM schools? Especially given that STEM is not even in the mission statement of these schools. The lack of common definition of what constitutes a STEM school (Casto & Williams, 2020; Rogers-Chapman, 2014) further complicates this question. Members of NCSSS must "prepare students to be leaders in global innovation by engaging them in rigorous, relevant, and integrated learning experiences, with a science, technology, engineering, and mathematics focus and specialization that include authentic research and/or project-based focus school-wide" (NCSSS, 2020a). But I do not see that these schools, with perhaps the exception of Illinois MSA, have a STEM "focus." This descriptor seems to be vague enough that schools such as Maine SSM that do not include STEM activities on the application can be members.

Are the schools conflating STEM and giftedness? Though it is not clear from the documents, I do not believe this to be the case. Perhaps the use of STEM in the creation of the school provided a means by which funding and support could be obtained. As Hytten and Stemhagen (2020) observe, politicians and corporations seem eager to endorse STEM schools. Given the language of the state statutes, the schools seemed designed for high achieving students regardless of their interest in STEM. So rather than a conflation of STEM and giftedness, there

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appears to be an unnecessary inclusion of STEM perhaps for other purposes. Considering what "problems (real or perceived) a policy was chosen to address" (Lewis-Durham, 2020, p. 8), it seems that there was a perception by state leaders that high achieving students were not being provided adequate services and opportunities by the existing state schools. As Mansfield (2016) observes, this:

> begs important questions such as, "Why are these services or activities not ordinarily provided by schools?" And, "Do not all children have potential and capability? How do we *know* if we are not providing opportunities at schools for them to demonstrate their potential beyond state and local mandated benchmarks and high-stakes testing?" (p. 307)

Answering Mansfield, Welton, and Grogan's (2014) call for researchers "to investigate further into who might be perpetuating the current discourse and to identify clearly who emerge as winners and losers" (p. 1177), it seems that these STEM schools were advanced by those seeking to leverage concerns around economic competitiveness to create these schools. And those who seem to be winning are those who were already ahead. Rather than necessarily identifying students who are not getting opportunities at their sending school, the admissions selection criteria seem to favor those who have had opportunities.

Reinforcing Hierarchies

The admission selection criteria are likely contributing to school racial demographics that are not representative of the state. For all three schools, the overrepresentation of Asian students is the most drastic difference between the school population and the general education population. Although each school still shows underrepresentation of either Black students, Latinx students, or both, the use of local norms in the admissions selection process is aligned with the research on best practices for admittance to gifted programming (Mun et al., 2021,

Peters, 2022; Peters et al., 2020). So, the demographics may partially reflect opportunity gaps within other schools in the state as posited by Warne and Larsen (2022).

The requirements of specific-course work for admission can fail to consider structural issues that prevent students from certain areas or backgrounds from completing such requirements. These requirements aside, Illinois MSA's approach of evaluating how a student's course work compares to what is available at their school fails to consider the historic exclusion of CLED students from gifted and advanced academic programming. The requirement of Algebra 1 at Maine SSM and the focus on "more advanced" classes also requires students to already have access to opportunities. Given that Maine SSM accepts ninth grade students, this relies on a student being placed in advanced courses in middle school. The only solution given to address this is for students to wait to apply until they are older. While that is an option, it means such students are vying for fewer available spots against students who potentially have had further opportunities to engage in advanced coursework at their current high school. Even if a school has such programming available, a student may not have been allowed to participate, thereby positioning opportunity gaps as the fault of the student, emblematic of deficit-thinking (Ford, 2014). Similarly, Maine SSM's desire for students who have demonstrated seeking out opportunities seems to reinforce a privileged mindset in which students are comfortable making such requests and having access to such opportunities.

While not necessarily viewing a student without these opportunities or courses listed in their application materials as performing poorly in school, the student is penalized for perceived "motivational deficits, while institutional structures and inequitable schooling arrangements that exclude students from learning are held exculpatory" (Valencia, 1997, p. 9). Indeed, all three schools emphasize that their students are highly motivated, as noted in Chapter III. If this is

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assessed primarily on the coursework students take, even using school building norms, it may disadvantage those who have traditionally been excluded. In short, it doubles down on a system that has been shown to exclude CLED students (Davis et al., 2020; Ford, 2014; Mansfield, 2015).

Although the Illinois MSA admission policy is the most detailed, shows that a variety of students can be qualified, and includes that diverse perspectives are sought after, it is notable that the IMSA Law first specifies that admission "shall be determined by competitive examination" (IMSA Law, 1985 & rev. 2019, section 2, para. 1). This language evokes a high-stakes test focus rather than the practice of holistic review emphasized throughout the rest of the Illinois MSA admissions policy and descriptions of selection (Illinois MSA, 2023h; IMSA, 2023i; Yue, 2018). Despite the continued assertion of a holistic process in which test scores and GPA are not used as precise measures, determining admittance begins with a numerical ranking of students by scores. Further, a recent update to the Illinois MSA admissions process includes more weight given to standardized test scores. The practice of numerical ranking and higher weight to standardized test scores detracts from messaging regarding a holistic process and may make applicants doubt the veracity of those claims. The inclusion of SAT/ACT scores for students at Illinois MSA and Mississippi SMS and for rising juniors at Maine SSM fails to account for how such tests have been noted to be a culturally biased tool (Ezzani et al., 2021; Peters et al., 2020; Siegle et al., 2016).

Though Peters (2022) suggests bias in measures such as standardized tests is only a "reflection of the inequality in American society" (p. 87), ignoring the existence of this structural inequality places burden on those from marginalized groups in the admissions process. Rather, if the aim is truly to make the process equitable, such inequities should be recognized and

addressed. "Racial hierarchies determine who gets tangible benefits, including the best jobs, the best schools" (Delgado & Stefancic, 2017, p. 27). While all three schools include multiple elements in the admissions criteria, they are still using tools and measures that seem to reinforce privilege and inequity.

Who is Welcome? Who is Sought? Who is in the Know?

Looking at demographics of applicants can provide information on who is included and excluded by these selection criteria. However, as Corcoran and Baker-Smith (2018) observed in their study of selective New York City schools, the admissions selection criteria might be impacting who chooses to apply. Other language choices and communication will also impact who applies. Students who could be successful at these selective STEM schools might not feel they are qualified, might not feel they are welcome, and might not have the information about the schools to make an informed decision.

All three schools include a variety of non-academic qualities such as curiosity and innovation when describing their students. However, clarity regarding how these attributes would factor into selection varied. Since no admission policy for Maine SSM and little detail regarding the selection process at either Maine SSM or Mississippi MSM are available online in board documents or on the admissions web pages, there is no clear indication of how attributes such as this would be determined and how all the various requirements are factored into determining who gains admittance. This leaves open the possibility that the varied elements of the application packet are reviewed subjectively as cautioned by Peters et al (2020). The younger age of some Maine SSM applicants adds an additional challenge for students to have the opportunity to demonstrate independence and maturity. Given that students can apply in multiple grade levels for Maine SSM, the school should communicate differing expectations for

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applicants at each grade level. Illinois MSA conveys a broader description of student attributes and desired characteristics. Throughout Illinois MSA's statements about mission, philosophy, and admissions, diverse perspectives and identities are highlighted as being sought after at Illinois MSA. This is evident in policy, in description of attributes, in belief statements, in admissions procedures, and in planning documents. Illinois MSA's extensive description of the variety of students, including those who can contribute to a diverse discourse, seems most inclusive and welcoming to a variety of students. By not emphasizing a narrow set of criteria and attributes, Illinois MSA communicates that a diverse student body is welcomed. Still, the numerical ranking, inclusion of SAT scores, and course requirements included in admissions send a conflicting message.

This conflicting message is seen at Maine SSM and Mississippi SMS as well. Though Maine SSM's repetition of students having "similar interests" might be intended to help students feel like they would be joining a close-knit school community, it could also discourage students from applying who see themselves as different than the traditional successful STEM student. Similarly, Mississippi SMS's Executive Director comment that Mississippi SMS is "not for everybody" (Skinner, 2019, The admissions process section), while perhaps intended to convey that the academic and residential environment can be difficult, could also discourage capable students. Considering the potentially underdeveloped STEM identity that Collins et al. (2020) describe, such statements could particularly deter students of color from applying.

Lack of information can also be a barrier to eligible students applying, particularly CLED students (Johnson & Sondergeld, 2020). The Mississippi SMS admissions policy did not seem to me to be in an obvious place. In fact, I did not find it in my initial search for it even through a web search for "admissions policy" with multiple variations of the school's name. A different

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search led me to find the student handbook and, upon reviewing it, I discovered the section with the admissions policy. For a student interested in applying to access the admissions policy, they would need to think to check the student handbook, which appears under resources for students and is not linked or referenced in the admissions pages. The application for Mississippi SMS was also more difficult to access. The Illinois MSA and Maine SSM applications are available from their respective admissions websites before a student starts the application so students can see what will be involved in completing the application. However, accessing the Mississippi SMS application elements requires a user to start the application. The additional steps required to get more detailed information for Mississippi SMS could deter some interested candidates from applying. In contrast, the Illinois MSA admissions policy and posted admissions information is extensive and comprehensive. From the Illinois MSA website home page, I found it easy to navigate to the admissions page and to the board's admission policy. This along with clarity about how students will be evaluated for admissions helps students and families understand what the school is, who it is for, and what it takes to be a member of the school community.

Despite each state statute stating that the STEM school should be available to high-achieving students throughout the state, the requirement of fees, potentially thousands of dollars per year, hinders the ability for all students to attend. A further barrier to families who may qualify for a fee reduction is the lack of readily available information about those fees. The lack of detail regarding the sliding scale of these fees even at Illinois MSA was perplexing given the wealth of detail generally provided. This lack of information and the existence of the fees themselves are an additional burden placed on students and families. Though my focus is on racial demographics rather than socioeconomic background of students, yearly fees can deter families who are not considered low-income as well. Families will have to engage in additional

time to justify what fees they should be paying and figure out what they can afford after finding

out their child has been admitted to the program. As a parent, I can imagine the additional stress

this would add. The potential exists that a student may have to decline acceptance based on those

fees or a family may put itself in a tenuous financial position so that their child can attend. While

the student may gain improved prospects for college attendance after attending the STEM

school, this can draw funding away from that allotted for college or lead to additional

accumulation of debt. I found the frequent assertion that these schools are tuition-fee to be

disingenuous given these fees.

Given the benefits perceived to be afforded by attending a STEM school (Frazier et al.,

2012; Sayman, 2015; Shi, 2020; Thomas & Williams, 2010), it is likely that those from well-

resources families will be incentivized to prepare for admittance to selective STEM schools as

seen in other gifted programs (Dixson, 2022). As my daughter has asked questions about the

admissions process at the selective STEM school in our state, I have been able to allay her fears

regarding misconceptions she has heard. Thus, she has benefited from my familiarity with the

school. Making policies, procedures, and fees visible to everyone minimizes the impact any

insider knowledge students might have due to connections to the school or familiarity with

selective admittance processes. The lack of detail regarding important information further

reinforces an air of elitism and exclusivity that is at odds with the description of meeting the

needs of a diverse group of students.

Color Consciousness and Color Evasion

If greater racial equity is desired, increased transparency and updated selection criteria

can only go so far. As Basile and Lopez (2015) found in their review of STEM education

documents, so too I observed that in most cases the importance of diversity in STEM education

was "made predominantly from a one-sided economic perspective, favoring the owners and operators of the STEM enterprise" (p. 540). Language at each of the three schools is often used to say serve "all" students in the state. This, "while potentially appearing to be inclusive, is an example of racial essentialism, meaning the generalizing language of 'science-for-all' or 'math-for-all' works to erase the continued injustices, segregation, and exclusion experienced by Students of Color" (Basile & Lopez, 2015, p. 532). As Delgado and Stefancic (2017) emphasize, "only aggressive, color-conscious efforts to change the way things are, will do much to ameliorate misery" (p. 27, comma added for clarity).

Unlike Illinois MSA and Mississippi SMS, the Maine SSM policy does not mention race or ethnicity. The absence of mention of racial diversity in most of Maine SSM's statements regarding reach, diversity, and demographics was striking to me, especially given that Maine SSM's statements repeatedly specify that geographic and socio-economic background should not impact access to Maine SSM. When discussing policies for the New York City Community Schools, Lewis-Durham (2020) observes that "the absence of any direct reference to marginalized groups by their race and/or ethnicity reflects the minimization of racism tenant [sic] of color-blind racism " (p.15). Maine SSM was unique among the three schools in not offering programs specifically for underrepresented groups. Research supports the importance of providing engaging opportunities to CLED students prior to identification for advanced academic programs (Collins et al., 2020; Jackson, 2020). Though Maine SSM offers summer camps, and many attendees later enroll in the school, the programming appears to have a general audience. Although Maine SSM is directed to provide distance and online education opportunities via its state statute (MSSM, 1993 & rev. 2011), there is no mention of such services in the documents that I reviewed. Providing such opportunities, as Mississippi SMS and

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Illinois MSA do, can further help provide positive learning experiences in other parts of the state, particularly for CLED students (Davis et al., 2020). This color evasive approach to admissions with no intentional move towards addressing racial inequity suggests that Maine SSM will be challenged to achieve a more diverse community despite Maine SSM leaders' assertion that they seek it (MSSM, 2023e).

Although the statute establishing Mississippi SMS mentions students from "racial, social, and economic background" (MSMS, n.d.-e), there is little on the school's website that communicates a racial equity mindset and only a few mentions of diversity in exterior news articles (Fallows, 2014; Sharp, 2011). The philosophy, again only found through the student handbook, mentions meeting the needs of students of varied backgrounds. On the legislative outreach page, there is a mention of "opportunity regardless of zip code" (MSMS, n.d.-f). This may be indicative of reaching students of color as well, but it is not explicitly stated. Mississippi SMS's assertions also include troubling ambiguity. Stating that community stakeholders will be included (MSMS, 2023a) without elucidating could result in the exclusion of important voices, particularly CLED voices, from meaningful, substantive inclusion. If leaders are developing policies and procedures around generic, color evasive views of identity without considering different identities, particularly that of students of color, it may "water down the critical work needed to promote long-lasting change for racial equity" (Welton et al., 2018, p. 3).

Conversely, the IMSA Law is overt in seeking a diverse student body and specific in defining this to closely match the state demographics. The Illinois MSA admissions policy is aligned well with this aim, though it specifies that enrollment should approximate the applicant pool rather than the state demographics (IMSA, 2023h). However, the admissions policy also mandates that recruitment strategies need to be employed that target underrepresented groups.

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Mandating both these recruitment strategies and an alignment with the diversity of the applicant pool gives specific steps the school needs to take to meet the requirements of the IMSA Law. The Illinois MSA PROMISE program seems to support this aim especially given that many PROMISE students reportedly eventually attend Illinois MSA (Wright et al., 2022). I did not see mention of other specific recruitment strategies targeting underrepresented groups. However, it is conveyed through various statements, including the equity and excellence policy and vision statements, that Illinois MSA is tracking their racial demographics and continually working on increasing the percentage of CLED students attending the school. The Illinois MSA President noted that since 2015 "IMSA has increased the number of culturally, linguistically, and economically diverse (CLED) students from 183 to 251 out of a total enrollment of around 650" (Wright, et al., 2022, p. 4). Still, Illinois MSA's demographics show they are not currently achieving the goal of matching state demographics. I was impressed by Illinois MSA's extensive equity and excellence policy and clear metrics for tracking progress. The recent increase of the percentage of Latinx students at Illinois MSA may be an indication that these policies are having a positive impact. Still, the continued underrepresentation of Black and Latinx students despite this attention to equity further raises my concern that these selective STEM schools may be unable to represent the state population by their very nature.

Though each school mentions diversity in various ways when describing the school community, the diversity of the people reviewing the applications is never mentioned. As Ford (2014) explains, "white privilege in gifted education appears in such realities as" the people who "interpret students' scores and information are often White" (p. 149). There is no indication that attention is paid to ensuring those serving on the admissions review teams represent diverse identities, though both Illinois MSA and Mississippi SMS seem to include some different

perspectives with internal and external members. There is also no indication of what training

application reviewers receive. If such training includes culturally responsive approaches, it could

help reviewers understand the different ways giftedness can manifest and might lead to more

inclusion of CLED students (Collins et al., 2020; Davis et al., 2020; Ford, 2014; Ford et al.,

2020; Ford et al., 2021; Jackson, 2020; Michael-Chadwell, 2010; Mun et al., 2021).

Though varying in degrees, color evasion was present at all three institutions. However,

each school includes language regarding diversity and equity. Illinois MSA has specific racial

equity goals and seems to recognize that they need to continue working towards achieving them.

In contrast, Maine SSM and Mississippi MSM do not espouse such goals beyond vague

statements about a desire for diversity or equity. So, I am left wondering about their commitment

and ability to address the underrepresentation.

> Is equity just a buzzword, a contemporary fad, or is there true commitment? Do the
>
> professionals entrusted with educating these same Black and Brown students truly want
>
> equitable schools and services? And if so, are they professionally culturally competent to
>
> aid in the intellectual development of these students and the programs that serve them?
>
> (Ford et al., 2021, p. 174)

But if there is genuine commitment to equity and if these state-funded selective STEM schools

are here to stay, what can be done to improve equity?

Implications and Recommendations

As mentioned at the beginning of this chapter, I am conflicted about the existence of

these schools. The connection between creating a STEM school and serving gifted students is not

adequately problematized by state or school leaders. The view of the STEM schools as a driver

for state economic growth rather than as an environment that fosters engaged citizens leads me to

further question whether they can contribute to an equitable education landscape. Mindful of the opportunities these schools provide and the detriments a dramatic overhaul could cause, I reflected on what could be done to take steps toward improving equity. Drawing on my findings and on what current research suggests, I developed three recommendations for residential selective STEM schools such as Illinois MSA, Maine SSM, and Mississippi SMS. Considering what elements can lead to more equitable outcomes, my recommendations address admissions selection criteria and procedures, programming for younger students, and intentionality in seeking racial equity.

Admissions Selection Criteria and Procedures

While the schools I studied have admissions procedures based on a more holistic approach, their current approaches fail to fully acknowledge and account for structural inequities marginalized students of color have experienced before applying to the school. Given this, it is perhaps not surprising that inequities persist in access to these selective STEM schools. "Decreasing underrepresentation requires culturally responsive and equity-based policies, procedures, instruments, and attitudes" (Ford et al., 2020, p. 34). Ensuring admissions review teams are themselves racially diverse, have received culturally responsive training, and understand the different ways potential for success in the STEM school can manifest can help improve racial equity in admittance (Collins et al., 2020; Davis et al., 2020; Ford, 2014; Ford et al., 2021; Jackson, 2020; Michael-Chadwell, 2010; Mun et al., 2021). For this to be successful, those developing the criteria on which students will be assessed will also need professional development to ensure they understand that the ability to thrive in an advanced academic environment can be evident in different ways.

Students with a strong interest in STEM fields whose access to previous advanced academic opportunities have varied greatly can be successful in STEM schools (Johnson & Sondergeld, 2020; Means et al., 2021). Admittance criteria should not penalize students who have been systematically excluded from opportunities. Nor should the admittance criteria exclude those students for whom requesting additional work or opportunities would be outside of personal or cultural norms. To help achieve this, the criteria should be developed by those with an extensive understanding of the opportunities and experiences throughout the state and who have developed culturally responsive mindsets.

Illinois MSA's embrace of equity and excellence language with commitment to equity, diversity, and inclusion threaded throughout their communications seems to be the furthest along the path to achieving greater racial equity. In line with Illinois MSA's approach, the admissions selection criteria and procedures at selective STEM schools should be transparent and readily available to applicants. This will help ensure students from underserved communities are not lacking information that other communities have access to through prior connections to the school.

Programming for Younger Students

Research suggests that such programming designed for CLED students prior to identification can increase CLED student awareness and engagement in STEM (Collins et al., 2020; Davis et al., 2020; Jackson, 2020). The large percentage of Illinois MSA PROMISE participants who eventually attend Illinois MSA shows it can have a positive effect. Planning engaging STEM programming specifically for students of color can help students gain a better awareness of the school and develop a positive STEM identity, particularly if this programming pairs students with mentors from diverse backgrounds (Collins et al., 2020). Offering

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programming for younger CLED students can help address the opportunity gaps that are prevalent in education systems. Even Illinois MSA and Mississippi SMS, who are already offering some of this programming, can include regular evaluation of their programs' reach and outcomes.

Intentionality in Seeking Racial Equity

Intentionality is a key component for achieving greater racial equity (Ezzani et al., 2021; Ford et al., 2021; Mun et al., 2021; Peters et al., 2020). Selective STEM schools can be intentional in seeking racial equity by incorporating specific goals, steps, or language in their strategic initiatives and policies. Establishing a concrete goal for demographics can help to improve equity in the students who are reached (Ford, 2014). For example, using Ford's suggested equity index based on 20% threshold, each school would aim for percentage representation with minimum percentages of those shown in Table 7. I acknowledge that consideration of race in admissions is a nuanced issue, as clearly seen by the recent Supreme Court finding that race cannot be considered in college admissions (American Civil Liberties Union, 2022) and controversies such as Northern Virginia's Thomas Jefferson High School being sued by parents from Asian families. However, the Supreme Court's denial of the families' petition for a hearing regarding what the families perceive as discrimination is evidence that policies can be modified in a way that impact race when discrimination based on race is not the intent (Woolsey, 2024). Rather than suggesting that schools seek to exclude Asian students from admissions, I assert that the schools should interrogate their admissions policies and selection procedures to determine why it results in such different demographics. The goal should be creating policies that do not uphold inequities. An underlying component of CRT is the recognition that racism is present and cannot be removed without effort (Delgado & Stefancic,

2017). Instead of seeking to change racial demographics for the sake of changing racial demographics, I suggest that STEM schools identify the root cause of what is leading to a school body that is not representative of the state. Failure to acknowledge racial inequity and track the impact of policies on racial demographics will uphold the status quo and sustain inequity.

Table 7. Targeted Goal for Minimum Percentage of Each Race Based on Ford's (2014) Equity Index

Race	Illinois MSA	Maine SSM	Mississippi SMS
Asian	4.2	1.2	0.9
Black	13.3	3.2	37.9
Latinx	21.4	2.3	3.6
White	37.7	69.9	34.5

Next Steps

To move toward greater accountability and equity, I recommend leaders of these schools commit to collecting demographic data and analyze trends to inform decision making. For example, leaders should consider:

1. Tracking racial demographics of who the school is reaching with their outreach initiatives, summer programs, and marketing.

2. Tracking racial demographics of applicants to the residential program.

3. Surveying students from CLED communities who are aware of the school but choose not to apply or who apply and are not admitted.

4. Providing culturally responsive training for school leaders and admissions review members.

Using the data and training from these four steps, school leaders and other state stakeholders can pinpoint the deterrents and barriers to admission at the selective STEM schools. This will provide the foundation by which the schools can update policies and communication, offer

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targeted programming for younger students of color, and establish specific racial equity goals. In alignment with the selective STEM schools' purpose to improve education in the state, the schools should also share their findings broadly to help other educational institutions identify inequities that likely exist throughout the state education system. These actions will help ensure that updated policies and procedures, as Kendi (2019) expresses it, produce racial equity rather than sustain racial inequity.

Limitations and Future Research

There are numerous confounding factors that my study did not consider but that likely impact the schools' racial demographics. Notably, I did not have the racial demographics of students who applied. Comparing how the demographics of *applicants* compare to both the state general education population and the school population would help give additional insight into what areas each school should focus on. Illustrating this, an Illinois MSA student newspaper article (Yue, 2018) showed data that suggests that the demographics of admitted students closely matched that of the applicant pool. Geographical location could also impact the school demographics. For example, Maine SSM is in a very remote area of Maine. Research suggests that location may impact representation in such programs (Rogers-Chapman, 2014; Siegel-Hawley, 2013). Additional transportation and time costs for the student to travel to and from the school likely also impact a family's decision about attending or applying, adding another dimension to the impact of the school's location in the state. How diverse the people reviewing the application as well as the diversity of the faculty and staff will also impact school demographics (Ford, 2014). As noted in Chapter I, I did not consider intersectionality of a student's identity when looking at demographics. Since female students are also traditionally

underrepresented in STEM schools, breaking down the racial demographics by gender could give additional insight into representation and equity.

Focusing on publicly available documents allowed me to consider the information available to applicants and their families. The information a school conveys publicly will directly impact how students perceive the school and the clarity they will have in the admissions process. While I found this to be an important lens to view the schools, it did impose limitations on the research. Further research that includes interviews with school representatives would provide answers to questions that I was not able to determine from the documents such as whether there is an unpublished Maine SSM policy for admissions and who is on their Admission Review Committee. Interviews would also provide a means to further interrogate the perceived need for a STEM focus for the schools and how leaders see a STEM focus as integral to their school.

As discussed in Chapter I, a qualitative study allows the researcher to explore a small sample but does not lend itself towards generalizations. I cannot and do not claim that all residential selective STEM schools exhibit the same trends that I observed for Illinois MSA, Maine SSM, and Mississippi SMS. Yet, other such schools may find it helpful to reflect on what overlap exists in considering how to develop and meet equity goals.

Final Thoughts

It would be comforting, if unexpected, to find clear answers and easy solutions to the problem of underrepresentation in residential selective STEM schools. The precise impact of discourse and policy is not obvious, and the numerous confounding factors mean there is not always a clear path toward improved equity. I am reminded that for those seeking to be culturally responsive and anti-racist education leaders, there are no one-size-fits-all answers. Context and circumstances matter. Even among the three schools I studied, the schools varied in size and age

of students served. The smaller size of Maine SSM and comparatively middling size of Mississippi MSM mean they have fewer students they can accept. With limited bed and building space available, the schools may not be able to expand their number of accepted students as Peters et al. (2020) recommend. Since Maine SSM's students are also spread across ninth through twelfth grade, fewer student spaces are available in each grade. Along with this, Maine SSM will need to consider how their selection is impacted by the younger age of some of their applicants. Identifying the solutions that will improve equity at the school and at the state level will require leaders to reflect and incorporate the needs of Black and Latinx students in their conversations (Ford et al., 2021).

The current climate in which the Supreme Court has struck down color-conscious admissions policies (American Civil Liberties Union, 2022) make addressing underrepresentation in schools even more challenging. As the board chair at Thomas Jefferson High School for Science and Technology discovered (Woolsey, 2024), school leaders are likely to be criticized or possibly have legal actions pursued even if their goal is to ensure access and not to discriminate. Thus, leaders must be prepared to advocate in the face of resistance and justify their actions guided by cultural competence and equity goals.

As I continue to make sense of my conflicting feelings about the role these STEM schools should, can, and do play, I recognize that part of this conflict arises from seeing how students can flourish in a new environment that may allow them to embrace aspects of their identify for perhaps the first time. The schools generate interest and energy from stakeholders across the state. Yet, who loses out? It seems to be disproportionally those who have been excluded from previous opportunities, which research identifies are CLED students. And how will the mindsets of STEM school alumni be impacted, either implicitly or explicitly by

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attending a school in which CLED students are excluded? How will the mindsets of students across the state be impacted when they see who is left out and who is included? From my perspective as an education leader who strives to be anti-racist, change needs to occur if the states with these schools are to improve equity for their students.

Discourse that "consistently promotes bureaucratic processes for advancement and innovation, offers competition as the only means to advance, and fails to fully recognize that it is not the lack of skill but rather the lack of social, economic, and educational opportunities that hinders advancement in STEM" (Mansfield, Welton, & Grogan, 2014, p. 1173) cannot lead to improvements in equity. Presenting equity and excellence as a dichotomy positions equity as detrimental to excellence. The assertion that greater equity would lead to a decrease in academic standards represents an embrace of deficit-thinking. Selective STEM schools can move toward greater equity and maintain excellence by holding themselves, other educational institutions, and state leaders accountable for racial inequities, rather than placing the burden on the CLED students of the state who can thrive in the challenging, engaging academic communities these STEM schools offer.

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APPENDIX A: SAMPLE CODED DOCUMENT

Figure A6. Maine SSM 2020 Annual Report (MSSM, 2020a, p.4) with Coding

Executive Summary

The Maine School of Science and Mathematics has been a school of academic excellence available to all Maine students for over 25 years. Its students have demonstrated that all students, when given the opportunity, can compete and excel on both national and international stages. MSSM has a strong residential program which can be leveraged to support STEM education across the State of Maine. The State has been investing in higher education STEM programs to secure its economic future. MSSM is poised to provide a crucial channel of secondary students from ALL regions of the state who can matriculate into these higher education programs and seed our STEM economy. MSSM is positioned to be the STEM high school for Maine's high-achieving students, with a focus on helping all Maine's local districts provide their students with the most advanced science and math classes.

[Handwritten annotations: belief statement; MSSM purpose: state-wide education; student attribute: diversity; MSSM purpose: economy; MSSM purpose: state-wide education; student attribute: academic ability]

The Maine School of Science and Mathematics was created during a time of economic uncertainty caused by the closing of Loring Air Force Base. The vision that let the State to make the investment in a STEM Magnate Residential High School at that time is the same vision that is needed today. It is the same vision that will invest in expanding the MSSM investment to support high school STEM education in Maine.

[Handwritten annotation: MSSM purpose: statewide education]

Overview of MSSM

Mission

The Maine School of Science and Mathematics (MSSM) brings together and helps a group of Maine's most academically motivated high school students from across all regions of the state. Through their MSSM experience, these Maine students become innovative, well-rounded scholars with the ability to develop, investigate, and communicate critical ideas that improve the human condition and benefit the state of Maine. The school builds and shares a rigorous curriculum that exceeds state educational standards while emphasizing connections between science, mathematics, and the humanities. MSSM extends its mission by fostering a statewide, year-round community of innovative learners that includes many of Maine's students, educators, and the general public.

[Handwritten annotations: student attribute: academic ability; MSSM purpose: state-wide education; MSSM purpose: residential student experience outcomes; MSSM purpose: curriculum]

History

MSSM is a public residential magnet high school chartered and funded by the Maine State Legislature. A residential community committed to the pursuit of academic excellence, MSSM provides an extensive and challenging curriculum in science, mathematics, technology, and the arts and humanities.

MSSM was created by the 116th Maine Legislature in 1995 and is a member of the **National Consortium of Secondary STEM Schools**. The Maine School of Science and Mathematics opened with a pioneer class in 1995. At that time, it was only the eleventh statewide residential

Figure A7. Maine SSM 2020 Annual Report (MSSM, 2020a, p.5) with Coding

magnet school specializing in mathematics and science education in the United States and the only school of its kind in New England. Both remain true today.

[handwritten: Student attribute: diversity]

While MSSM students come from diverse backgrounds, one common purpose prevails: the enthusiasm, desire, and commitment to, learning. The challenging curriculum and stimulating environment create an ongoing learning experience with students working, studying, and socializing with classmates who share similar interests and goals.

[handwritten: Student attribute: mindset]

For a more in depth look at the history of MSSM, please review the 20th Anniversary Publication attached as Appendix G.

Vision

MSSM achieves its mission by:

[handwritten: MSSM purpose: Curriculum]

- Providing a rigorous, immersive, student-centered curriculum that emphasizes the connections between math, science, and the humanities; including post-AP courses; and culminating in opportunities for authentic research and community service.
- Presenting students with supportive opportunities to realize their personal and professional aspirations in Maine both through nurturing, challenging on-campus programs and through partnerships with research and higher education institutions throughout the state and beyond.
- Creating a supportive, residential environment and academic community that promotes personal development, leadership, service, and academic success.

[handwritten: MSSM purpose: residential student experience/outcomes]

[handwritten: MSSM purpose: state-wide education]

- Developing programs to inspire younger students while also serving as a professional development partner for Maine's teaching community.

Philosophy

[handwritten: MSSM purpose: residential student experience outcomes]

The administration, faculty, staff and Board of Trustees of the Maine School of Science and Mathematics (MSSM) are committed to providing academic excellence for all our students, who arrive at MSSM form diverse parts of the state and with diverse academic preparation. Our students excel because they are willing to embrace the opportunity MSSM provides them; they dedicate themselves to both the academic rigor and residential program. Graduates of MSSM have experienced a well-defined curriculum based upon academic standards fostering both academic discipline and honesty.

[handwritten: Student attribute: diversity]

[handwritten: Student attribute: mindset]

All students live in residence to fully participate in this intensive programming with students who share similar interests. The nurturing of this educational community – the integration of the academic and residential components – is crucial to success at MSSM. Students are responsible for taking advantage of the academic and extra-curricular pursuits available at

[handwritten: Student attribute: diversity]

[handwritten: student attribute: mindset]

APPENDIX B: ILLINOIS MSA'S BELIEF STATEMENTS AND STRATEGIC PRIORITIES

Illinois MSA's beliefs as stated on their mission webpage (IMSA, 2023a) are:

- "All people have equal intrinsic worth."

- "All people have choices and are responsible for their actions."

- "Belonging to a community requires commitment to the common good."

- "Diverse perspectives enrich understanding and inspire discovery and creativity."

- "Honesty, trust and respect are vital for any relationship to thrive."

- "Learning never ends."

- "Meaning is constructed by the learner."

- "No one's path in life is predetermined."

- "The ability to discern and create connections is the essence of understanding."

- "We are all stewards of our planet."

- "We can significantly improve life on our planet."

The strategic priorities of Illinois MSA's strategic plan (IMSA, 2022a) are:

- "We close equity gaps of excellence in STEM because DEI is a priority at IMSA" (p. 1).

- "[Our colleagues] are charged to rethink their practice within their goals, and are given ongoing feedback and opportunities to stretch themselves, so they can advance to their next career step. The more feedback, the more they learn and grow" (p. 2).

- "IMSA is regarded as the hub for educational innovation. We develop a cycle where colleagues can invent and test new ideas, collaborate with colleagues to make them better, and then share them broadly" (p. 3).

- "IMSA can provide an enriching learning experience to exceptional STEM-loving students that live outside the state. We expand our facilities and set the stage for a financially stable future" (p. 4).

APPENDIX C: MAINE SSM'S VISION STATEMENT, PHILOSOPHY STATEMENT, AND

STRATEGIC INITIATIVES

Maine SSM's vision statement is provided as a bulleted list of actions describing how the school will achieve its mission.

- Providing a rigorous, immersive, student-centered curriculum that emphasizes the connections between math, science, and the humanities; including post-AP courses; and culminating in opportunities for authentic research and community service.

- Presenting students with supportive opportunities to realize their personal and professional aspirations in Maine both through nurturing, challenging on-campus programs and through partnerships with research and higher education institutions throughout the state and beyond.

- Creating a supportive, residential environment and academic community that promotes personal development, leadership, service, and academic success.

- Developing special programs to inspire younger students while also serving as a professional development partner for Maine's teaching community. (MSSM, 2023c, Vision section)

Maine SSM's philosophy statement is stated below.

The administration, faculty, staff and Board of Trustees of the Maine School of Science and Mathematics (MSSM) are committed to providing academic excellence to enhance previous student knowledge, as well as to prepare students for future studies. The opportunity to attend MSSM is a privilege, and each student can make the most of this experience by being dedicated to the academic and residential programs. Graduates of

MSSM have experienced a well-defined curriculum based upon academic standards fostering both academic discipline and honesty. All students live in residence to fully participate in this scholastic program of excellence with students who share similar interests. The nurturing of this educational community – the integration of the academic and residential components – is crucial to success at MSSM. Students are responsible for taking advantage of the academic and extra-curricular pursuits available at MSSM and for supporting community members in both their academic and personal development. (MSSM, 2023c, Philosophy section)

Maine SSM's first strategic initiative is:

MSSM's on-campus program has been a foundational piece of its exceptional student outcomes since its inception. Every qualified, exceptionally motivated Maine student, no matter their socio-economic circumstances or geographic location, should have the opportunity to experience the MSSM on-campus program.

To maintain exceptional outcomes, the MSSM facilities need to be expanded and fully maintained. MSSM students, faculty and staff need first-rate facilities. (MSSM, 2020a, p. 125)

The second strategic initiative is:

MSSM must expand its outreach to become a vital partner to Maine public schools, and a valued, accessible resource for students and educators across the state.

MSSM remains a well-kept secret across the state. Through active partnerships and broader recognition of MSSM's ability to meet the needs of Maine's high-achieving students, MSSM will be seen as a key partner in the Maine STEM landscape. (MSSM, 2020a, p. 127)

The third strategic initiative is that "exceptional faculty, staff and facilities will enable MSSM to provide world class student outcomes" (MSSM, 2020a, p. 128).

APPENDIX D: MISSISSIPPI SMS'S BELIEF STATEMENTS, PHILOSOPHY STATEMENT,

GOALS, AND VALUE TO THE STATE

Mississippi SMS's belief statements are that Mississippi SMS:

- addresses the extraordinary needs of Mississippi's gifted and talented students through innovative and rigorous research-based courses;

- teaches students how to integrate technology with current content in courses;

- offers a living-learning environment that facilitates students' intellectual growth, encourages their social maturity and self-confidence, and strengthens their citizenship;

- stimulates excellence in all Mississippi schools by providing a model of educational leadership; and,

- courts active participation from all of the community's stakeholders. (MSMS, 2023a, p. 11)

The Mississippi SMS philosophy statement is:

The Mississippi School for Mathematics and Science recognizes the unique values, needs, and talents of the academically able student. The program at MSMS is designed to challenge each student based on individual capabilities, background, interests in certain curricular areas, and on college requirements.

The curriculum at MSMS provides students with the foundation needed for successful academic pursuits after high school. Each discipline is seen as a part of the whole rather than as a separate entity. The total instructional program is integrated in such a way that students do not perceive content information as isolated and fragmented,

but understand the interrelatedness of all learning. The instructional climate is conducive to recognizing entry level skills and abilities of each student and then allowing students to progress to reach their maximum potential.

The faculty and administration at the Mississippi School for Mathematics and Science bring diverse talents and superior teaching skills to the college preparatory instructional program. Instructors at MSMS are encouraged to draw upon their creative abilities to seek innovative approaches to instruction. Instructional techniques allowing students to develop skills in critical thinking, problem solving, research, independent study, and the use of technology are stressed. Faculty members are encouraged to seek continuing professional development to remain current in their respective fields. Resources are provided for professional and instructional enhancement.

The residential program at the Mississippi School for Mathematics and Science plays an integral role in the development of each student. Through the residential program, students are encouraged to become independent thinkers, to develop the ability to work cooperatively with others, and to use appropriate decision-making skills. The residential program also provides activities that foster the development of social skills and promote physical health. (MSMS, 2023a, p. 11)

According to the student handbook (MSMS, 2023a, p. 12), Mississippi SMS's goals are to

- "Work toward providing an educated populace with a strong background in mathematics, science, and technology, thus attracting industry and aiding economic development in Mississippi."

- "Provide students with a residential program, which promotes the development of a cooperative spirit, rewarding interpersonal relationships, a sense of responsibility, and

healthy self-concepts as they develop appropriate attitudes and values regarding interaction with peers and adults."

- "Provide students with a strong college preparatory background which emphasizes innovative and unique learning experiences outside the classroom to enhance the development of the ability to move from the acquisition of facts to the process of comprehension, analysis, synthesis, application, and evaluation."

- "Promote the awareness of the MSMS experience to external publics statewide."

- "Serve as a resource for public education in Mississippi in many ways, such as providing opportunities to teachers and students from other schools to attend special seminars and workshops during the summer months."

Mississippi SMS's value to the state is that it:

- Enhances collective prosperity. MSMS provides innovative residential learning experiences and leadership development, so that gifted and talented students reach their potential and overall state prosperity is expanded.

- Ensures the future economy. Through forward-thinking STEM programs, such as its Engineering and Entrepreneurship Programs, MSMS is building a pipeline for the state's top students to meet the workforce needs of tomorrow.

- Promotes opportunity regardless of zip code. By generating high-quality teacher development and outreach programs, MSMS improves STEM interest among elementary, middle, and high school students across the state. (MSMS, n.d.-f, MSMS' Value to Mississippi section)

APPENDIX E: ILLINOIS MSA ADMISSIONS CRITERIA FROM THE IMSA ADMISSIONS

POLICY

Applicants who are admitted and placed in the waitpool will meet the following criteria:

- History of consistently high academic achievement in STEM as indicated by grades and evaluations from teachers in the student's local school (deviations of this pattern must be due to extraordinary circumstances that are not expected to interfere with future performance);

- Demonstrated interest and talent in mathematics and/or science as indicated by grades, evaluations from teachers in the student's local school and other information in the student's application;

- Expectation for success within the IMSA academic and residential environment as indicated by evaluations from teachers and in the student's local school and other information in the student's application;

- Demonstrated potential for significant contributions in the fields of mathematics and science.

Particular attention is paid to the applicant's integrity, maturity and genuine interest and talent in math and/or science. To ensure adequate geographic, gender, and ethnic representation, the Selection Committee considers the demographics of the selected class thus far, the eligible applicant pool, and high achieving students overall and by sub-groups on one or more competitive examinations administered by the State or local educational systems; as well as the strengths of the individual applicants. Factors such as demonstration of exceptional talent or potential for exceptional talent in the areas of mathematics and/or science, coursework completed, demonstration of potential for

leadership, demonstration of a pattern of ethical decision making, behaviors consistent with research on gifted students in math and science, expectations for success within the IMSA environment, relative academic standing in home school, first language, course availability in home school, potential to contribute to diverse discourse among students and staff and other special circumstances are considered as a single qualitative judgment when selecting from among the eligible applicants. Relative importance of these factors will be determined by the professional judgment of the Selection Committee members. (IMSA, 2023h)

APPENDIX F: MISSISSIPPI SMS ADMISSIONS CRITERIA FROM THE MISSISSIPPI SMS

ADMISSIONS POLICY

- Submit all required sections of the admissions application to the MSMS Admissions Office on or before the priority application deadline.

- Be a current tenth grader with a minimum of twelve (12) Carnegie units of study upon the completion of the tenth grade, including specified required units.

  o Mathematics: 2 Carnegie units; Algebra 1 and Geometry are required; Algebra 2 is recommended.

  o Science: 2 Carnegie units; Biology 1 is required; Chemistry is recommended.

  o English: 2 Carnegie units

  o Social Sciences: 2 Carnegie units from: Mississippi Studies, World Geography, World History, U.S. History, Government, and Economics. Only one-half Carnegie unit from Mississippi Studies or World Geography may apply toward the required 12 Carnegie units.

- Other courses that are strongly recommended before attending MSMS include: ½ Carnegie unit in Comprehensive Health, Family and Individual Health, or Allied Health; and ½ Carnegie unit in Physical Education; 1 Carnegie unit in Computer Discovery, or ½ credit in Keyboarding and ½ credit in Computer Applications; Mississippi Studies; Geography; and World History.

- Have a record of school performance that is above average in all subjects (mostly all As, few Bs).

- Have a record of school performance that is excellent in mathematics and science courses (mostly all As)

- Demonstrate clear evidence of a strong interest in mathematics, science, and related areas such as electronics, research, technology, engineering, independent projects, etc.

- Have a strong desire to attend MSMS.

- Submit an ACT score. (Score of at least 20 is recommended).

    o (All applicants must take the ACT no later than the December

    testing date).

- Undergo a personal interview if the applicant's packet receives a 9 or above (of a possible 15) by the Application Review Committee.

- Show proof of legal residency in Mississippi.

- Complete and sign a Declaration of Legal Residence form. (MSMS, 2023a, pp. 14–15)

APPENDIX G: TABLES OF RACIAL DEMOGRAPHICS FOR SCHOOLS AND STATE

GENERAL EDUCATION POPULATIONS

Table G8. Racial Demographics for Illinois MSA for Academic Years 2019 – 2023 as

percentages

Race	2019 – 2020 [a]	2020 – 2021 [b]	2021 – 2022	2022 – 2023 [c]
Asian	40.0	35.5	–	37.2
Black	10.0	10.1	–	10.3
Latinx	9.0	17.1	–	17.2
White	32.1	29.0	–	29.3

[a] Data obtained from IMSA 2020 Profile (IMSA, 2020, p. 4)
[b] Data obtained from IMSA 2022 Profile (IMSA, 2022c, p. 4)
[c] Data obtained from IMSA 2023 Profile (IMSA, 2023l, p. 4)

Table G9. Racial Demographics for Maine SSM for Academic Years 2019 – 2023 as

percentages

Race	2019 – 2020	2020 – 2021	2021 – 2022	2022 – 2023 [a]
Asian	16.0	13.0	11.1	8.8
Black	0.0	0.9	0.9	1.0
Latinx	4.8	5.2	7.4	4.9
White	76.0	75.7	75.0	76.5

Note. Data for all years except 2022 – 2023 obtained from Department of Education data warehouse (Maine Department of Education, 2023b)
[a] Data obtained from Department of Education ESSA Dashboard (Maine Department of Education, 2023a)

Table G10. Racial Demographics for Mississippi SMS for Academic Years 2019 – 2023 as

percentages

Race	2019 – 2020	2020 – 2021	2021 – 2022 [a]	2022 – 2023
Asian	–	21.34	20.26	19.48
Black	21.85	–	25.43	22.51
Latinx	–	–	1.29	–
White	53.78	53.56	48.28	47.19

Note. Data for all years except 2021 – 2022 obtained from the Department of Education data warehouse (Mississippi Department of Education, 2023)
[a] Data obtained from National Center for Education Statistics (2023)

Table G11. Racial Demographics for Illinois General Education Population for Academic

Years 2019 – 2023 as percentages

Race	2019 – 2020	2020 – 2021	2021 – 2022	2022 – 2023
Asian	5.1	5.2	5.4	5.4
Black	16.7	16.6	16.6	16.6
Latinx	26.4	26.6	27	27.2
White	47.6	47.5	46.7	46.4

Note. All data was obtained from the Illinois State Board of Education report card trend data set (Illinois State Board of Education, 2023).

Table G12. Racial Demographics for Maine General Education Population for Academic

Years 2019 – 2023 as percentages

Race	2019 – 2020	2020 – 2021	2021 – 2022	2022 – 2023 [a]
Asian	1.4	1.4	1.4	2.4
Black	4.0	4.1	4.4	3.3
Latinx	2.6	2.7	3.0	3.2
White	88.2	88.0	87.3	85.3

Note. Data for all years except 2022 – 2023 obtained from the Department of Education data warehouse (Maine Department of Education, 2023b)
[a] Data obtained from Department of Education ESSA Dashboard (Maine Department of Education, 2023a)

Table G13. Racial Demographics for Mississippi General Education Population for

Academic Years 2019 – 2023 as percentages

Race	2019 – 2020	2020 – 2021	2021 – 2022	2022 – 2023
Asian	1.11	1.15	1.11	1.12
Black	47.65	47.72	47.1	46.99
Latinx	4.23	4.39	4.64	4.76
White	43.72	43.13	43.14	42.59

Note. Data obtained from (Mississippi Department of Education, 2023)

Table G14. Sample Mean Differences Calculation: IMSA & Illinois

Race	IMSA Mean	Illinois General Education Population Mean	Difference
Asian	37.6	5.3	32.3
Black	10.1	16.6	-6.5
Latinx	14.4	26.8	-12.5
White	30.1	47.1	-16.9