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Sunnybrook Health Sciences Centre

MEET THE SCIENTIST PROGRAM

Centre of Excellence for Black Student Achievement

Toronto District School Board

Sunnybrook

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Executive Summary

The future of science, technology, engineering, and mathematics (STEM) education resides in the hands of youth. However, persistent systemic, and structural barriers within the educational system have restricted Black[1] youth from realizing their dreams of becoming leaders in STEM, particularly science. Although ensuring equitable access and opportunities to STEM fields is crucial for the success of Black students, the support they receive from Black mentors is integral to their pursuit of a career in the science field.

The Centre of Excellence for Black Student Achievement ("Centre of Excellence" or "the Centre")[2] collaborated with Sunnybrook Health Sciences Center to create the Meet the Scientist Program to afford Black students meaningful access to the field of science. Not only did the initiative grant Black students a chance to learn more about various career pathways in the field of science, but it also facilitated networking opportunities and learning experiences with scientists from working departments including research labs. Furthermore, the project aligned with the Centre's goal to improve Black students' academic outcomes and graduation rates through increased support and "access to appropriate resources (e.g., scholarships, networking, mentoring)."

This report details students' experience in and benefits gained from the Meet the Scientist Program. The evaluation of this program was conducted virtually between November and December 2022. To achieve the objectives of the study, a survey design was used to gather data and inform the findings. A total of eight students completed the end-of-program survey. While the findings cannot be generalized due to the limited sample size, they highlight patterns in Black students' perspective of the program. Analysis of the data included thematic coding and descriptive analysis.

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[1] The term Black refers to individuals, peoples or communities of Black /African descent living in Canada. This may include, but are not limited to individuals or peoples from the Black diaspora with varying geographical, historical, cultural, national, ethnic, religious, and ancestral origins and influences (e.g., African, African -Canadian, Afro-Caribbean, Afro Latin, Afro indigenous, Afro- Europeans).

[2] Centre of Excellence for Black Student Achievement

The findings revealed four key themes related to students' involvement in the program objectives. These themes include:

1. Students’ engagement with the program goals;
2. Experience in the program;
3. Engagement with scientists and facilitators; and
4. Awareness and understanding of the various career pathways in science.

The survey results indicate that most Black students engaged in the Meet the Scientist Program reported positive experiences. At the same time, the findings underscored the need for increased Black representation across various levels within the STEM field.

Background

While there has been an ongoing effort in K-12 education to help students succeed in STEM, Black students still face many systemic and structural barriers that hinder their success (Anderson et al., 2022; Andrade, 2021; McGee, 2016, 2020). These obstacles manifest in some educators' challenges to support Black students due to discriminatory practices rooted in race, gender, and socio-cultural/socioeconomic backgrounds (Grossman & Porsche, 2014). In addition, the underrepresentation of Blacks in STEM fields means that Black students lack role models and mentors who can guide and support them in their area of interest (Actua, 2023; McGee, 2021; Wong, 2022). Families, community members, educators, and scholars recognize that investing in the lives of Black children and youth starts with middle and high school interventions and continues through college and graduate studies (Kelty & Wakabayashi, 2020). Hence, there is an ongoing call for education systems, Black networking organizations, and others to help dismantle cultural, instructional, and institutional policy barriers to improve Black students' access to STEM programs (Adams, 2021).

While efforts to de-stream education take precedence, it is important to acknowledge the enduring impact of discriminatory practices on Black students within educational institutions. Over the years, these practices have significantly shaped Black students' attitudes towards post-secondary education, particularly in the field of STEM. (Grossman & Porche, 2014; James & Turner, 2017; Malone et.al., 2023; Parekh et al., 2018). These negative practices can make it difficult for Black students to imagine themselves in STEM career fields. As a result, they may experience a decreased sense of belonging and confidence in the STEM field; thus, intensifying the existing challenges of attracting and retaining Black students (Collins, 2018; Malcom & Feder, 2016). Despite growing demands for STEM graduates across different sectors, systemic and structural racism continues to pose restrictions/barriers for equity-deserving groups (McGee, 2016, 2021). Prioritizing equity in access to STEM education opportunities for Black students is, therefore, an imperative that must be addressed (Anderson et al., 2022).

To better understand the pathway for Black students from early exposure to STEM experiences to pursue a STEM career, the Center of Excellence continues to forge community partnerships. Programs such as Meet the Scientist bridge the gap between informal STEM (science, technology, engineering, and mathematics) education and the career decisions of Black students in K-12 education. What we do know is these informal STEM experiences influence Black students to envision themselves, for example, as scientists or information technologists. Due to the exposure and opportunities, Black students also think about choosing the right courses related to STEM that can set them up for success while working toward post-secondary education and/or career pathways.

Figure 1

Information session poster

Program Objectives, Framework and Design

The 3-week program enriched Black students' overall experience and worked to ensure that Black students:

- Received the opportunity to connect and engage with Black scientists;
- Developed an understanding of the various career pathways in science; and
- Gained knowledge of health science research.

Literature Review

Science, technology, engineering, and mathematics (STEM) fields have been identified as key drivers of innovation and economic growth in Canada (Government of Canada, 2021). Black students are, however, significantly underrepresented in STEM fields, especially at higher levels of education and in leadership positions (Anderson et al., 2022; Demise 2017; Collins, 2018). This underrepresentation has been attributed to various factors, including historical and systemic barriers, lack of

role models and mentors, insufficient access to resources and support networks, the lack of early K-12 exposure to STEM education and academic preparedness (Malcom & Feder, 2016; McClain, 2014; Wilson-Forsberg et al., 2018).

In this section, the review of literature captures Black students' experience and access to STEM programs. It also highlights the importance of mentorship programs and the growing need for equity in hiring practices to meet the needs of Black students at an early age who are interested in STEM careers, particularly in the field of science. The literature offers an overview of the career pathways in science, and the need for improvements in supporting and guiding Black students in their pursuit of careers in this field.

Black Students in STEM

Despite the generally held belief that Canada is a merit-based country, students from racially minority backgrounds experience disadvantages that are sometimes reproduced and perpetuated by dominant racial groups (Yiridoe, 2021). Accordingly, Museus and Neville (2012) urged schools and colleges to adopt deliberate attitudes and actions that would connect racial minority students to social capital in the broader social networks at an institution that would facilitate their success.

In recent years, interest in the underrepresentation of Black students in STEM professions in Canadian institutions has tremendously grown (Caxaj et al., 2021; James & Tuner, 2017; Norman et al., 2022). Though many Black students perform exceptionally well in K–12 education, they frequently encounter difficulties when trying to transition to post-secondary education and pursue STEM careers (Carlone & Johnson, 2007; Norman et al., 2022; Oloo & Correa, 2022; Suran, 2021). According to Statistics Canada (2016), Black Canadians acquired less than 3% of the degrees and diplomas in post-secondary institutions in 2016 that would have qualified them for STEM employment. Therefore, to effect meaningful change, there is a need to create more opportunities for Black students in K-12 education to explore STEM fields and careers (Park-Taylor et al., 2022; Sasaki, 2021).

In Ontario and across Canada, information on student achievement by race has not been readily available (Whitley & Hollweck, 2020). Race-based data is important in understanding the Black experience in STEM fields and careers. Research suggests that despite a growing increase in STEM graduates in Ontario (65%) and across Canada (51%) from 2010-18, Black graduates' experiences and performance are unknown (Carlone & Johnson, 2007; McClain, 2014; Statistics Canada, 2016).

According to Robson et al. (2018), students of Asian origin in Ontario were more likely to enroll in universities after graduating from high school than Black and Latino students. Black students were less prepared for post-secondary education and tended to have lower than average marks, higher identification of special education needs, and were disproportionately assigned to applied streams (Robson et al.,2018). Interestingly, Robson et al. (2018) found that Black students were more likely than white students to secure a place in a university in 2011. However, their analysis fails to explore the intersectionality of gender and race in the context of STEM. Authors from the student-led organizations – Science and Policy Exchange (Montreal) and Toronto Science Policy Network – discussed the importance of addressing equality, diversity, and inclusion (EDI) issues within the context of intersectionality (Anderson et al., 2022). Anderson et al. (2022) and researchers expanded on the notion of intersectionality to highlight what they consider the 'Glass obstacle course' that hinders the promotion of racialized females with multiple identities in STEM at the university level and other industries (as cited in Grossman & Porche, 2014). In a similar study, Collins (2018) examined the intersectionality of race, giftedness, and female identity to highlight gender discrimination and the privileging of white girls as the representative of females in STEM programs.

Figure 2

Black students in a STEM classroom

Oloo and Corrêa (2023) suggested that racial identity has an impact on students' experiences across STEM professions. In their study that explored the racialized mathematics experience of Black undergraduate students in Ontario, the authors found that issues disproportionately affecting Black students include: (a) fewer Black teachers, (b) tolerance of anti-Black racist incidents in schools,(c) harsher school discipline of Black students compared to their non-Black peers and (d) streaming of Black students into applied courses in K-12 (Oloo & Corrêa, 2023). In addition, Black students encounter lower academic expectations from educators, a lack of leadership opportunities, and a minimal acknowledgement of Black experiences/culture/history in the curriculum (James & Turner, 2017; Kohli et al., 2017; Malone et al., 2023). Due to these unfriendly social environments at both

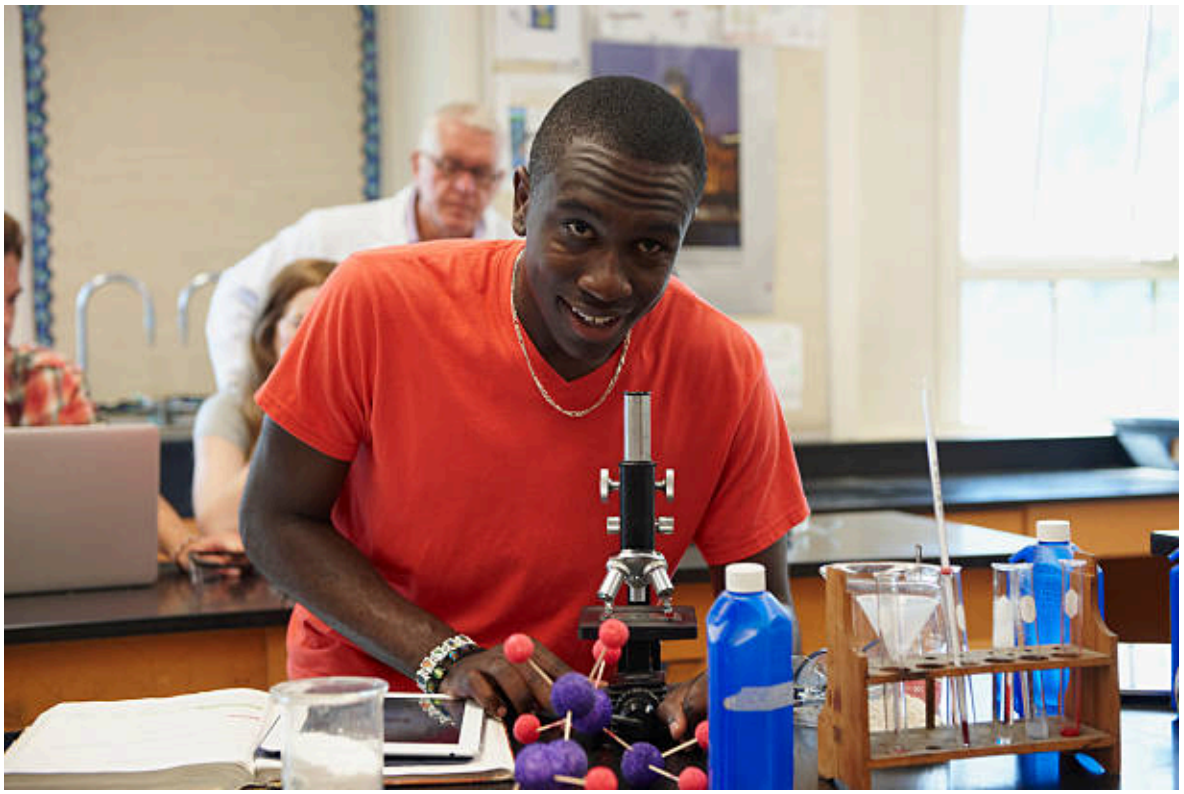
secondary and post-secondary institutions, Black students are severely impacted as they face constant challenges that hinder their academic ability (Crenshaw et al., 2015; Gelbgiser & Alon, 2016).

As Parekh et al. (2018) demonstrate, the relationship between students' achievement, their learning skills, and teachers' biases is another factor that impacts Black students' engagement in schools. Parekh et al. (2018) observed "the presence of implicit bias within teacher-reported assessments on how students approach their own learning" (p.19). Parekh et al. (2018, as cited in Oloo & Correa, 2023) noted that Black students were less likely to be assessed as having excellent learning skills when compared with other groups of students at similar achievement levels (p. 19). They concluded that some groups of students are always perceived as not good enough, no matter how well they perform academically (Parekh et al., 2018).

As Wilson-Forsberg et al. (2018) argued, challenging the academic capabilities of Black students not only hinders their sense of self-worth but also intensifies their marginalization by peers. Despite the challenges, Black students have managed to cope and succeed in school. McGee (2021) noted that despite the obvious harmful impacts of real and perceived racism, anti-Black racist experiences motivated some Black students to adopt resilience strategies that were psychologically reaffirming and enhanced their academic achievement. For example, to challenge stereotypes, many Black students are motivated to stay on top of things and excel in examinations for their classes (McGee, 2021).

Figure 3

Black student in science class



For Black students, having access to educational, career, and other professional opportunities and relationships creates a sense of community and belonging (Ghazzawi et al, 2021; Hansen et.al, 2023). Programs developed to address racial and economic challenges affecting Black students have greater and long-term impacts on their aspirations (Bennett, 2019). According to Adiredja and Andrews-Larson (2017), the underrepresentation of racial minority students in STEM fields stems from the post-secondary institutions to adequately address their needs. Educational institutions therefore need to address opportunity gaps in STEM education. The authors contend that comprehending the politics of knowledge, the complexity of identity, and the relationship between power and privilege in the

context of students' STEM learning experiences is necessary for interpreting socio-political viewpoints (Adiredja & Andrews-Larson, 2017).

For teachers to better support Black students' STEM learning and accomplishment at the secondary and post-secondary levels, it is crucial to recognize the need for change in teacher training programs and professional development opportunities (McGee & Bentley, 2017). Post-secondary institutions should also take into account consideration regarding the campus environment and the needs of Black students (McClain, 2014; Miles et al., 2020). Creating a more welcoming and inclusive campus climate is crucial for the success of all students, especially those from racialized backgrounds (Strange & Cox, 2016). Making higher education more inclusive, calls for both increasing the enrollment of historically underrepresented groups and addressing their needs, such as difficulties navigating the systems of higher education institutions (Altbach et al., 2009).

Mentorship and Black Peers in the Science Field

Figure 4

A Black scientist mentoring Black students in a school science lab

Black students in the science field acquire knowledge and skills through mentorship from professionals and peers working in the same area of specialization. Mentorship is viewed as a positive and reciprocal learning relationship established between a mentee and mentor (Byars-Winston et al., 2015; Davis et al., 2021; Mentor Canada, 2021; Mitchell Dove, 2022; Pedersen et al., 2022). These scholars posited that mentorship relationships occur over time through careful planning, reflecting, questioning, and r problem resolution. This ensures that mentees acquire the transferable skills and knowledge needed to advance their career path. Further, Ma et al.'s (2020) analysis of mentorship and students' success in STEM revealed

that while scientists value the relationship established with their mentees, it remains inconclusive whether or not it contributes to their overall success.

Few studies have, however, shed light on students' mixed views about the benefits of youth being paired with a mentor of the same race and gender identity in STEM (Blake-Beard et al., 2011). For example, Blake-Beard et al. (2011) found that Black and racialized youth established positive relationships with their mentees from the same race, while other scholars shared contrasting views about this issue (McGee, 2021). Researchers have discussed the limitations of mentoring programs in identifying and acknowledging structural and institutional racism that is embedded in STEM programs (McGee 2016, 2021; National Academies of Sciences, Engineering, and Medicine [NASEM], 2019). What is evident are structural racism policies that exist in STEM and other programs that scholars believe must be addressed to improve equity in hiring practices and representation (McGee, 2020; NASEM, 2019).

Mentorship provides Black youth with career guidance and support to further enhance their career goals (Chandler, 2022; Dahlberg & Byars-Winston, 2019; Henderson, 2022). Black youth receive career guidance, advice and support from their mentors (e.g., educators and community/professional organizations) regarding the career paths in science they can pursue, aligning with their requisite skills, qualifications, and experience (Dahlberg & Byars-Winston, 2019; Joshi et al., 2019; Pedersen et al., 2022). These career pathways in science (e.g., radiologist, MRI technologist, research scientist, biologist, pathologist, epidemiologist, clinical technician) are areas of specialization that Black youth can pursue. Career guidance by mentors is important in the field of STEM because they help mentees to think about how their goals and interests align with their knowledge skills and abilities (Dahlberg & Byars-Winston, 2019; Joshi et al., 2019). The support further assists students in planning and tracking their progress and decisions to reach their full potential (Henderson, 2022).

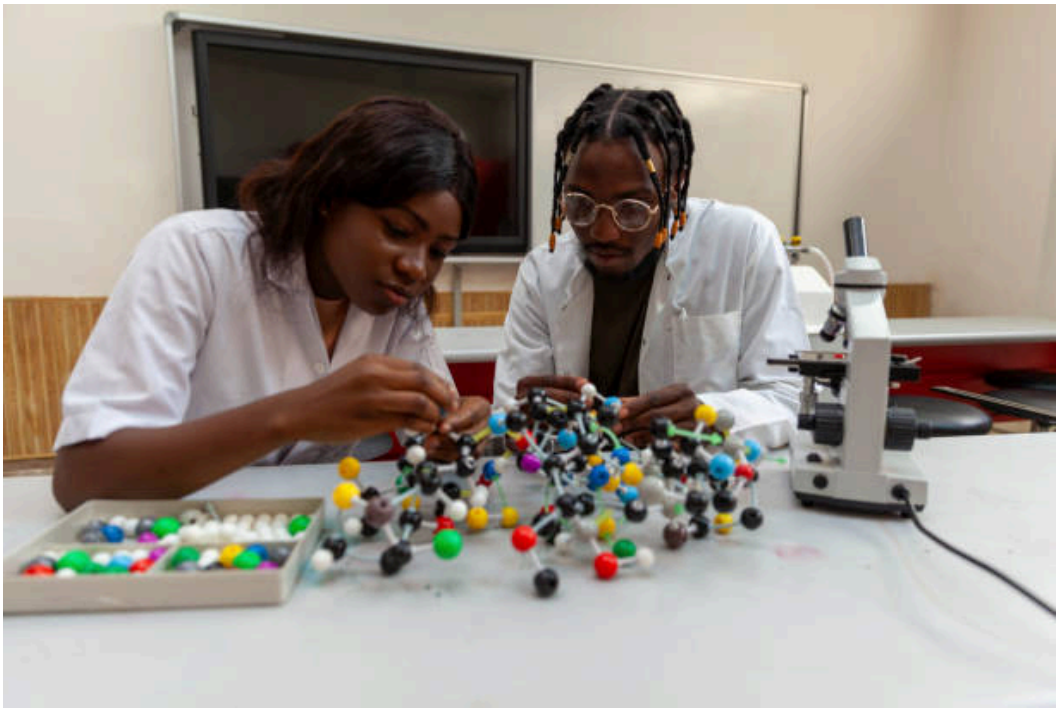
As role models in the field of STEM, Black mentors help to develop, guide, and strengthen Black students' behaviours, actions, and attitudes; thereby allowing

them to see themselves as successful scientists (Suran, 2021; Wong, 2022). Professional organizations also form part of a community that helps to mentor Black youth who are interested in pursuing their career in science. The Canadian Black Scientist Network (CBSN) is one such organization that focuses on mentoring and supporting Black identifying youth of African descent to work towards achieving their post-secondary education in science. Cancer biologist and Co-founder of the CBSN, Dr. Juliet Daniels, reinforced the importance of Black scientists, encouraging elementary and high school students to see themselves reflected in the spaces of science (Wong, 2022). She further noted that educators/mentors play an important role in encouraging and mentoring Black students to pursue STEM programs (Wong, 2022).

Other organizations such as Actua (2021) use innovative sessions to mentor and support Black students' understanding and passion for science while developing their leadership and study skills. Actua's mentorship program further builds a community of support that motivates Black youth to model their mentors and create networks to further advance their interest in science (Actua, 2021). In addition, organizations such as Blackboys Code, Durham Black Students Network, Black Youth in STEM, and the National Society of Black Engineers aim to prepare, mentor and inspire Black youth in the STEM field to increase Black representation (Kulandlovi, 2020). Notwithstanding the benefits of Black youth having Black scientists as mentors, the literature indicates that Black representation is needed to encourage more of them to pursue a career and succeed in the science field (BPTN, 2022; Wong, 2022). Consistent findings in the literature captured the importance of mentorship in attracting and strengthening Black youth satisfaction, commitment, success, and retention in the field of STEM (McGee, 2021; NASEM, 2019; NASEM, 2019; Pedersen et al., 2022).

Figure 5

Black scientist mentoring Black student



Methods

A survey design was used to gather data from the students who participated in the Sunnybrook Meet the Scientist Program. The survey included both closed and open-ended questions which enabled the students to share their experience with the program. The survey also provided an opportunity for the students to assess their level of engagement in the program, level of satisfaction with the content of the sessions, and the overall impacts of the program. The quantitative data were analyzed using a descriptive statistical approach. Moreover, the research team employed a thematic analysis approach (Braun & Clark, 2006) to analyze the qualitative data. Findings from both data sources were merged to provide a more holistic story of students' experiences with the program.

Project Site and Participants

The Centre of Excellence for Black Student Achievement promoted the Sunnybrook Meet the Scientist Program across all TDSB schools in November 2022. Black students between Grades 7 to 12 with an interest in a STEM career were encouraged to apply for the program. In total, (n=12) students applied to participate in the program. After successful interviews, (n=8) students were finally selected to participate. The program was conducted virtually between November and December 2022. All n= (8) students completed the end-of-program survey.

Findings

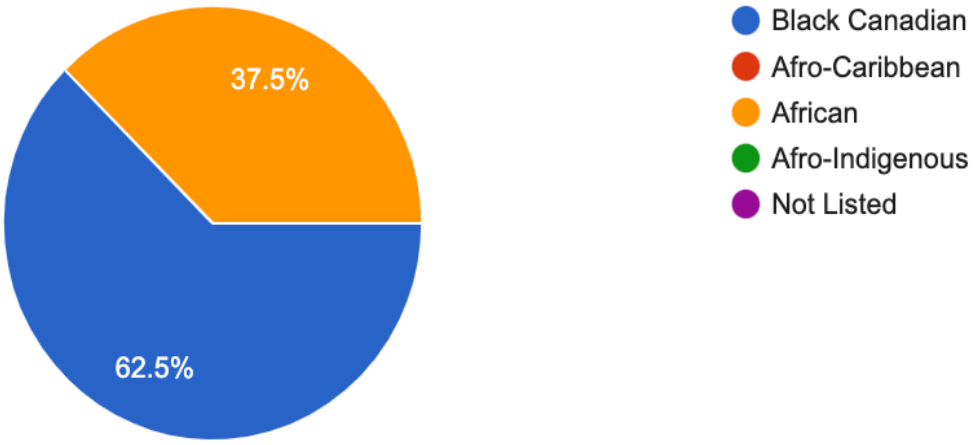
Student Demographics

Racial Identity

Out of the total number of Black students (n=8), (n=5) or 62.5% self-identified as Black Canadian, while (n=3) or 37.5% identified as African. Figure 6 below illustrates the number of participating students by racial identification.

Figure 6

Racial Identification

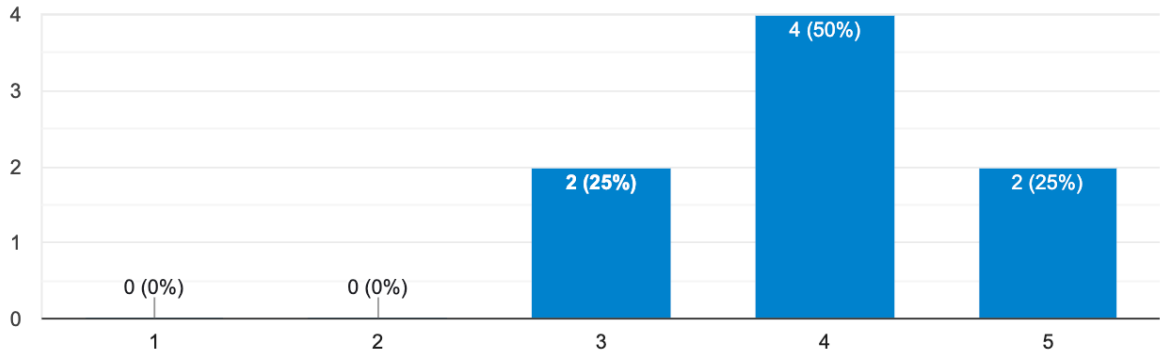


Students' Experience in the Program

Students reported that they had a very positive learning experience with the Sunnybrook Meet the Scientist Program. Three fourth of the total respondents, (n=6) reported being either satisfied or very satisfied with the program. On the other hand, only a few students (n=2) indicated average satisfaction with the program. Figure 7 below shows the satisfactory level of the students.

Figure 7

Program Satisfactory Levels



Importance of the program

When asked about one of the most important things that they learned while participating in the Sunnybrook *Meet the Scientist Program*, students' responses included learning about ultrasounds, MRI technologies, diseases such as Alzheimer's, and the different roles and jobs of scientists in the health sector. The students were generally appreciative of the overall impact of the program. For most of the students, participating in the program created an avenue for them to learn about the different career pathways and opportunities in different STEM fields, especially in the field of science.

> "I would not mind being a scientist when I get older. Right now, I'm in grade 7 and I have wanted to be a scientist since I was in kindergarten." (Student 6)

Through these experiences, the students learned about the different science and career pathways that they can pursue to achieve their aspirations of becoming scientists. For most of the students, participating in the Sunnybrook Meet the Scientist Program was an eye-opening experience. As indicated by student 6, the program deepened their interest in becoming a scientist in the future.

Students' Engagement with the Program Goals

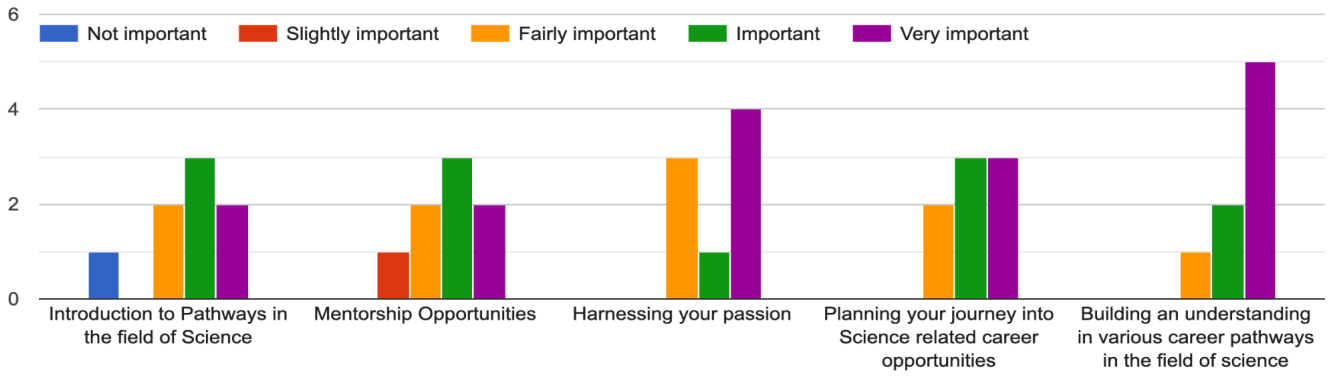
Achieving the Program Goals

The goals of the Meet the Scientist Program included introducing students to the different pathways in the field of science and providing a learning platform for students to receive mentorship and thus harness their passion in the STEM field while planning their journey into science-related fields. By pursuing this goal, the program provides numerous learning opportunities for Black students at the TDSB to build a deeper understanding of science career pathways. This goal aligns with the Center of Excellence for Black Student Achievement's objective to promote and improve upon Black students' well-being and academic achievement in TDSB.

When students were asked to rate the importance of the program goals, the majority reported that all the goals were mostly important to their growth and future career/professional aspirations. The responses emphasize the importance of Black students' engagement in underrepresented fields such as STEM. These findings underscore the need for continuous engagement of Black students in STEM-related programs. Figure 8 below illustrates how students rated the five (5) goals of the Sunnybrook Meet the Scientist Program.

Figure 8

Achieving Program Goals



Students' Engagement with the Scientists

STEM programs such as Meet the Scientist have been found to have positive impacts on Black students. During the program implementation, students attended three virtual sessions. The virtual sessions included:

- "What's the FUS about? and "Brain Metabolism"
- "Bone, Fracture and Better Healing" and "Artificial Intelligence to Understand the Brain"
- "How we repair the Brain" and "Computer Vision for the Spine"

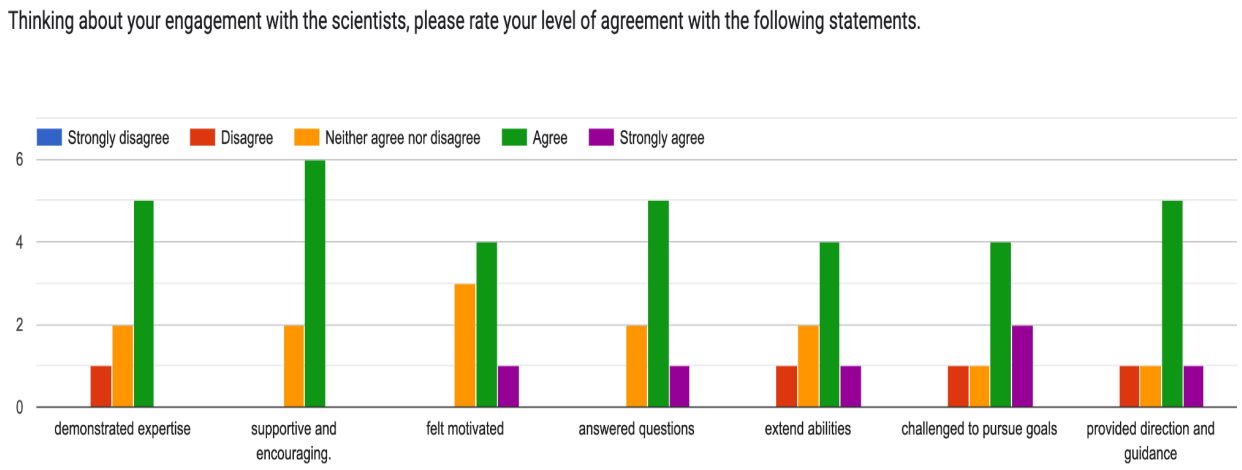
These sessions enabled the students to engage virtually with scientists from the Sunnybrook Health Center. The students' responses to the survey indicated that their engagement with the Scientists was a great learning experience. From their responses, students appeared to have experienced high quality interactions with the scientists/facilitators. Students revealed that the scientists were very supportive and responsive to the learning needs during the sessions and encouraged them to pursue careers in the field of science. For instance, most of them (n=5) agreed or strongly agreed that the scientists supported and encouraged them to explore different opportunities in STEM. Conversely, a few of them (n=2) provided a neutral

response to the facilitator support prompt, and (n=1) student disagreed that the scientists were supportive and encouraging.

Furthermore, when we asked about their level of engagement with the Scientists, most students (n=5) agreed or strongly agreed that the scientists demonstrated expertise in their areas of interest; motivated them to improve their work in class; responded to their questions satisfactorily during the sessions; challenged them to extend their abilities to pursue their goals; and helped to provide direction and guidance on how to build their networking skills. On the other hand, (n=1) disagreed and felt that the scientists did not offer much while (n=2) offered a neutral response regarding the overall engagement and performance of the scientists. Figure 9 below illustrates the students' responses.

Figure 9

Engagement with the Scientists



Students' Understanding and Awareness of the Program

Students shared mixed views about their understanding and awareness of the Sunnybrook Meet the Scientist Program. However, according to most of the

students, the program enabled them to learn more about the different roles and responsibilities of scientists including radiologists.

Ultrasound and MRI[3]

Most participating students in this study observed the role of radiologists/MRI technicians, specifically using Ultrasound and MRI to diagnose patients' medical problems. For example, a student participant shared,

> “I learned about ultrasounds, and how they can help people out.” (Student 3)

Although this participant did not provide details about how ultrasound helps patients, they acknowledged its benefits to their care. Another participant also reported:

> “Learning about the MRI was very interesting and cool and would be interested to learn about it.” (Student 4)

This student’s reflection on their experience indicates that they are desirous of learning more about the use and benefits of MRI in scanning for different medical problems in the body. Other participants in the study captured the specific use of the MRI in identifying existing tumors in the body. As one of the participants mentioned,

> “I learnt about the MRI scan for the head and the sound waves they send to the head to clear [see] the tumour.” (Student 8)

This student’s shared view suggests that they were exposed to the use of MRI in scanning for brain tumours. Another participant highlighted the specific diseases such as Alzheimer that affect some people as they age. This student stated,

> “I learned about Alzheimer's disease and how it works.” (Student 7)

[3] Ultrasounds capture specific images of the body organs or to identify specific issues affecting the human body. A sonographer usually takes these images (National Institute of Biomedical Imaging, n.d.). Magnetic Resonance Imaging (MRI) Technicians are medical professionals who are competent/skilled in using specialized machines to take images of the human body to diagnose the cause for and/or check progress of particular diseases such as dementia among others (National Institute of Biomedical Imaging, n.d). MRI technicians are considered support staff for radiologists (Coursera, 2023).

Similarly, another participant explained their understanding of Alzheimer and its relation to age, as they noted:

> “Young people like me can't get Alzheimer's at this age, but what you do is the determining factor.” (Student 5)

In building upon their understanding of Alzheimer, this student explained that individuals’ lifestyles contribute to their risk for this disease.

Understanding Various Career Pathways

When asked if the program supported their understanding of the various pathways in the science field, most students indicated that they gained a general understanding of the pathways to becoming a scientist. One of the students confirmed and explained:

> “Yes it did, it showed me that there are various pathways to be a scientist. And that it's actually very fun to be one.” (Student 6)

This student provided a general overview that the program highlighted different avenues for them to become scientists. In terms of specific interest, another student participant discussed their interest in understanding more about Alzheimer disease. This student mentioned:

> “Yes, because I want to learn more about Alzheimer.” (Student 7)

It is important to note that for this particular student, providing more details in the program about Alzheimer’s would have helped them to further develop their knowledge and understanding of Alzheimer’s.

Surgery and Virtual Reality

Students were enthused about the different ways that the Scientists used in their lesson/content delivery. Students demonstrated appreciation for the different

ways that the scientists used their lesson/content delivery and the use of virtual technology which offered them the opportunity to gain an in-depth understanding of the various careers in science. Particularly, one student revealed that the scientists' use of virtual technology to explain surgery helped them to understand more about how surgeries are performed in hospitals which deepened their interest in the medicine/surgery career pathway. This student mentioned:

> “It helped me to understand the field of surgery by using virtual reality to explain.” (Student 8)

According to student 8, the use of virtual technology in explaining scientific and medical procedures, particularly in surgery increased their level of engagement in the sessions and consequently heightened their interest in the science career pathway.

Opportunities and Availabilities for Different Career Pathways

The program provided a space for Black students to learn more about the different opportunities within the science career pathways. Students reported that they learned more about the different careers in the field of science and found the learning experience very rewarding.

> “Yes, I learned about a lot of different career options that I did not know about before.” (Student 3)

This student, like others, was able to understand the multiple career options available to them. For another participant, the program enabled them to identify the varying availability and opportunities in the science field. As this student mentioned:

> “Yes, It helped me see all opportunities and availability.” (Student 5)

From the survey responses, we found that only one participant had a different perspective regarding their specific area of interest not being available in the program. This quote from a student below confirmed.

> “I did, but the path that I wanted wasn't there, but that's okay.” (Student 4)

While this student understands the career pathways offered, they did not have the opportunity to work in that area of specialized interest.

Sense of Belonging

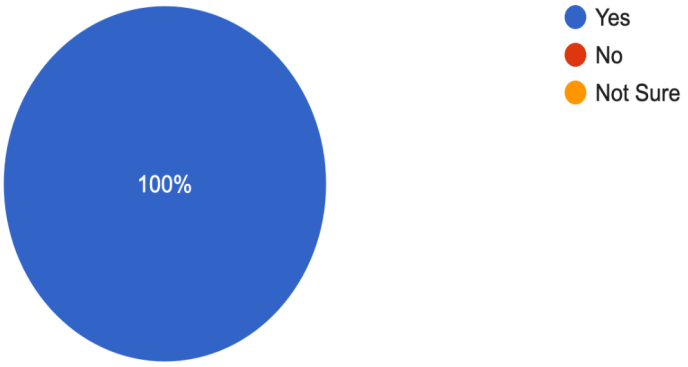
Feedback from students who participated in the *S*unnybrook Meet the Scientist Program revealed that they felt a great sense of belonging working with peers and the scientists. The survey responses indicated that most of the students (n=7) “agreed” and “strongly agreed” that they felt a sense of belonging while working with their Black peers and the scientists during the program. Conversely, only one student (n=1) “neither agree” nor “disagree” with the statement.

Learning Resources

All student participants (n=8) indicated that the resources used by the program facilitators/scientists aligned with the goals of the Sunnybrook Meet the Scientist Program.

Figure 10

Learning Resources



In explaining their level of engagement and satisfaction with the learning resources that were utilized participants noted that the materials and presentations used by the facilitators/scientists were useful, clear, and informative. One of the participants in the study explained:

> “Yes, the presentations were very useful.” (Student 7)

Similarly, a student discussed:

> “I thought the [presentations] were very clean, simple and quite clear and very informative.” (Student 4)

Another student explained in more detail:

> “I chose yes because I think the topics and resources went along with what they wanted to achieve although I feel having more black guest speakers would help me and other students envision themself in that job or working in that field. I enjoyed the presentations though.” (Student 5)

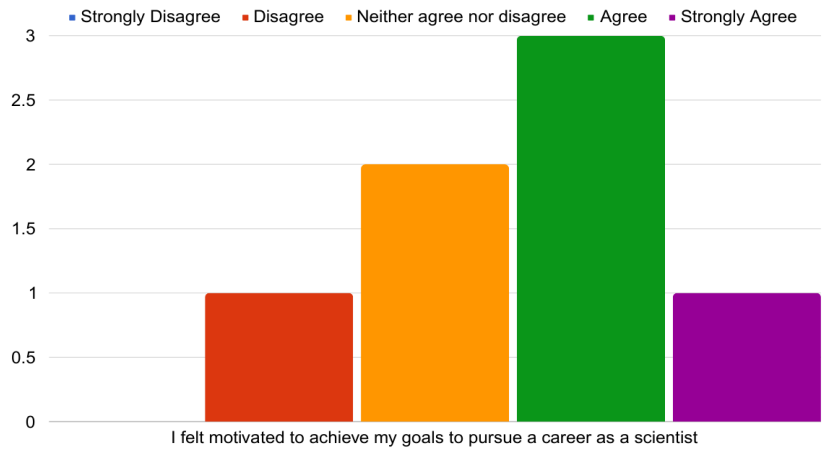
While most students found the resources useful and more engaging there was some limited representation of Black texts and images in the presentations and the materials used did not allow them to visualize themselves as a scientist.

Students' Motivation to Pursue a Scientist Career

Participants were asked to share if they felt motivated to pursue their career goals as a scientist. Figure 11 illustrates that half of the students shared mixed views (n=4; 50%). While four (n=4) of the surveyed participants “agreed” and “strongly agreed” with this statement, a few of the students (n=2) neither agreed nor disagreed that their facilitators contributed to their sense of motivation. Only one participant (n=1) disagreed with the same statement.

Figure 11

Students' Motivation to Pursue a Scientist Career



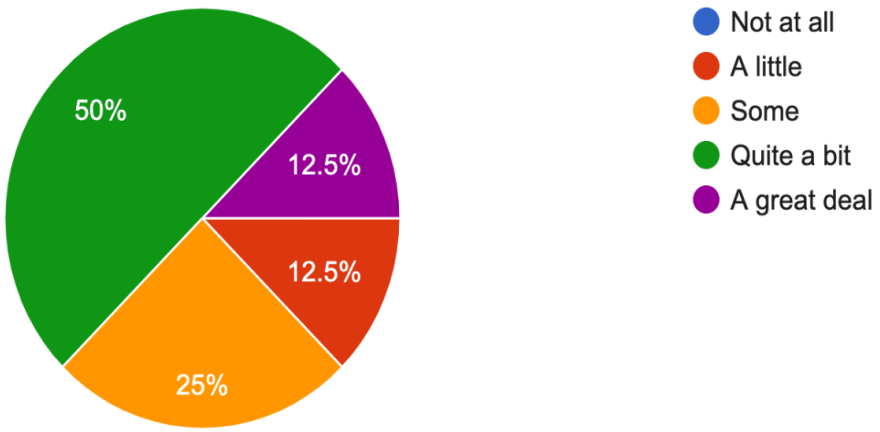
Care for Students' Progress and Success in Achieving Goals

The majority of student participants (n=6) "agreed" and "strongly agreed" that the facilitators/scientists encouraged them to consider different educational opportunities in science beyond their existing career pathways. The remaining student participants (n=2) neither "agree" nor "disagreed" with the statement.

Moreover, most of the students (n=5) surveyed in this study indicated that their facilitators cared about their progress and success in achieving their goals. Figure 12 provides a diagrammatic representation of the results.

Figure 12

Care for Students' Progress and Success in Achieving Goals



Students' Suggestions and Future Directions

While the students experienced a very positive and enriching experience in the program, some of them offered suggestions for future improvement of the SunnyBrook Meet the Scientist Program.

Some students shared their views about how facilitators could further support their understanding of different career pathways. According to most of these students, they would like to see a diverse range of scientists working in the scientific field.

A student disclosed:

> "I think maybe if they include different groups of scientists that would be great, but other than that I think this is going in the right path." (Student 4)

Some students also highlighted the need to provide more opportunities to learn from Black community members in STEM, specifically having representatives from the field of medicine speak about their professional experience. By doing so, it will encourage Black students to feel seen and gain confidence in their abilities to pursue similar career pathways.

As suggested by one student:

> “There should be more opportunities for Black people who are in the medical field to speak about their experience in the medical field.” (Student 8)

Students suggested an in-person educational trip to Sunnybrook facilities to witness the learning in the labs to enable them to gain an in-depth and practical understanding of what the daily work life of a scientist looks like.

> “Maybe we can come to Sunnybrook to see the lab and other cool things.” (Student 7)

Moreover, students were interested in receiving adequate information that addresses areas of need in the field, job description, and the associated salaries.

> “I think you should give out a quiz or an info sheet covering all the areas of the [profession] needed and…their net income.” (Student 5)

Discussion and Conclusion

The Centre of Excellence’s collaboration with the Sunnybrook Health Centre was a timely response in meeting most of the students' needs that took part in the 3-week program. Based on the findings, it appeared that the Sunnybrook Meet the Scientist Program was successful in achieving its goals. These goals included introducing Black students to the different pathways in the field of science, providing the chance for students to meet mentors, harnessing their passion for STEM and science-related fields, and as they built an understanding of different career pathways. Leading to most of the students seemingly feeling motivated to pursue STEM careers and pathways. The findings also suggest that the majority of students had gained insightful knowledge about how scientists in research institutions carry out their day-to-day activities. Equally important is the first-hand knowledge Black students acquired while learning about the different kinds of MRI and ultrasound services provided by scientists.

Findings illustrated that Black students who participated in the program became consciously aware that representation matters at all levels in the STEM field. Based on their suggestions, it became evident that students are calling for increased representation, specifically to Black scientists in the STEM field to share their experiences while mentoring and supporting their peers. For these students, such experiences serve to increase their sense of belonging and motivation to pursue the numerous science pathways.

The findings are consistent with the literature that recognizes mentorship and career guidance as key pillars needed to support Black students' transition from high school to STEM and science career pathways. Similarly, the findings show that community organizations and school career guidance/facilitators play an integral role in encouraging students to pursue post-secondary education and careers in STEM.

Recommendations

Black students' participation at the Meet the Scientist Program seemed to have successfully met most of their learning goals and expectations. For the most part, students appear to be engaged and enthusiastic about acquiring new knowledge specific to their area of interest. The following suggested recommendations are aimed at supporting similar programs in the future.

Themes	Recommendations
Mentorship and Guidance	• Culturally relevant mentorship and guidance opportunities are key to ensuring that Black students can develop their identities in the field of sciences. Such intentional practices will motivate students to pursue careers in the STEM fields. • Increase Black representation in the field of science to help mentor and guide Black youth as they think about their career interests. • Educators should value and treat Black students with respect, and empathy, and demonstrate a belief in their ability to succeed academically. • There is a need for more opportunities to engage and partner with community agencies and relevant organizations to support Black students' retention in the field of science careers and pathways. • Career guidance is an important strategy to support Black students to pursue science career pathways. • Guidance professionals need to be aware of the impact they have on the career pathways of Black students, and how they may inadvertently discourage them from pursuing STEM-related academic programs
Include Experiential Learning in K-12 Curriculum	• There is a need to engage in more discussion about modifying the K-12 education curriculum to include experiential learning methodologies. • The benefits of such modification to the curriculum are two-fold: (1) It may increase Black students' engagement in STEM programs; and (2) help to direct them to their area of passion in science careers/programs.

Themes	Recommendations
Transform Student Learning through Access to Science Career Pathways and Post-Secondary Programs	• Increase Black students' access to science career pathways. • Improve Black students' access to STEM career pathways and opportunities in science research at the post-secondary level. • There is a need for more science career pathway programs to help Black students make informed decisions on their career choices
Outreach and Networking with Community Organizations	• Ongoing information sessions specific to career pathways in science should be held to inform Black students in middle to high school about the different areas of STEM (including science). • Information from these sessions must be accessible in different languages and broadly published for parents and students to have an understanding of the respective career paths in science. • Develop partnerships with organizations that focus on science where Black students can build relationships and garner support and inspiration from community practitioners in the field.

Themes	Recommendations
Improve equity in hiring to support students interested in STEM Careers	● In keeping with the TDSB's Strategic Plan (2019) to strategically allocate staffing to meet students' needs, there is an urgent need to increase equity in hiring practices at the elementary, secondary, and post-secondary levels to ensure Black students can get the support and guidance from teachers in STEM. ● In doing so, Black students will be more optimistic and motivated to follow their passion in pursuing a career in the field of science and more broadly STEM. ● More female representation (students and employees) is needed in the field of science to reduce the gender gaps and barriers in Black students accessing these programs. ● Consideration must be given to the intersectionalities of identities to overtime address this glaring issue of structural and systemic racism in STEM.

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