Strategies to Increase Engagement in K-12 STEM Programs Among BIPOC Students Grades 3rd – 8th

Denisha C. Griffey
Western Michigan University

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The WIRE Youth Development Programs, housed within the Lewis Walker Institute for the Study of Race and Ethnic Relations at Western Michigan University, Kalamazoo, MI foster two enrichment programs geared towards strengthening the gap in academic knowledge through STEM/STEAM activities. Since its inception, WIRE has impacted over 1,000 youth grades 3-8 among the BIPOC population through its programs, most notably the WIRE Math and Science Summer Camp and Saturday Academy. In 2020, during the height of the Covid-19 pandemic, many K-12 education school systems switched to remote learning. As a result of this transition, there was a decrease in access to the learning tools students would have had normally. In addition to the school systems, summer enrichment camps canceled programming to minimize the spread of the virus. Faced with an anticipated Covid-19 slide, WIRE quickly transitioned to remote learning to continue summer programming to meet the needs of the youth while keeping them engaged. After 18 months of learning virtually, the students returned to in-person learning. As predicted, there was evidence of a decline in math learning loss among 3rd -8th graders compared to pre-COVID data (Baily et al., 2021; Kuhfeld et al., 2022). This study focuses on how WIRE established programming to keep the youth engaged in STEM, particularly the geosciences, during and post-
Covid-19. This dissertation discusses engagement strategies through the innovative programming developed as WIRE transitioned to and from remote learning, showcasing the importance of representation through personal experiences and preparing and training staff to work with BIPOC students.
STRATEGIES TO INCREASE ENGAGEMENT IN K-12 STEM PROGRAMS AMONG BIPOC STUDENTS' GRADES 3RD – 8TH

by

Denisha Chantiel Griffey

A dissertation submitted to the Graduate College in partial fulfillment of the requirements for the degree of Doctor of Philosophy
Interdisciplinary Studies
Western Michigan University
August 2023

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ACKNOWLEDGMENTS

I would first like to thank the All-Mighty God for guiding me over the years as I worked to complete this process, without him this would not be possible. I would like to thank my chair Dr. Luchara Wallace for guiding me through this process and instilling in me the courage to finish. Your mentorship is like no other, as a Black woman navigating through this dissertation, you allowed me to showcase my talents and whenever there was doubt you supported me and would never let me give up. Dr. Sue Stapleton, aka “momma” I appreciate you not ever giving up on me and sticking with me to the end. You have stuck by me during my high and low throughout my doctoral journey and always believed that I could do it. To Dr. Heather Petcovic and Dr. Peter Voice, thank you for always supporting me and finding a way to still incorporate the geosciences into this dissertation.

To my family, my mother Anjel Griffey, thank you for your continued support throughout this journey and to staying up with me and pulling an all-nighter when I needed it the most. To my sisters LaNessa and Crystal and my niece, Imani, thank you all for believing in me. To my dear friends who are more like family, Grace, Ann, Gia, and Craig, thank you for sticking by me and supporting me throughout this entire journey. You all kept me going through the long pep talks, prayers, laughs and the adventures. You all have been the best support system ever. To Krishna, we started this journey together, I would have never discovered this field without you. To my sands Melinda, thank you so much for pushing me to the end. The late nights in the library,
the support that you gave me even when I constantly said I quit, you would not let me. You have been such a blessing this year and I am forever grateful. To Jashaun, thank you for all the encouragement as we began this collaboration with WIRE together, you were my sounding board for every idea I had for the program. To Dr. Tasia Bryson, you were a guiding light throughout this writing process even without you even knowing, you gave me the courage to finish this writing.

To the Lewis Walker Institute family past and present, thank you all for your support especially Dr. Gus Calbert. Your constant nagging, check ins, and long discussions provided more support and encouragement than you will ever know. I truly and grateful and appreciative. I sometimes think you believed in me more than anyone else. To Dr. Betty Dennis and Tony Dennis, thank you for all the support throughout the years, never letting me give up and Dr. Toni Wolfork-Barnes, for reminding me there was the light at the end of the tunnel. Finally, to Delta Sigma Theta Sorority, Inc., Kalamazoo Alumnae Chapter members that supported during this last year of my program.

This dissertation is dedicated my granny, Odessa Steger and aunt, Addie Harper who always knew I was going to be a doctor one day. Although you weren’t physically here to start this doctoral journey with me you both inspired me. And finally, to the family members who began this journey with me but are no longer here physically to see
me complete it, my dad, Dennis Griffey, grandfather, Monroe Steger, uncle, Woodrow Parks, god-sister, Dr. Shawnna Steele-Battier, and grandmother Lacey Griffey. I am truly grateful to my entire village; it was bigger than I could have ever imagined. As I reflect on my educational journey I think of the words from Nelson Mandela “It always seems impossible until it’s done.” I can finally say I am PhinisheD!

Denisha Chantiel Griffey
# TABLE OF CONTENTS

**ACKNOWLEDGEMENTS** ........................................................................................................... ii

**LIST OF TABLES** ................................................................................................................... viii

**LIST OF FIGURES** ................................................................................................................ ix

**LIST OF ACROYNMS** ............................................................................................................ x

## CHAPTER

I. **INTRODUCTION** ................................................................................................................ 1

   K-12 STEM Education .............................................................................................................. 5

   Geoscience Education ............................................................................................................ 6

   Background ............................................................................................................................ 8

   Target Population .................................................................................................................. 11

   Purpose .................................................................................................................................. 11

   Methodology ......................................................................................................................... 12

   References ............................................................................................................................. 14

II. **WIRED TO WIRELESS: STRATEGIES TO ENGAGE STUDENTS IN K-12 SCIENCE EDUCATION DURING THE COVID-19 PANDEMIC** ........... 16

   Abstract ................................................................................................................................. 16

   Introduction ............................................................................................................................ 17
Table of Contents—Continued

CHAPTER

Curriculum Development........................................................................................................18
Leveraging Technology.............................................................................................................22
Final Student Projects/ Student Symposium........................................................................24
Engagement.............................................................................................................................25
Conclusion...............................................................................................................................28
References...............................................................................................................................30

III. PREPARING INTERNATIONAL STUDENTS TO ENGAGE WITH DOMESTIC YOUTH .........................................................................................................................31

Abstract................................................................................................................................31
Introduction...............................................................................................................................31
Methodology.............................................................................................................................35
Results and Discussion...........................................................................................................36
Conclusion...............................................................................................................................39
References...............................................................................................................................41

IV. DOES REPRESENTATION MATTER IN STEM: AN AUTOETHNOGRAPHIC JOURNEY TO BECOMING A GEOSCIENTIST ................................................................................42

Abstract................................................................................................................................42
Introduction...............................................................................................................................43
Minority Serving Institutions.................................................................................................45
  Historical Black Colleges and Universities.......................................................................45
  Tribal Colleges and Universities.........................................................................................46
Table of Contents—Continued

CHAPTER

The Importance of Representation and Role Models ........................................ 46
Methodology ........................................................................................................... 48
My Autoethnographic Journey to Geoscience .................................................. 49
  Setting the Foundation ....................................................................................... 50
  The Beginning of My Educational Journey .................................................... 51
  The Shift ............................................................................................................. 54
  The Start of my Geoscience Education ............................................................. 56
Increasing the Representation of BIPOC in STEM Education for WIRE .... 62
Conclusion ............................................................................................................ 65
References ............................................................................................................ 67

V. CONCLUSION .................................................................................................... 69

Summary of Article I ........................................................................................... 70
Summary of Article II ........................................................................................... 70
Summary of Article III ......................................................................................... 71
Future Work .......................................................................................................... 72

APPENDICES ........................................................................................................ 73

A. Human Subjects Institutional Review Board Approval Letter ........... 74
B. Sample WIRE Activity Lesson ................................................................. 77
C. WIRE Youth Development Programs Staff Guide ............................... 82
LIST OF TABLES

1. Summer Math and Science Programs.................................................................4
2. State Requirements for Science Curriculum....................................................7
3. NGSS used in the development of the science curriculum.................................19
4. Michigan K-12 Math Standards used in developing the math curriculum.........19
5. Math and Science Camp Curriculum................................................................21
6. Saturday Academy Curriculum.........................................................................22
7. WIRE Platforms of Engagement........................................................................23
8. Geosciences degrees conferred in 2019-2020 by race/ethnicity.......................44
9. Faculty demographics at the Institutions of Higher Educations I applied to for
   Undergraduate Studies.......................................................................................48
LIST OF FIGURES

1. Examples of WIRE Activities.................................................................21
2. WIRE Math and Science Camp Engagement..............................25
3. Asynchronous vs Synchronous Engagement.............................26
4. Student Symposium Poster...............................................................28
5. Countries represented by WIRE Staff...........................................32
6. Image of the WIRE Staff Guide........................................................36
7. Staff Representation in the WIRE Program.................................37
8. Staff Representation in each WIRE session...............................38
LIST OF ACRONYMS

AY – Academic Year representing (September – April) following the schedule set forth by Western Michigan University

BIPOC – Black, Indigenous, (and) People of Color

Black/African American – Black/African American will be used interchangeably based on literature.

COVID-19 – Coronavirus disease

HBCU – Historically Black Colleges and Universities

Hispanic/ Latino – Hispanic/ Latino will be used interchangeably based on literature.

Indigenous – refers to Native Americans and Alaskan Natives

KPS – Kalamazoo Public Schools a school system within Kalamazoo County, MI

LWI – Lewis Walker Institute for the Study of Race and Ethnic Relations

NOBCChE – National Organization for the Professional Advancement of Black Chemists and Chemical Engineers

PPS – Portage Public Schools a school system within Kalamazoo County, MI

PWI – Predominately White Institutions

SA – Saturday Academy

SECME – Southeastern Consortium for Minorities in Engineering

STEAM – Science, Technology, Engineering, Arts, and Mathematics

STEM – Science, Technology, Engineering, Mathematics
List of Acronyms- Continued

**TA** – Teaching Assistant

**TCU** – Tribal Colleges and Universities that serve Native Americans and Alaska Natives.

**WIRE** – Walker Institute for the Study of Race and Ethnic Relations
CHAPTER I

INTRODUCTION

Over the past four decades, there has been a call for an increase in science, technology, engineering, and mathematics (STEM) workers to fulfill the demand in the U.S. labor market (Xe and Larson, 2015). In response that call, President George W. Bush chartered the President’s Council of Advisors on Science and Technology, PCAST, in 2001 (Exec. Order 13226, 3 C.F.R. 1399, 2001) to address the demand of the lack of STEM workers. In 2010 it was re-chartered by President Barack Obama to stay abreast of the science, technology, and innovation here in the U.S. (Exec. Order 13539, 3 C.F.R. 21973, 2010). In a 2012, the PCAST presented an executive report outlining the problems associated with the lack of work and resolutions to rectify the problem. It was stated that if the U.S. wants to remain preeminent on the international work stage in science and technology, it will need to produce 1 million additional STEM professionals than projected to graduate within the next decade. Outlined in the 2012 Report to the President, the U.S. was producing more than 300,000 associate and bachelor's degrees in STEM each year, with a 40% retention rate. If the retention rate of students entering STEM majors increased to 50% annually, then three-quarters of the targeted 1 million will be reached (Report to the President 2012). During the 2019-2020 academic year, the U.S. had produced more than 750,000 degrees in STEM, including 85,000+ associate and 400,000+ bachelor’s degrees. Of all the degrees conferred, 50.2% were from ethnic groups other than white in which 7% were Black or African American and
12% were Hispanic or Latino (National Center for Education Statistics, retrieved 8.19.2022). However, in order to fulfill the goal of the increasing STEM professionals by an additional million, there must be a baseline and that starts with K-12 education.

In 2010, PCAST presented President Obama with the executive report, *Prepare, and Inspire: K-12 Education in Science, Technology, Engineering and Math (STEM) for America’s Future*, it outlined two strategies for the U.S. to remain at the forefront among nations in health, environmental protection, and national security through STEM education (Report to the President, 2010). The two strategies are 1) to prepare students so they have a strong foundation in STEM subjects and are able to use this knowledge in their personal and professional lives and 2) inspire students so that all are motivated to study STEM subjects in school so that it instills excitement of the prospect of a career in STEM. However, there are many educational challenges that arise when it comes to K-12 STEM education. Those challenges are often accompanied with the danger of Americans don’t know enough about STEM to contribute or fully benefit from it (National Academy of Sciences, 2007). What was even more troubling, is that the report indicated achievement gaps in STEM among marginalized groups, particularly Blacks, Hispanics, Native Americans, and women, the fastest growing demographic of the U.S. population (PCAST 2010, Institute of medicine 2011). These are the same groups least represented in many STEM fields. Moreover, in addition to lack of proficiency there was a lack of interest in STEM fields all together. Although there are many factors that can attribute to proficiency and interest in STEM among students, the overall problem is systemic. Schools lack of educators who are proficient in math and science, therefore unable to teach effectively (PCAST, 2010; Archer et al., 2019).
In response to the lack of interest and proficiency in STEM, many institutions of higher education developed STEM enrichment or pathway programs (Table 1). However, many pathway programs were geared towards high school and collegiate students, with the goal of filling the vacancies in the workforce. In literature many of the programs geared towards advancing STEM in K-12, target students in high school, typically grades 10th -12th (Valla & Williams, 2012; Martin & Scott, 2013; Cagle et al. 2018). Searching for STEM programs geared toward K-12 students, led to the website Pathwaytoscience.org, although, there are many programs listed, over 50 of the STEM programs are only accessible to high school students, and less than ten for students in grades K-8 (pathwaytoscience.org, accessed June 11, 2023).

Cagle et al. (2018), conducted a literature review to determine the characteristics of E-STEM (environmental, science, technology, engineering, and math) programs that exist for student from underrepresented backgrounds and what are the techniques used to prepare students for the next stage in the E-STEM pathway. What they discovered was that of the 197 selected articles, 24% of the pathway programs are in environmental science and the geosciences, the largest discipline represented. However, the targeted age groups of the programs were; K-12 at 46%, high school 46%, middle school 8% and elementary school 0%. The targeted demographic of the environmental science and the geoscience articles indicated underrepresented minorities in 52%, indigenous peoples 14%, Black people 11%, Latinx 8%, and women 6%. The socioeconomic status only accounted for 3% and location wasn’t a factor in of the articles reviewed. The final assessment in the study was that there was a missed opportunity among elementary
students and there is a need to address the gap in availability of K-12 STEM pathway programs.

Table 1: Summer Math and Science Programs

<table>
<thead>
<tr>
<th>Name</th>
<th>Grade</th>
<th>Location</th>
<th>Target Demographics</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awake*</td>
<td>1st -6th</td>
<td>Berwyn, IL 60402</td>
<td>immigrants</td>
<td>T/TH 5</td>
<td>$15</td>
</tr>
<tr>
<td>Summer Institute in Science and Mathematics</td>
<td>college students</td>
<td>Capital university, Columbus, OH</td>
<td>college students</td>
<td>5 weeks</td>
<td>summer tuition</td>
</tr>
<tr>
<td>The Summer Academy for Math and Science (SAMS)</td>
<td>11th grade</td>
<td>Carnegie Mellon University</td>
<td>underrepresented communities (African American/Black, Hispanic/Latino or Native American)</td>
<td>4 weeks</td>
<td>Free</td>
</tr>
<tr>
<td>Access Engineering</td>
<td>high school</td>
<td>University of Pennsylvania</td>
<td>all backgrounds</td>
<td>weekly during the academic year</td>
<td>Free</td>
</tr>
<tr>
<td>Engineering Summer Academy at Penn (ESAP)</td>
<td>rising 10th-12th grade</td>
<td>University of Pennsylvania</td>
<td>all backgrounds</td>
<td>3 weeks</td>
<td>$85 application/ $7700 program fee</td>
</tr>
<tr>
<td>Penn GEMS: Engineering, Math, and Science Camp</td>
<td>rising 7-9th graders</td>
<td>University of Pennsylvania</td>
<td>marginalized groups (based on photos from website)</td>
<td>1 week</td>
<td>$25 application/ $650 program fee</td>
</tr>
<tr>
<td>InnoWorks Summer Academy at Penn</td>
<td>middle school</td>
<td>University of Pennsylvania</td>
<td>underserved students in Philadelphia</td>
<td>1 week</td>
<td>Free</td>
</tr>
<tr>
<td>Females of Color Underrepresented in STEM (FOCUS)</td>
<td>rising 6th, - 8th</td>
<td>George Mason University</td>
<td>minority girls</td>
<td>2 weeks</td>
<td>$100</td>
</tr>
<tr>
<td>Aspiring Scientists Summer Internship Program (ASSIP)**</td>
<td>age 16+ (note. There is a 13-15 age group as well)</td>
<td>George Mason University</td>
<td>high school and undergraduate students</td>
<td>8 weeks</td>
<td>$25 application fee</td>
</tr>
<tr>
<td>Global STEM Scholars Program</td>
<td>high school</td>
<td>George Mason University</td>
<td>developing nations</td>
<td>4-5 days</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Source suggest demographics is Hispanic/Latino community.*
K-12 STEM Education

The effectiveness of STEM education presents barriers that take a toll on the student, especially with Black, Indigenous, and People of Color (BIPOC) students. Studies indicate that it is a lack of information and confidence that emulates how students perceive STEM fields. To combat the perception, studies have been focused on the best way to reach students in relation to STEM fields.

Julien (1999) introduces several factors that block the effectiveness of adolescence from making sound decisions that lead to future career choices, and they include readiness, lack of and unreliable information, discouragement by individuals approached for information, lack of self-confidence or communication skills, inability to identify questions to ask pertaining to career-related information, and/or lack of knowledge about sources.

Schmidt et al. (2019), investigated four teachers and their interaction with students within seventh-grade classrooms. The goal was to observe how their teachers communicated the relevance of science based on their perception and to examine their students' perceptions regarding the content received. It was determined that when teachers used more relevance (using instructional strategies that connect content to "real world" issues) when teaching science, the students' perception of the subject increased. It should be emphasized that the teacher's emotion (how they presented the material) played a vital role in how students perceived the information presented.

However, the focus to get students interested in studying earth science must be addressed early on in their K-12 education. Unlike the other STEM fields, geoscience is
not introduced during the formative years of learning, which is critical in attracting students to the discipline (McConnell et al. 2017).

**Geoscience Education**

When evaluating areas of science in STEM fields, many tend to associate it with chemistry, biology, and physics; and align it with long term goals of pursuing a career in the healthcare fields. However, there is a vast array of areas that are applicable to STEM. Geoscience, as outlined by the American Geosciences Institute, The US Geological Survey describes it as the study of processes that form and shape the earth’s surface, the use of natural resources, and the interconnection of water and ecosystems, using the techniques and tools from chemistry, biology, physics, and math. Geosciences encompasses how humans interact with the earth through biological, chemical, and physical systems. The field investigates the past, present, and models the future behavior of the planet. Moreover, it involves the study of the known universe to better understand this galaxy and others that have and maybe discovered.

In education, geoscience, also known as earth science, is an area in natural science that is often underrepresented in K-12 education. According to the Education Commission of the States (2019), and the National Center for Education Statistics (2013), state graduation requirements for high school students do not include earth/environmental science, except for 4 states (Kansas, Nebraska, North Carolina, and West Virginia) including it as part of the curriculum and eight others providing it as an option (Table 2). In the state of Michigan, it is highly suggested that students complete a 4th science credit, which can include earth/ environmental science or
Table 2: State Requirements for Science Curriculum (Education Commission of the States, 2019);

<table>
<thead>
<tr>
<th>State</th>
<th>Req. Credits</th>
<th>Biology</th>
<th>Chemistry</th>
<th>Earth/ E. Science</th>
<th>Physics</th>
<th>Other</th>
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<td>WA</td>
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<tr>
<td>WV</td>
<td>3</td>
<td>X</td>
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<td>WI</td>
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<td>WY</td>
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<td>DC</td>
<td>4</td>
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<td></td>
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<td>X</td>
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</tbody>
</table>

Note: X/O in the Earth/Environmental field indicates that Earth Science (X) is an optional requirement and Environmental Science (O) is option but not required. X= requirement, O=optional
geology option (Michigan Merritt Curriculum, 2017). The lack of offering of geoscience courses appears to correlate with the lack of teachers trained in the area of earth science, therefore leading to a lack of exposure in K-12 education. (Lewis and Baker (2010). In order help rectify the lack of representation of geoscience education among K-12 youth and underrepresented minority groups, the WIRE Youth Development Programs began to incorporate into its curriculum.

**Background**

**Program Overview**

The WIRE Youth Development Programs, housed within the Lewis Walker Institute for the Study of Race and Ethnic Relations (LWI), was developed in 2008 to fulfill part of the mission of the LWI of building a more equitable and inclusive community through community service. Since its inception, WIRE has provided opportunities to over 1000 youth between ages 7-13 through one of its programs. Currently, there are two WIRE programs geared towards STEM (science, technology, engineering, and math) enrichment; the WIRE Math and Science Camp and Saturday Academy. The WIRE Math and Science Camp was created to aid in the reduction of summer slide among 3rd- 8th graders, which is calculated as a loss between 25-33% of academic learning loss during the summer months. Through these two programs, WIRE helps students envision themselves in college and in desirable careers by providing culturally sensitive guidance and instruction to get there. This was achieved through hands-on activities as they relate to real-world problem solving.
**Community Impact**

Early on during the height of the COVID-19 pandemic, many schools and school districts closed their doors to mitigate the effects of the COVID-19 spreading. This act left the many communities across the country scrambling to determine the best way to serve students that were forced to learn asynchronously rather than the traditional synchronous way they were accustomed to. In response to the “new normal” LWI was able to allow students the option to continue their participation in the WIRE youth programs through remote learning. WIRE provided learning kits and created a virtual platform for students to engage. During the 2021-2022 school year students transitioned back to the classroom and there is documented evidence supporting the COVID-19 slide that was anticipated in 2020 (Kuhfeld and Tarasawa, 2020; Baily et al, 2021, Kuhfeld et al, 2022).

The goal of this study is to examine the effectiveness of engagement among BIPOC students in the WIRE Youth Development Programs’ Math and Science Camp and Saturday Academy as they return to a traditional learning environment after 18 months of remote learning. This study will provide shed light on how to engage students virtually, defining a relationship between popular culture and STEM education in curriculum, and training instructors to effectively engage with students whose cultural background differs from their own.

**WIRE Math and Science Camp**

The WIRE Math and Science Camp (WIRE) established in 2014, is a four-week program held during the first month of the Summer II semester at Western Michigan University, which typically is the month of July. This program was created to aide in the
reduction of summer learning loss, also known as summer slide. Summer slide is described as the loss of 25-33% of academic knowledge learned from the previous school year from not engaging in math and science over the summer months (Cooper et al. 1996). The primary goals of the WIRE program are to 1) give the students the opportunity to develop a deeper understanding of math and science through real-world applications, 2) to focus on number theory, 3) problem solving, and algebraic expressions and 4) to increase the level of confidence by reducing the fear of anxiety associated with learning math and science.

**WIRE Saturday Academy**

In the Fall of 2019, the WIRE Saturday Academy (SA) was established as an extension of the WIRE Math and Science Summer Camp. With the goal of continuing the foundation of the WIRE Summer Program, SA provided STEM enrichment activities throughout the academic year. At its inception, the SA was held monthly for three (3) hours on Saturday mornings. During the COVID-19 pandemic academic year (AY) 2020-2021, the LWI began to hold the sessions twice a month for one (1) hour during the academic school year (September- April), synchronously, using a virtual platform. The current program format is to meet twice a month, synchronously, in-person, on a three-hour time block. The goals of SA are to 1) to enhance the students’ knowledge of non-traditional sciences, 2) to improve comprehension of mathematical concepts, 3) to provide academic enrichment using real-world applications, and 4) to introduce students to advanced careers in STEM. Most recently, the students explored many areas of STEM, most notably, the delving into the various areas within the geosciences.
**Target Population**

For this study, the target populations are students, parents, and staff that participate in the WIRE youth programs. The WIRE programs focus on youth advancing to the 3rd to 8th grade, ages seven to thirteen. Many of the participants are from underrepresented minority (URM) groups (e.g., African American, and Hispanic), residing in Kalamazoo County, Michigan. The school districts within the county where the majority of the students are enrolled are Kalamazoo Public Schools (KPS) and Portage Public Schools (PPS.). The parents in this study, have had children that have been enrolled in any of the WIRE programs post-2019.

The staff for the WIRE program includes the instructors and teaching assistants that work with the student participants during the summer program and Saturday Academy. The staff are undergraduate and graduate students at Western Michigan University that are studying in STEM and related areas. During the last few years, the majority of the WIRE staff are international graduate students that are from India, the Philippines, Lebanon, and Nigeria, that are coming to America for the first time for advanced studies.

**Purpose**

This study focuses on how WIRE established programming to keep the youth engaged in STEM, particularly the geosciences, during and post-Covid-19. This dissertation discusses engagement strategies through the innovative programming developed as WIRE transitioned to and from remote learning, showcasing the importance of representation through personal experiences and preparing and training staff to work with BIPOC students.
Methodology

The research for this study will incorporate a mixed-method approach in which qualitative and quantitative methods will be used. As a concurrent strategy of data collection, the mixed methods approach will provide a comprehensive analysis of the research objectives (Creswell, 2003). Qualitative inquiry will be the major component of this mixed-method research design. The quantitative data will be analyzed from a non-experimental design inquiry in the form of surveys. The surveys will consist of predetermined closed-ended data, primarily descriptive, which will allow for statistical analysis. This dissertation is organized into three distinct articles each focusing on strategies to increase engagement.

Strategy 1: Transitioning to Remote Learning

During the past few years, the WIRE program has drastically evolved. The program became streamlined and centered around a central topic. The topics allowed the coordinator and instructors to develop a more meaningful curriculum that participants would be engaged in. In order to effectively assess engagement among the youth participants, first I needed to address the learning styles. There were three approaches to learning styles that were integrated into programming: hands-on learning, technology-based learning, and student presentations. This was the strategy utilized during the Covid-19 pandemic when WIRE transition to remote learning.

Strategy 2: Developing Staff Training

In order to prepare international students to effectively engage with youth that differ in cultural and socioeconomic backgrounds a training program was established.
Training took place within a two-week period prior to the start of the summer program. It consisted of classroom management tips, minorities on campus training, and curriculum plans. It also, allowed for team building to develop a cohesive process.

**Strategy 3: An Autoethnographic Method**

The third strategy focused on the integration of influential BIPOC in STEM to showcase representation from underrepresented minority groups. This method used utilizes autoethnographic approach to examine the significance of a representation and role model in STEM. Autoethnography is a qualitative research method that uses the researcher’s personal experiences to describe and critique cultural beliefs, practices, and experiences. It combines, the characteristics of an autobiography and ethnography to write about past experiences retroactively and selectively, not to merely publish but to assemble them using hindsight (Bruner, 1993; Denzin, 1989, Freeman, 2004).
References


CHAPTER II

WIRED TO WIRELESS: STRATEGIES TO ENGAGE STUDENTS IN K-12 SCIENCE EDUCATION DURING THE COVID-19 PANDEMIC

Abstract

The WIRE Summer Math and Science Camp and subsequent Saturday Academy are youth development programs housed in the Lewis Walker Institute for the Study of Race and Ethnic Relations (LWI) at Western Michigan University. For 10 years the WIRE program has impacted over 1,000 youth in grades 3-8 from marginalized populations, particularly Black, Indigenous, People of Color (BIPOC) youth, to strengthen their gap in academic knowledge through STEM activities. During the height of the COVID-19 pandemic many school districts transitioned to remote learning and summer enrichment camps canceled to minimize the spread of the virus. Despite the many challenges and obstacles that interfered with the normal youth outreach programming offered through the LWI, the goals of WIRE remained the same. Placed in a unique position, WIRE quickly transitioned to remote learning and provided an asynchronous and synchronous learning environment for the student participants. Considering the socioeconomic background students that the program served, all materials were provided to each student that enrolled in the program as well as weekly access to engage with other participants using technology. This study addresses how the WIRE program leveraged technology to design innovative curriculum to provide the
opportunity to engage with the students remotely, transitioning from WIREd to WIREless.

**Introduction**

The WIRE Youth Development Programs housed within the Lewis Walker Institute for the Study of Race and Ethnic Relations (LWI) fosters two STEM (Science, Technology, Engineering, Mathematics) enrichment programs: the WIRE Math and Science Summer Camp and the Saturday Academy. The WIRE Math and Science Camp, developed in 2014, is a 5-week STEM program held during the month of July on the campus Western Michigan University in Kalamazoo, MI. The program was created to aid in the reduction of summer slide among grades 3-8, which previous research calculates it to be 25-33% loss of academic knowledge learned from the previous year from not engaging in math and science over the summer months among underrepresented populations (Cooper et al, 1996, Education Trust-West, 2020). The Saturday Academy was developed in 2019 to continue on the foundation set forth by the WIRE Math and Science Camp, to provide enrichment throughout the academic year geared towards strengthening the gap in academic knowledge in STEM based on standardized test scores, among marginalized groups, particularly Black, Indigenous, People of Color (BIPOC). In addition, Saturday Academy was in response to youth and parents articulating the desire to stay in contact with friends made over the summer who shared similar interest.

During the height of Covid-19 pandemic, many K-12 education school systems switched to remote learning, decreasing access to learning tools that students would have access to under normal circumstances, when they were in-person. As a result of the
prolonged remote learning, researchers anticipated a COVID-19 slide with a decrease in learning of approximately 50% in math and reading (Kuhfeld and Tarasawa, 2020). In response to the anticipated COVID-19 slide upon return the classroom, the WIRE programs: WIRE Math and Science Camp and Saturday Academy, were placed in a unique position to immediately respond to the challenges that would potentially arise from being out of the classroom for nearly 18 months. Unlike other enrichment programs that were canceled, the WIRE programs were able to transition to a virtual mode of instruction and integrate various technologies to aide with the students’ learning. This article will describe the process the WIRE program took to keep the youth engage during the Covid-19 pandemic.

**Curriculum Development**

To promote engagement during the pandemic, the WIRE program shifted to provide the program remotely. Remote programming offered the option for the students to participant asynchronously (self-guided) and synchronously (guided), which allowed the students the flexibility to engage in the program based on their needs and schedule. In developing the curriculum, the first step was to structure the program around themes. In selecting a theme, the goal was to introduce students to non-traditional sciences and careers in STEM. The objective was to pick themes that would excite the students while providing an opportunity for them to learn a new topic. The theme of the summer program was the *World of Food Science*; focused on the importance of food science in urban communities, biological science, space. The theme of Saturday Academy was *The Interdisciplinary World of Environmental Science* with exploring topics in the geosciences. Once the themes were finalized, the curriculum was
developed. Using the Next Generation Science Standards, the science curriculum focused on Earth and Human Activity, Growth Development, Reproduction of Organisms, and Engineering Designs (Sample Lesson- Moon Exploration in appendix which adheres to NGSS 1-ESS-1). The math curriculum followed the Michigan K-12 Mathematics Standards.

Table 3: NGSS used in the development of the science curriculum

<table>
<thead>
<tr>
<th>Next Generation Science Standards</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth’s Place in the Universe</td>
<td></td>
</tr>
<tr>
<td>• 1-ESS-1 - Use observations of the sun, moon, and stars to describe patterns that can be predicted.</td>
<td></td>
</tr>
<tr>
<td>• MS-ESS1-1 – Develop and use a model of earth-sun-moon system to describe the cyclic pattern</td>
<td></td>
</tr>
<tr>
<td>Earth and Human Activity</td>
<td></td>
</tr>
<tr>
<td>• 5-ESS3-1. Obtain and combine information.</td>
<td></td>
</tr>
<tr>
<td>Growth, Development, and Reproduction of Organisms</td>
<td></td>
</tr>
<tr>
<td>• MS-LS1-5 Construct a scientific explanation.</td>
<td></td>
</tr>
<tr>
<td>Engineering Design</td>
<td></td>
</tr>
<tr>
<td>• 3-5-ETS1-1. Define a simple design problem.</td>
<td></td>
</tr>
<tr>
<td>• 3-5-ETS1-3. Plan and carry out fair tests.</td>
<td></td>
</tr>
<tr>
<td>• MS-ETS1-2 Evaluate competing solutions using a systematic process.</td>
<td></td>
</tr>
<tr>
<td>• MS-ETS1-3 Analyze data from tests to determine similarities and differences.</td>
<td></td>
</tr>
<tr>
<td>• MS-ETS1-4 Develop a model to generate data.</td>
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</tbody>
</table>

Table 4: Math Standards used in developing the math curriculum

<table>
<thead>
<tr>
<th>Michigan K-12 Mathematics Standards</th>
<th></th>
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<tbody>
<tr>
<td>Operations and Algebraic Thinking</td>
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</tr>
<tr>
<td>• Solve problems involving the four operations.</td>
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</tr>
<tr>
<td>• Gain familiarity with factors and multiples.</td>
<td></td>
</tr>
<tr>
<td>Numbers and Operations in Base Ten</td>
<td></td>
</tr>
<tr>
<td>• Use place value understanding to perform multi-digit arithmetic.</td>
<td></td>
</tr>
<tr>
<td>The Number System</td>
<td></td>
</tr>
<tr>
<td>• Multiply, divide, add and subtract whole numbers and fractions.</td>
<td></td>
</tr>
<tr>
<td>Expression and Equations</td>
<td></td>
</tr>
<tr>
<td>• Solve real-life and mathematical problems using expressions and equations</td>
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</tr>
</tbody>
</table>
Math and Science Summer Camp

One challenge in providing programming for the students was how to get the materials to them while adhering to state and federal guidelines as it pertained to social distance and mitigating the spread of COVID-19. Previous research showed that STEM learning kits would be a great option to keep the students engaged. According to Caniglia et al., (2021), STEM kits have been used to help students continue their academic progress through hands-on activities. They have been utilized by various organizations such as UNICEF and Feeding America, to students in need. Using the premise, the WIRE staff created STEM learning kits and opted to deliver them to each students’ home. The learning kits were delivered in two different “drop offs” that coincided with the planned curriculum. Divided into two parts, equally focused on math and science, the first two weeks science driven, with focus on George Washington Carver, a prominent black agricultural chemist and inventor who promoted alternative crops for soil depletion. The final two weeks, focused on Katherine Johnson, a mathematician, and her many contributions to NASA/space science. Both parts of the curriculum were designed under the umbrella of food science. With the overall topic being food science, the students grew an urban garden with either a tomato or pepper plant that would last the entire 5 weeks of the summer program. Many of the activities in the summer camp curriculum were adapted from the Institute of Food Technologies, National Park Services, PBD LearningMedia, Danielle’s Place, and NASA.gov.
Table 5: Math and Science Summer Camp Curriculum

<table>
<thead>
<tr>
<th>Topic</th>
<th>George Washington Carver</th>
<th>Katherine Johnson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urban Garden</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Potato, Potato</td>
<td>Moon Exploration</td>
</tr>
<tr>
<td>3</td>
<td>Tomato Taste Test</td>
<td>Rocket Exploration</td>
</tr>
<tr>
<td>4</td>
<td>Fun with paints</td>
<td>What Do Astronauts Drink?</td>
</tr>
<tr>
<td>5</td>
<td>The Perfect Package</td>
<td>What Do Astronauts Eat?</td>
</tr>
<tr>
<td>6</td>
<td>Porch Presentations</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Examples of WIRE Activities - A) Potato, Potato, Fun with Paints, C) What do astronauts drink? D) Urban Garden, and E) Rocket Exploration

**Saturday Academy**

The Saturday Academy explored the Interdisciplinary World of Environmental Science, the curriculum introduced the various topics the geosciences (Table 4). During the 2020-2021 academic year, the Saturday Academy didn’t utilize learning kits that were dropped off at their homes. The materials used were based on what the student participants had at home and what was already provided during the summer program. The goal was to show the students how to utilize what they had at home to create activities. The year was divided into two semesters, with various hands-on activities.
Just as in the summer program, the Saturday Academy had two experiments/projects that lasted several weeks. One focused on science and the other on math. For the first experiment, then students created a microbe community which focused on the geosciences area of geobiology. All the materials were items that students found around the house. The second project focused on math in the area of financial literacy. The students created a savings account by making a penny bank, they used to save money for whatever item they wanted. However, they could not use money they already had saved, because everyone had to start with a clean slate. For each of the projects, the students had to provide updates at the biweekly meetings. Saturday Academy met every other Saturday for one hour virtually. This provided a chance for the students to interact with each other as many of them did not interact with other kids throughout the stay-at-home orders.

Table 6: Saturday Academy Curriculum

<table>
<thead>
<tr>
<th>Topic</th>
<th>Geosciences</th>
<th>Financial Literacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Geologic Time Scale</td>
<td>Microbe Colony</td>
</tr>
<tr>
<td>2</td>
<td>Rocks and Minerals</td>
<td>Fossils</td>
</tr>
<tr>
<td>3</td>
<td>Natural Disasters</td>
<td>Volcanoes</td>
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<tr>
<td>4</td>
<td>Weather vs Climate</td>
<td></td>
</tr>
</tbody>
</table>

**Leveraging Technology**

To increase engagement, the WIRE programs integrated technology into STEM education. The most notable was Google Suite Platforms; Meet, Sites, Forms, and YouTube (Table 5). The Google Platform was chosen because the familiarity and access, because the school districts in Kalamazoo County, MI already use in their paperless classroom model. Using the Google platform allowed for versatility and provided
information to the students that participated in the program. Each lesson was uploaded to Google Sites for those students participating asynchronously. In addition to the materials already provided in the learning kits during the drop offs, supplement information was loaded to the site. Videos from YouTube that were relevant to the topics discussed were also added, including information about the influential BIPOCs in STEM, links to virtual learning opportunities, and Explore More were available on the site. This was not only beneficial to the asynchronous students but also the synchronous students.

Table 7: WIRE Platforms of Engagement

<table>
<thead>
<tr>
<th>Platform</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imagine Math</td>
<td>Utilized for math enrichment, pathways are individualized for each student based on their need.</td>
</tr>
<tr>
<td>Google Meet</td>
<td>Live interaction for synchronous learning</td>
</tr>
<tr>
<td>Google Sites</td>
<td>Created a program website to for students and parents to engage both asynchronously and synchronously. All materials provided on the program website was provided via drop offs.</td>
</tr>
<tr>
<td>Remind App</td>
<td>To communicate with parents for updates and learning kits. Parents used the platform to share photos of students who participated asynchronously.</td>
</tr>
<tr>
<td>YouTube</td>
<td>To provide visual aides to support learning objectives.</td>
</tr>
<tr>
<td>Google Forms</td>
<td>To submit presentations or check-in surveys throughout the program</td>
</tr>
</tbody>
</table>

Other technological platforms used was Imagine Math for math enrichment and the Remind App for text communication with parents. Imagine Math is an online mathematics program designed to meet the students where they are on their learning
journey. Before students begin lessons, they take a Benchmark to see their strengths and weaknesses, then the program adjusts lessons based on the results. As students’ progress and learn, the program updates. This allowed WIRE to observe the progression over time.

The Remind App was mainly used to communicate with the parents of the students enrolled in the program. During the summer session, parents of students participating asynchronously uploaded the progress that their child was making.

**Final Student Projects/ Student Symposium**

In 2019 the WIRE program introduced the concept of student presentations. At the end of each programming session, the students prepared posters of what they learned or experienced over the summer or academic year. This allowed them to experience the effects of a research symposium. During the pandemic WIRE revamped how the program showcased the projects. During summer 2020, the students participated in what was called “Porch Presentations.” During the final drop off the students would present their project to the WIRE team. For those who were not going to be available for the presentations, the students were able to upload their project via Google Forms. They had the option to submit pictures, videos, or papers.

**Engagement**

During the 2020-2021 academic year the WIRE Math and Science Summer Camp they level of engagement was assessed. Engagement in this study as characterized by the Department of Education is behavioral engagement, which means the is consistent
in attendance, assignment completion, preparedness and participation. In the summer camp there were 42 students registered and in Saturday Academy there were 22. Of the students who had registered for the summer camp an average of 35% of students attended synchronously (Figure 3). Whereas 60% engaged in overall (Figure 2). Meaning that the students logged into the virtual platform at least twice or submitted work via the Remind App or during drop offs/pickups.

Figure 2: WIRE Math and Science Camp Engagement (Note: Minimally engaged is logged in at least twice, somewhat engaged attended sessions but only participated is called on.)
During Saturday Academy, there were 22 students who enrolled and 15 that attended on a regular basis synchronously, approximately 68%. The students that did not participate in a synchronous manner did not engage at all. The students that participated in Saturday Academy engaged in the program differently. 53% of them engaged verbally during the live sessions that happened every other Saturday. The other students that were a little shy participated in the chat. The students enjoyed engaging in the chat and seeing each other on video as many of them didn’t see another child at all during the stay-at-home orders. This provided them an outlet to communicate with individuals other than their parents.

**Student Symposia**

At the conclusion of each WIRE program, students were to present the information that had learned throughout the program. Normally students would present
this information for their families and community partners at the WIRE symposium. Although, the students were remote, the option for the symposium remained in the form of “Porch Presentations.” The Math and Science Camp students had the option to create a poster and present to the WIRE team in the final drop off or submit a video showcasing the experiments that enjoyed or learned the most from. From the “Porch Presentations” 11 students presented projects. Threes students submitted video presentations, via google forms. Four students submitted completed lab notebooks. Two students created poster presentations that they presented as Porch Presentations at their home during final drop off/pickup. Three students submitted paintings via google forms. Two students showcased their urban garden plants. One student showcased their potato plant. For the Saturday Academy students still submitted projects for the symposium, however, it was all virtual. 50% of the students who regularly attended submitted work. Two students created google slide presentations, three students submitted essays, the remaining students shared what they learned and enjoyed best about the WIRE program for year.
Conclusion

Overall, the remote learning experience was successful. Although, towards the end of the summer the engagement started to decrease, there was still approximately 50% participating. The decrease in engagement was likely a result of families having to make adjust with the care of their youth. It was communicated by some parents that because they had to return to work, their children went to stay with other family members. Having more sessions during the Saturday Academy than previous year helped keep the students who were remote learning stay engaged. The students benefited from meeting synchronously rather than asynchronously. The students had
the opportunity to ask the instructors for more academic aid during the Saturday sessions to assist with their schoolwork. Although there were still obstacles present, the virtual programming allowed the WIRE team to see what gaps needed to be addressed in future programming.
References


CHAPTER III

PREPARING INTERNATIONAL STUDENTS TO ENGAGE WITH DOMESTIC YOUTH

Abstract

In 2021, the Lewis Walker Institute (LWI) transitioned into solely hiring graduate students (GS) to instruct the youth that was participating in the WIRE Math and Science Camp (WIRE). The GS hired were from the international community and were culturally different from the students the WIRE currently serves. Although the GS were provided an introductory meeting with the LWI staff, to provide more insight of the WIRE program and all that it was involved in teaching the youth of the program, it was not a true training. Through the progression of the program, there were indications that there was a disconnect between the GS and the youth participants, that appeared to stem from social and cultural differences. Based on observations, there was a need to develop a more formative training program. This article delves into what led to the creation of the WIRE staff training program and what steps were taken in the training to ensure engagement among students and their instructors.

Introduction

The United States has a growing population of international students advancing their education. According to the United States Immigration and Customs
Enforcement’s Student Exchange Visitor Program’s (SEVP) 2021 report, there are more than one million students studying abroad here in the United States. The countries that leading the pack in SEVP are China and India making up 71% of the students studying here in the United States. In comparison, Western Michigan University (WMU) enrolled more than 1,800 international students from more than 100 different countries as of Spring 2020, as reported by the Haenicke Institute for Global Education. The countries representing the majority of the international students attending WMU are Saudi Arabia, India, China, Dominican Republic, and Iraq. As population of international students attending WMU is growing so is the number of international students applying for student employment on the university’s campus, particularly, during the summer term.

Figure 5: Countries represented in WIRE Staff (United States, Mexico, Nigeria, Philippines, and India)
Throughout the course of the WIRE Math and Science Camp’s (WIRE) 10-year existence, the personnel that has worked with the children in Math and Science were educators and volunteers from the local school district within the greater Kalamazoo County, MI community. In recent years, the attempt had been made to utilize the WIRE program as a gateway to allow university students, mainly graduate students the opportunity to work with the children and gain valuable experience in teaching. Prior to the Covid-19 pandemic the teachers that were employed by the program were domestic and had similar ethnic and cultural backgrounds to the children that we served. Since returning to in person programing summer 2021, the demographics of the university students seeking employment with the WIRE program are international students. With the rise of international students working with the WIRE program, comes more challenges that must be addressed such as sociocultural differences (Nieto and Booth, 2010).

In 2021, my co-instructor and I took a step back from the everyday teaching for the WIRE Math and Science summer camp as the camp was returning to in-person learning. This change is what led to a need to hire instructors and the program needed at least four instructors to disseminate the program activities that had been developed. A call was sent out through the university job posting system Handshake seeking graduate students with a background in any STEM field to teach the youth participants in the WIRE camp. After the hiring process four graduate students were selected to for the program, three as instructors and one teaching assistant (TA). All the instructors and the TA that was hired were international students.
When the instructors first began to interact with the youth, it was clear they did not know what to expect. The interaction between them and the youth indicated that there were gaps and different strategies needed to implement. Previously the university students that worked with the WIRE program had experience teaching or working with children. However, they did not have experience with students in the United States. Many of the instructors were just arriving to the United States for the first time. In response to the disconnect, a WIRE Staff Training program was developed, to aide in the transition of international staff teaching children from various ethnic and cultural backgrounds from their own.

When it comes to addressing cross cultural behavior among educators of various backgrounds teaching in the United States, there are gaps in the literature. When engaging with K-12 youth, most of the literature discusses the need to not assimilate and adjust to the American system, but to accommodate the diverse culture. Lopes-Murphy and Murphy (2016) indicated developing relationships early on and connecting with the youth, would aid in understanding their culture.

Intercultural sensitivity plays a central role in education and improving relationships cross culturally (Hammer, Bennet, & Wiseman, 2003). However, to be effective in another culture, individuals must be interested in the culture, sensitive to cultural differences, and willing to modify behavior as an indication of respect for people of other cultures. Understanding different cultural practices do not require determining which way is right, rather is it important to be open to other assumptions about the world and be thoughtful to cultures without abandoning one’s own or disregarding the other (Rogoff, 2003). When instructors get to know students and their cultures, they can
better tailor activities that makes connections to their students’ existing knowledge which in turn helps to foster student engagement that is often more difficult to maintain (Self, 2021).

**Methodology**

In order to promote engagement among the instructors and the youth in the WIRE program, a training program was developed. Training was held within a two-week period before the start of summer camp. It began with a team building exercise to help the staff get more acquainted. It also consisted of the topics on classroom management, minorities on camps training, and curriculum plans. The classroom management and minorities on camp training was provided by the Lewis Walker Institutes staff (i.e., WIRE coordinator and Parent Liaison). The curriculum was provided by representatives from the Michigan Department of Transportation MTRACs program. In addition to the training, a staff guide (See appendix) was developed to provide relevant information about the positions and policies and procedures. Other activities that were conducted where icebreakers to be used with the youth to promote engagement.

To assess the effectiveness of the training, a mixed-method approach to analysis which employed both qualitative and quantitative methods. Data was collected concurrently in the form of individual interviews, surveys, and focus groups. The target population was any instructor or teaching assistant that had work with the WIRE programs post 2019. Qualitatively, the data collected came from individual discussions
and focus groups. A survey using closed-ended data that allowed for statistical analysis was used.

Figure 6: Image of the WIRE Staff Guide

Results and Discussion

The training offered during 2022 was the first time the WIRE program had help any training activities prior to the WIRE camp. During this time the WIRE staff was able to get acquainted with other Lewis Walker Institute staff. The training began with providing background information about the institute and the history of the WIRE youth programs. All this information was provided in the staff guide which can be found in the appendix (Figure 6).

To access the effectiveness of the training program a survey was sent out to 15 individuals that had worked with WIRE since 2019. The response rate was which 27%.
Of the respondents, 50% worked only for the summer camp, 25% only Saturday Academy, and 25% for both. 50% of the respondents were international students representing the countries of Nigeria and Philippines. Although, there were only two international students that responded to the survey, there 71% of the WIRE staff within the last two years were international students, 90% working for the summer camp and 60% working during the academic year (Figure 7 and 8). The countries represented are India, Lebanon, Nigeria, Mexico, and the Philippines.

Figure 7: Staff representation in the WIRE program
Prior to working with the WIRE participants, 100% of the respondents had teaching experience ranging from under 5 years old to adults, with the 25% of them working with both middle school children and college age students.

When the respondents were asked about barriers, they felt that having students from different groups had a different understanding for the concept taught. Other hindrances included previous teaching experience being virtual made it harder for them engage with the youth. Whereas, another student, had no hindrances because of their diverse background, but it did take some time to understand the youth. Overall, the responses indicated that training was productive, however, there was a disconnect between what strategies were shared and how they were received.

In addition to the survey a focus group was held with former staff, representing 50% of former staff but 100% participation of 2022 staff. They provided feedback on
each session that was provided during the staff training and made recommendations. Their main concern was the amount of time that was spent on the curriculum. During the 2022 training there was one day spent on the curriculum as it was provided by the Michigan Department of Transportation TRACS representative. The staff felt it was minimal and more materials needed to be provided. They also indicated that they would like more detailed demonstrations of the STEM activities so that they would be comfortable disseminating the curriculum to the youth. However, they did indicate that there is room for improvement, it helped them overall when dealing with the youth in the WIRE program.

Conclusion

During the last three years it has become more apparent, that our youth need instructors who are able to keep them engaged when learning any subject area, but most importantly in STEM. Although, there are an increase in students studying STEM in their postsecondary education, there is a lack of students pursing STEM education (Otero et al., 2006). Developing a training program for international students to work with domestic youth in the United States, is a continuous process. Initially, in the development of the program, it was based purely on observations and verbal feedback from the youth participants. Once the program was implemented and completed, the staff was asked to provide an honest assessment. The feedback received from the staff that completed the survey, outlined what components of the training were of most importance. The results from the survey indicated that in future trainings there should be sections dedicated to classroom management strategies, the curriculum, and demo lessons. Although these topics were provided in the training session, the instructors did
not fully understand the significance of the topics until they actual met with the youth, therefore were led to believe the topics were not covered. Although, the instructors had previous teaching experience in their home countries, there was still a disconnect with the youth here in the United States that was later determined to be cultural. That led to what gaps needed to be addressed to have more effective training. In the future the training would need to have longer sessions on these topics and provide more helpful guides in the areas indicated. In addition, weekly meetings would need to be established to touch base with instructional staff to address any gaps or disconnect along the way. This would be help ensure the instructional staff as the support they need from administrative staff.
References


CHAPTER IV

DOES REPRESENTATION MATTER IN STEM: AN AUTOETHNOGRAPHIC JOURNEY TO BECOMING A GEOSCIENTIST.

Abstract

It is a known fact that there is a lack of diversity in the STEM (science, technology, engineering, math) fields among BIPOC (Black Indigenous, and People of Color) populations (Institute of Medicine, 2011; NCSES, 2021). Although the issue with diversity is across all STEM disciplines, in the geosciences, BIPOC representation still lags behind even with moderate gains (Kirsch, 2018; Pride & Olsen, 2018; AGI, 2020; NCSES, 2023). For over 50 years, the geoscience community has been trying to combat this issue and increase diversity within the field. Although, there has been an increase with brining women in to the field, it has been hard to engage, recruit, and retain members of BIPOC when there is a lack of individuals to serve as role models and mentors. As a Black woman in the geosciences, who serves as a role model to K-12 youth, how does my experience in the field help others find their niche within the geoscience’s community. This article uses an autoethnographic approach to examine the significance of BIPOC representation in STEM. Through my journey to becoming a geoscientist, I analyze my personal experiences throughout my educational career, the
individuals that I encountered that helped shape me into the Black woman in STEM I am today.

**Introduction**

There has long been an issue with the lack of BIPOC (Black, Indigenous, and People of Color) in STEM. In 1972, the geosciences community held its First National Conference on Minority Participation in Earth and Mineral Engineering, to address issues in recruiting youth from marginalized groups into the field and scientist from underrepresented backgrounds most often need to go above and beyond their white peers to prove their professional value and their right to belong (Houttuijn Bloemendaal et al., 2020). Although, many institutions often draft Diversity, Equity, and Inclusion (DEI) support, it is insufficient to effect the needed change in the geosciences. The work lies in the communities to create spaces for conversations that highlight and share best practices focused on improving DEI (Houttuijn Bloemendaal et al., 2020). In 2019, the American Geophysical Union’s (AGU) Voices for Science used their platform to create a space to have the hard conversation about DEI in the geosciences to make it inclusive and accessible. Although, these conversations have been occurring for more than 50 years, is the geoscience community seeing any change, let alone an increase in diversity within the field? To put it in perspective, has the geoscience community seen an increase in BIPOC?

In the most recent American Geosciences Institute report on the status of graduates, of the 441 respondents, over 90% identified as white, which further reflects the lack of diversity within the geosciences (Dutt 2019; Keane et al. 2021). To better understand the lack of diversity in the geosciences, one would have to look at the total
amount of geosciences degrees conferred by BIPOC groups in 2019-2020 academic year in comparison to their white counterparts. For clarity, the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation, categorizes the geosciences into three fields, atmospheric sciences, earth sciences, and oceanography (NSF 23-315). Based on the degrees conferred, Hispanics or Latino is the largest BIPOC group represented in the geosciences with 990 degrees (Table 1). This can be attributed to Hispanic Serving Institutions (HSI), which are institutions who serve a student population that has more than 25% Hispanic representation (Beane at al. 2021). It is noteworthy to know that the majority of these institutions reside in California and Texas and the majority of these schools have a geoscience related academic department. In comparison, Native American and Alaskan Native have the lowest representation with 35 degrees conferred in the geosciences. So, this leads to the question why is there a still a lack of diversity in the geosciences after 50 years?

Table 8: Geosciences degrees conferred in 2019-2020 by race/ethnicity. (Source: NSF 23-315)

<table>
<thead>
<tr>
<th>Degree Type</th>
<th>Black or African American</th>
<th>Native American &amp; Alaskan Native</th>
<th>Hispanic or Latino</th>
<th>More than one race</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate</td>
<td>1</td>
<td>4</td>
<td>25</td>
<td>4</td>
<td>96</td>
</tr>
<tr>
<td>Bachelors</td>
<td>178</td>
<td>25</td>
<td>764</td>
<td>162</td>
<td>4734</td>
</tr>
<tr>
<td>Masters</td>
<td>49</td>
<td>4</td>
<td>154</td>
<td>57</td>
<td>1274</td>
</tr>
<tr>
<td>Doctorate</td>
<td>9</td>
<td>2</td>
<td>47</td>
<td>22</td>
<td>490</td>
</tr>
<tr>
<td>Total</td>
<td>237</td>
<td>35</td>
<td>990</td>
<td>245</td>
<td>6594</td>
</tr>
</tbody>
</table>
**Minority Serving Institutions (MSI)**

When thinking about representation, among BIPOC in STEM, emphasis can lead to institutions of higher education that serves them; Predominately White Institutions (PWI), Historically Black Colleges and Universities (HBCU), and Tribal Colleges and Universities (TCU). As with HSIs, many of those institutions are considered PWIs and are not tailored to serve just the Hispanic or Latino populations. Do these institutions have geoscience departments or dedicated programs to the field? If so, how are they recruiting students to the field.

**Historical Black Colleges and Universities (HBCU)**

HBCUs are institutions of higher education established prior to 1964 with the intention of primarily serving of Black or African Americans. As of 2021, there are 102 recognized HBCUs recognized by the Department of Education mainly located in the Southeast. HBCUs comprise of three percent of U.S. colleges and universities, they enroll 10% of all Black students and produce almost 20% of all Black graduates. They also produce 25% of all Black graduates with degrees in STEM. As of the 2022-2023 academic year, there are three HBCUs that have geology/earth science programs; Jackson State University, Savannah State University, and North Carolina Central University (College Navigator, NCES). Tennessee State University has a post graduate certificate program in Applied Geospatial Information Systems (GIS) obtained through distance learning, the professional science master’s program ended in Spring 2022 (tnstate.edu, accessed May 23, 2023).
Tribal Colleges and Universities (TCU)

Founded in 1968 by the Navajo Nation in Arizona, the U.S. Department of Education categorizes TCUs as institutions that are controlled and operated by federally recognized American Indian tribes. As of 2023, there are 36 recognized TCU in the United States located mainly in the Midwest and Southwest. TCUs comprise of less than 1% of all colleges and universities and serve approximately 9% of all Native American and Alaskan Native college students. In researching geology/earth science programs within MSIs, only eight (8) of them offer any geology-based programs at TCUs. The programs represented are mainly in geographic information science and cartography and are certificate programs at community colleges. A couple of the TCUs offer an associate degree in environmental science; Dine College and Fond du Lac Tribal and Community College, none of them offer programs in general geology or earth science (NCES, College Navigator).

The lack of geoscience programs at MSIs appear to shed some light on why there are not many BIPOC in the geosciences. Even in the few institutions that do offer programs, the representation in faculty does not reflect the student population. Therefore, if students are not exposed to the field early on in their educational career, they are unlikely to pursue it later on in their postsecondary education or even as a career (Archer et al., 2019).

The Importance of Representation and Role Models

Faculty play a major role in addressing gaps in recruiting potential students to any discipline. In the geosciences these may hold true as well, however, the lack of
representation in the field makes it difficult to recruit, retain, and advance BIPOC students, therefore leading to a pipeline gap in K-12 geoscience education (Archer, et al. 2019). Because there are fewer minority geoscience graduates, this contributes to the lack of minority geoscientist available to serve as role models for the youth (Sherman-Morris and McNeal, 2016). The lack of exposure of science in K-12 education, limits the interest in science as a career and narrows recruitment efforts. Having educators that can serve as role models or mentors for students, can curve the recruitment and retention in the geosciences, therefore, actively reducing the gap (Stokes et al., 2015).

In recent years, the number of Black or African American STEM students has increased, while still relatively slow compared to other minority groups. This also, is reflected in academia within the faculty and administrative ranks. Looking at the institutions of higher education that I either applied to or attended, there was diversity in the faculty among minority groups, however, there did not represent marginalized groups. For example, many of the institutions, applied to had representation from India, China, Brazil, and Columbia. Only one institution had BIPOC representation; The University of North Carolina at Chapel Hill. I attended the University of Tennessee at Chattanooga and currently there is one person in the now combined Biology, Geology, and Environmental Science department (note: the faculty size in Table 2 reflects only the geology faculty) and that individual resides in the biology department. In comparison to the institutions, I applied for my master’s studies to only two institutions that had a Black or African American on person on the faculty in their geosciences department; University of Kentucky and University of North Carolina at Chapel Hill.
When I look at the institutions that I attended and the lack of representation, it is interesting how I arrived at the field of geoscience and what led me to serve as role model for BIPOC youth in the WIRE Youth Development Programs. This article using an autoethnographic approach to express why representation matters among BIPOC youth within the K-12 educational system.

**Methodology**

This study utilizes an autoethnographic approach to examine the significance of a representation and role models in STEM. Autoethnography is a qualitative research method that uses the researcher’s personal experiences to describe and critique cultural beliefs, practices, and experiences. It combines, the characteristics of an autobiography and ethnography to write about past experiences retroactively and selectively, not to merely publish but to assemble them using hindsight (Bruner, 1993; Denzin, 1989, Freeman, 2004). In this study, I seek to describe and systematically analyze (graphy) my
personal experience (auto) and to understand the cultural experiences (ethno), that influenced me to pursue the career path of the geosciences (Ellis, 2004, Ellis et al., 2011). Throughout the process, I recall conversations with my mother to help clarify memories that I have of specific events. Using this method will allow me to understand how I am perceived as a role model within the WIRE Youth Programs based on past experiences.

My Autoethnographic Journey to Geoscience

Reflecting on my educational journey, I think of all the people who influenced, guided, and paved the way for me to become my eclectic self. I come from a family of educators; my mother, an elementary educator for 33 years, studied special education and specialized in social studies, and my maternal grandmother opened and operated the church daycare center until she retired. I was her first enrollee, and along with her sister, my great-aunt worked tirelessly at the daycare educating children from infancy. They were not the only educators in my family but the ones I interacted with daily. With all the educational influence in my life, there has always been the question of where I got the notion to pursue a career in STEM. My mother always said, “I don’t know where you got that science from because it didn’t come from me.” As I end my academic journey, I often reflect on how I got here, who influenced me, and what drives me to continue. As I explore my journey to becoming a geoscientist, I will reflect on the people that molded me to be the BIPOC or the Black woman I am in STEM and how this journey influenced me to share my experiences with the youth of the WIRE Youth Development Programs.
Setting the Foundation

I have always been a curious child. The one who would sit and ponder while gazing at the nature around me. As a child, my mother instilled the bug of curiosity in me. As an educator, she started me out young by sharing the wealth of knowledge with me. This knowledge began with trips to the museums in town, where I grew up in Tennessee, and there was plenty to see outside Big Orange Football. My mother was indeed my first teacher, certified in special education, and settled on K-12 education; she instilled in me the joy of learning. Also, being certified in social studies was a bonus. She exposed me to everything about history, culture, and the world, whether it was learning about my Black or African American heritage, the history of other cultures, or the reasons why. My mother wanted to show me the world, which she achieved through learning.

In the most recent conversation with my mother about my upbringing, I reflected on what led me to pursue a career in STEM, particularly geosciences. The conversation led to what I did as a child and were there any signs that may have laid the foundation for who I am today as an educator and scientist. The conversation led back to her taking my sisters and me to all the museums in town. She first told me that my favorite museum was the American Museum of Science and Energy (AMSE) in Oak Ridge, TN. Oak Ridge, TN, is the home of The Manhattan Project, where the atomic bomb was built at K-25. In addition to the AMSE, it is home to the Oak Ridge National Laboratory (ORNL) and the Y-12 National Security Complex (Y-12). As one of the only Black families in the museums, she continued how fascinated I was with all the power plants; the ORNL, Y-12, Tennessee Valley Authority (TVA), and the Knoxville Utilities Board
(KUB). As I continued to listen to her share with me her memories, I vividly began to recall all of those visits, and I began to smile. My mother was filling in the gaps that I thought were lost, and as I started remembering portions of certain events or activities, we did neither she nor I never realized that she planted the first seeds of science in me.

Growing up as a child in the 1980s, just like many families I knew, we had our very own set of Encyclopedia Britannica. As old and obsolete as they are today, it was an upgrade from the set my mother had growing up. Still, our collection sits in my mother’s living room in her secretarial bookcase. In addition to the main volume, we had a supplemental set that was all about science, and I was so fascinated by them that I was able to learn about Earth, space, animals, etc. My mother read the encyclopedia to my sisters and me as children, and we played games by looking up information and learning about different topics.

**The Beginning of My Educational Journey**

At age four, my mother enrolled me in the Martin Luther King Jr., Institute, a preschool that focused on educating Black children within the community. I would not consider it a traditional preschool of the time, as my mother compared it to a kindergarten class in regards to classroom management. I remember it vividly because it was where I learned to type. Yes, typing at the age of four. I learned to type on a vintage typewriter in a black case. To this day, I still see all the color-coded letters applied to the keyboard and the corresponding rings on my fingers. However, I was curious why she chose the MLK Institute. So, I asked my mother, and she stated that she chose this school because of the curriculum, which included integrating reading into the
program and teaching kids how to type, a method used to teach the alphabet through recognition. Her main reason for sending me to preschool was that I was starting kindergarten in the fall, and up until that time, I had not had any real interaction with kids other than my siblings, who were nine months and two years old at the time. Although I only attended the school from January to August, I learned motor and socialization skills.

As I transitioned into kindergarten that August, the foundation had been set. I now had the basic skills and knowledge to succeed, but what would I do now that I was not in the comfort of the community that I lived in? The elementary school I attended was where my mother worked. This school was not diverse; my mother was the only Black teacher at the school, and I was one of three minority students in my kindergarten class, two Black girls and one Vietnamese girl. Although my mother was currently the only Black teacher, she was not the only one who had worked at the school; the other teacher transferred before I started. All my teachers, except my mother, were White (yes, I did have my mother as a teacher). In elementary school, I created several science projects, and the first one was in the first grade about dinosaurs. For that project, I made a *tyrannosaurus rex* by sketching out his body and covering it with pinto beans glued to a poster board standing in the woods. My mother candidly talks about how I was so adamant about how to draw because I wanted to draw it myself. So, with the assistance of my mother, she drew the dinosaur on a piece of paper, and I recreated it on the poster board. Ironically, I still have the project in the back of my closet at my mother’s house. In the 3rd grade, the science project was the solar system, and in the 5th grade, I was introduced to dissections. Now some may say that is not anything special
because, at that time, we all studied dinosaurs or the solar system in elementary school and most likely created a science project for it. But what it did was piqued my interest in something more.

As my educational journey continued through middle school and high school, I was involved in many extracurricular activities that helped shape me into the person I am today. Knowing at a young age that I thought I wanted to pursue a career in the medical field, I continued on that trajectory. I began wanting to pursue nursing just like my aunt because I wanted to be a registered nurse (RN) just like her. I even dressed as RN in the 5th grade for Career Day, but then I thought, if I can be a nurse, then why not a doctor? So that is what I set out to become, a medical doctor, and every decision I made in my educational career was geared towards the career choice to go to medical school and become a doctor. In high school, I was very involved in extracurricular activities related to STEM; a physician’s mentorship program, a pre-medical program at Fort Sanders Hospital, and a STEM program called SECME (The Southeastern Consortium for Minorities in Engineering). This was a K-12 STEM program geared towards high school students from underrepresented minority groups (URM). SECME’s mission and vision, as outlined on their organizational website is:

To increase the pool of historically underrepresented and underserved students who will be prepared to enter and complete post-secondary studies in science, technology, engineering, and mathematics (STEM), thus creating a diverse and globally competitive workforce. To be a beacon and benchmark for excellence and equity in pre-college education (www.eng.ufl.edu, retrieval May 23, 2023).

The program at my school was overseen by my biology/chemistry teacher. I consider her a role model in many ways. She was a Black educator that not only taught science
but also had her doctorate. Up until this point in my education, I never had a Black
person as a science teacher; they were all white men and women, nor one with an
advanced degree. Although I had always been taught that I could be anything I wanted
to be by my mother, it was my high school science teacher, someone who looked like me,
a Black woman with a love of science, that showed me that it was possible.

The Shift

After graduating high school, I worked for a summer enrichment camp for
intercity youth called KnoxBridge. It was a six-week program held at a prestigious
private school in Knoxville, TN. This program exposed students from URM to learning
in various areas, including social studies, math, and science. I worked for the program
for two summers in the subject areas of social studies and math.

I continued my studies at the University of Tennessee at Chattanooga, in
Chattanooga, TN, majoring in Chemistry – Pre-medicine with a minor in Biology. At the
time, my heart was still set on going to medical school. But as time moved on, I began to
doubt if that was what I really wanted. I had previously completed two different
programs prior to coming to university at the two top hospitals in Knoxville. I shadowed
many doctors in various areas to find the areas of medicine that were just the right fit for
me. I honestly thought I wanted to be a plastic surgeon, but I recall thinking I did not
want to pursue it if it did not help people. The more I progressed in my studies, the
more I began to like the laboratory side of medicine. I didn’t want to do patient care; I
wanted to pursue medical research. Then I entered my senior year (4th year), and while
working on my chemistry, I took an advanced analytical chemistry class, Methods of
Environmental Analysis. This was the course that was the beginning of a career shift, I started to appreciate laboratory work more, and for the first time in my life, I was beginning to think more about research rather than patient care. My professor at that time was new to the university; she had so much energy and was passionate about science and the environment. It was a breath of fresh air in the chemistry department; as one of two women left in the department, she constantly encouraged me. She taught me about natural processes in the environment and the importance of remediation. I credit her and her class with shifting me toward the environmental field. Currently, she is a UC Foundation Professor in Chemistry and the Department Head for Biology, Geology, and Environmental Science.

A year and a half after completing my bachelor’s degree, I went on to obtain my master’s degree at Tennessee State University (TSU), a Historical Black College and University (HBCU). Still thinking about medical school, I obtained my MS in chemistry, completing my thesis work in the area of biochemistry. The focus of my research was the effects of Natural Killer Cell Function, the body’s natural ability to fight off cancer cells. Although the research was mainly toxicological, it stemmed from contamination in the water from antifouling agents used on boats. When that chipped off in the water, the contaminants made its way into the food chain through fish. After finishing my MS degree, I paused my educational journey for three years. I began to work at the university as an adjunct professor and eventually coordinator for the chemistry department, a job that I truly enjoyed; however, back in my mind was the notion of wanting to do more in the environmental realm. It was time to continue on my journey, and I enrolled in another master’s degree program, environmental engineering, at TSU.
This program was nudging on the desire to shift my education to the environmental field. Still wanting to pursue a doctorate degree, the opportunity presented itself to enroll in a geoscience program. A close friend and classmate of mine came to my office one day and said Dee, I found a program for us; it’s interdisciplinary and caters to all the different things we love about science. That was my first introduction to the geosciences.

The Start of my Geoscience Education

In 2012 I enrolled in the geosciences program at Western Michigan University to pursue my PhD. To pursue my studies, I was awarded a AGEP (Alliance for Graduate Education and the Professoriate) Fellowship, meaning I had a full ride to follow my dreams. At that time, I was excited to start this new chapter in my educational career. I finally found a field that catered to my interest. Upon entering the program, I could not help but notice that I was the only Black or African American graduate student in the department. Although it was not new to me to be the only Black person in many spaces over the years, subconsciously, I kept a mental note because this time I was not in my comfort zone, the familiarity of family and friends in the southern United States. As stated previously, I attended TSU for my master’s degree, and I was surrounded by people of color.

Joining the program, I knew exactly which area of geosciences I wanted to pursue, geochemistry. The geosciences allowed me to incorporate my love for the science field without eliminating all the previous work or knowledge I had done in the fields of chemistry, biology, and environmental engineering. Geoscience being an interdisciplinary field in itself, allowed me to incorporate all my training into one degree. My original research focus was studying the effects of the road salt deicers, an
anthropogenic contaminant, in eutrophic lakes in Southwest Michigan, by looking at lake stratification. The study also included metal speciation in marsh sediments and the isotopic ratios of deuterium and oxygen 18 in relation to the water balance within those lakes. My research introduced me to many different types of instrumentation and techniques that I only read about in my previous analytical chemistry courses. The techniques I learned afforded me the opportunity to travel to the University of Waterloo and assist the EcoHydrology group with their field study. It also presented the opportunity to mentor and train undergraduate students within the academic department that wanted to pursue geochemical research, which lead to serving on two honor thesis committees. However, this honeymoon phase of my education would soon come to a halt.

Three years into the program, I my progress would seem to stop. I had come to a crossroad; it was time to defend my proposal. At that time, I had completed and successfully passed all my prerequisites and core courses; and presented at four different conferences. But my doctoral committee did not allow me to progress pass my proposal. I was devastated, what did I do wrong, what did I need to improve on. I had been meeting with my advisor weekly either in a group setting or on an individual basis. But for reasons unknown, it was brought to my committee that my advisor didn’t know my protocol and that I was doing everything incorrectly. I was confused, this was a method that was provided by my advisor and was discussed weekly. It was the same protocol that was shared with my mentee, who was completing their honors thesis project on a smaller scale of what I was doing, in which they successfully defended. It was also stated that one study of my dissertation was never meant to be part of my
project. This was all news to me. At that point I was told to change my project and focus on isotopes.

Isotope geochemistry was interesting but by no means was it my passion. However, as a PhD student whose goal was to finish, I did exactly what my advisor requested of me. I was given three months to produce a new proposal with preliminary data and redefend. Three months later I was doing just that. At my last defense within the geosciences department, I presented my proposal for my new dissertation research. Again, my progress was stalled. I was told that I did not like my research project, and they were not failing me but not passing me either. Immediately, I was perplexed, what did this even mean? How do I move forward? Then my advisor asked what I wanted to do, and I shared that I wanted to complete my original project with studying metal speciation of marsh sediments.

Once the decision was made where I could continue with my original study, my advisor decided to come to the research lab and train me on different techniques. Up until this point in my educational career at Western Michigan University, my advisor had never been in the lab with me. Previously, I was trained by other graduate students in the research group who had directly been trained by the advisor. The first day we spent in the lab together, I learned that I was incorrectly been trained on most of the instrumentation by three different individuals. It was like I was starting from scratch. As I continued to work night and day to get back on track, I couldn’t help but notice that my colleagues (other members of my research group) were progressing, through their program with no issues at all. These were the same students that trained me in the lab on techniques they were using without any problems. At this point, self-doubt was
beginning to creep in, and my mental state was becoming affected. But I could not give up, I was not a quitter, therefore, I continued on with my study.

For the next few months as I worked tirelessly, progressing with my studies, then one day I received a message from my advisor, and they wanted to meet. When I went to my advisor’s office I sat down at their table and was told, they no longer wanted to advise me. They felt that they could not provide the support I needed to succeed in the program. It was even suggested to me that I just take a master’s degree and move on. I was devastated, I had worked so hard and excelled in my coursework, trained other students, went above and beyond what was asked of me, but I still wasn’t good enough in their eyes. That day I felt like a failure.

This was a pivotal time in my doctoral studies, what was I supposed to do? I had moved here to pursue a degree that I truly wanted but I was being told that I wasn’t good enough. What were my next steps going to be? Remember, I said that I was not quitter, I was not giving up so easily. I picked up the pieces of my dignity that I had left and went speak with the department chair and graduate dean, two individuals who supported me and I considered mentors. I needed guidance and they both provided that for me. So, I regrouped and went in search of another committee chair.

My next chair that chose to work with me, was actually the original faculty member that I wanted to work with, however, at the time they were on sabbatical. When they agreed to be my chair, I felt relief, I remember thinking that I was headed on the right track, but there was one condition, I had to continue with one of the faculty members that was on my previous committee. I was asked to finish the project I was working on with them first. Although, I was not happy, I agreed to finish up that project.
and write the paper. As I continued to work to complete the paper with my committee, it was becoming more apparent, that this individual did not want me to succeed, although I was told otherwise. Everything I did was wrong, I was belittled, told that I wrote like a high schooler, and criticized for not working 18 hours a day. During this time, I also suffered a couple of losses, my uncle had passed away and then a couple weeks later my god sister had unexpectedly passed away and I needed to return home. This was not ideal, as I was gone almost a week. After I retuned back to Michigan, I had a meeting scheduled with both my advisor and committee member, where I went through the research I was working on. At the conclusion of this meeting, I was told, that we were parting ways. Once again, I was in the same situation, except this time I didn’t even get the chance to showcase what I could do, it was just decided that it was not a good fit. However, there was a difference, I was labeled difficult to work with and no one in the department wanted to work with me. What had I done wrong? Again, I was doing everything that was asked of me and eve more. By this time, I had started seeing a therapist because of my mental state. The thoughts of how I was not good enough, this was not my first graduate degree, the previous areas of study were much harder in my eyes; chemistry and environmental engineering, both in which I excelled. Was I being labeled difficult because I was a Black woman? These were all the things that crossed my mind. But I did not give up, I just had to take a different approach.

Four years ago, I went to see the graduate student advisor in the department, and I had a conversation about wanted to continue my education. It had been two and half years since my advisor and I had parted ways. It had been the first time I had been inside of the building that the geology department resided in. Going into the building
was triggering so I just stayed away. But the time had come for me try and complete my degree. It was later decided the best course of action was to switch my degree program to Interdisciplinary Studies. This would allow me to still reach my goal of the doctorate, but in a different manner. As I met the dean and graduate advisor, it seems I was headed in the right direction. As I was gathering material for my research, life happened again, my mother became extremely ill and later that year my father would unexpectedly pass away. I became discourage and this time, and it affected my coursework. For the first time, I was not able to bounce back. Then to top it all off, the Covid-19 pandemic hit. I was really ready to give up this time. However, my saving grace was being introduced to the WIRE youth program by a colleague in the summer of 2019.

The WIRE youth program, housed I the Lewis Walker Institute, was a 4-week STEM program that provided math and science enrichment to underrepresented youth within the Kalamazoo County, MI community. I joined the program as the middle school (ages 11-13) science instructor. In this program I was able to introduce youth to different fields of science. The first summer I developed activities based on water chemistry. As the pandemic hit, I had a crucial part in developing the curriculum, incorporating the geosciences, as the program transitioned to remote learning. By working with this program, it seemed to ignite my love of science and sharing that love with the youth in the community warm my heart. Had I just found a new passion? In the spring of 2021, I was asked to be the coordinator for the WIRE program. In the fall of 2021, I decided to finally continue my education. I reached out to the graduate advisor in the geosciences department to determine my options. It was still in my best interest to pursue the Interdisciplinary Studies PhD. In addition, the director of the Lewis
Walker Institute would become my primary advisor, and the focus of my research would be the WIRE program and how I played a vital role in reimaging the program during and post the Covid-19 pandemic.

As I reflect on my doctoral journey, the piece that was missing or different from my other degrees, was that there weren’t any Black or African American role models paving the way for me. I went into the geosciences blindly, strictly what the field could offer. As I mentioned earlier, before pursuing a PhD in geoscience, I had no clue the field even existed. I often contemplate if I had been introduced to this field earlier in my academic career, would I have chosen this route rather than chemistry? Do I think having a role model would have help me? Absolutely. Knowing what I now, I am in a position to change the narrative among other students in BIPOC populations and be the representation that the youth need.

**Increasing the representation of BIPOC in STEM Education for WIRE**

“You can only aspire for what you can see yourself in.”- unknown

In the summer of 2020, the WIRE program transitioned to remote learning to avoid disruption of summer programming. To increase engagement, a theme was created, and curriculum was developed surrounding influential BIPOCs in STEM. The first two individuals introduced in the curriculum was George Washington Carver, an agricultural scientist and inventor, and Katherine Johnson, a mathematician. Both of these individuals left a significant impact to their respective STEM fields. George Washington Carver, one of the most prominent Black scientists of the 20th century, is known for developing alternative techniques to improve soils depleted by cotton
plantings using peanuts and sweet potatoes (History, 2023). Katherine Johnson, known as the “human computer,” left her mark on history through her work with NASA. Her mathematical calculations were instrumental in NASA’s orbital flights. She provided the trajectory analysis for NASA’s first human spaceflight, mission Freedom 7. This work resulted in co-authoring a report with fellow NASA engineer Ted Skiopinksi; this was the first time a woman in the Flight Research Division received credit as an author of a research report (NASA, 2020).

With the introduction of influential BIPOCs in STEM the students were able to learn about the impact of individuals that “look like them.” As Sujata Emani, from AGU’s 2019 cohort Voices of Sciences stated in response to representation, “to see one’s identity in spaces that otherwise appear unwelcoming is empowering” indicates that many STEM fields that lack representation, leave the feeling of underrepresented minorities not being unwelcomed. Had the introduction of the BIPOCs in STEM been enough to spark interest in the youth about a career in STEM? In response from feedback and end-of-program presentations there was assurance that the program was heading in the right direction.

Continuing into the next school year with the WIRE Saturday Academy, influential BIPOC in STEM were incorporated into the biweekly lessons and monthly newsletters. The program started with introducing a lesser-known geoscientist into the curriculum. Knowing that the WIRE program serves students from different ethnic backgrounds, mainly Black and Hispanic, intentionality was key when showcasing diversity in STEM mirroring the demographics of the youth when selecting people of color. Oftentimes the individuals I selected followed the different affinity months, such
as Native American Heritage Month, Hispanic American Heritage Month, and Black History Month. This allowed the program to highlight the diversity among people pursuing STEM.

In addition to showcases influential BIPOC in the lessons, the WIRE program invited speakers that represented the underrepresented groups. During the summers 2021 and 2022, there were guest speakers from various backgrounds. In summer of 2021, there were two speakers one virtual and one in-person. The students had the opportunity to meet Dorothy Jean Tillman, founder, and CEO of the Dorothy Jeanius STEAM Educational Leadership Institute, as she guided them through different activities such as the DNA of a strawberry. They also had the opportunity to talk with Caleb Anderson, a 12-year-old child prodigy that wants to be an aerospace engineer and attends Georgia Tech in Atlanta, GA. These opportunities show the students that no matter the age there are individuals that look just like them pursuing STEM and you can be whatever you want to be.

In summer 2022, the WIRE program incorporated the “Arts” in the STEM program to create STEAM and studied music. The program introduced the students to the different aspects of music from around the world and how it relates to STEM. There were four guest speakers invited and they represented different ethnic groups and cultures. They shared information about different genres of music, and what role it played in their culture. Then taught and inspired the students to express themselves through the dancing, singing, and playing the drums and bells.

Over the years, as the diversity within the program continued to grow, I have continued to incorporate different ethnic groups into the WIRE curriculum, not only
does showcase the diversity of the program but the diversity of contributors to STEM. Each month individuals from different ethnic groups are featured in the WIRE newsletter showcasing their contributions to STEM. Not only does it demonstrate the various areas of careers in STEM but it provides the student with representation.

Conclusion

Throughout my educational journey as I worked towards becoming a geoscientist, even before I knew what a geoscientist was. Culturally, as a Black or African American person, if you had any interest in science, the educational path was to pursue a degree in chemistry and biology with the goal of entering the medical profession. As a child, I always had a love for the field of geology, but I didn’t know what it was. Growing up, I loved the outdoors; I collected different rocks from the yard and shells from the beach, intrigued by the formations of rocks in the Appalachian Mountains, which I would discuss with my parents as we traveled along the mountains to see my paternal grandmother that lived in Benham, KY. Nature has always been a part of me, and it is the place where I am most at peace, my happy place. But it took me years to figure out why I was so interested in nature and the environment. The one lingering question is if I had met someone in the field of geosciences earlier in my journey, a person who had looked like me, would that representation matter? I cannot deny the presence of the strong women that guided me along the way, both Black and White representing STEM; however, there was not a person available outside the traditional fields of biology and chemistry to foster my budding interest in geology.

As I continue to reflect on my journey and the people that help mold me into the person I am today, a Black woman geoscience educator, I recognize the importance of
representation in STEM education. In the reimaging and developing of the WIRE Math and Science programs, the goal was to show representation. One of the critical components of the WIRE Youth Development Programs is to help the youth envision themselves in college and in desirable fields. As I continue work with the youth in the WIRE program my hope is that I am able to serve as the role model and be the representation that the youth need. Will I be able to recognize the budding interest the youth have in many different areas along their educational journey? I genuinely don’t know the answer to that question; however, you never know until you try.
References


CHAPTER V

CONCLUSION

For the last three years, the WIRE Youth Development Programs has undergone a considerable learning curve to engage the community youth. From transitioning from WIReD to WIReless, helping international students learn to work with youth from a culture different from their own, and using personal experiences to shed light on representation in STEM, the WIRE has just begun its transformation. Reflecting on the progress made within the program, there is still room for WIRE to grow. Youth who have participated in WIRE within the past four years have been introduced to STEM fields they had never imagined, such as geosciences. When the geosciences were first introduced in WIRE during the summer of 2020, many youths didn’t understand the significance of the field. But the program instilled in them that they could do or be anything they wanted to be. It let them know that being part of a marginalized group didn’t hinder them from pursuing STEM. Each time the WIRE program meets, the youth are often asked what they learned from the previous meeting or what they want to be when they grow up. It is heartwarming to hear that more youth are interested in pursuing a career in STEM, including geosciences.

I think of the success stories of alums of the program that have shared their experiences with the WIRE team. One student in particular, now in high school, has been accepted into various other STEM enrichment programs over the past few years,
and his passion are engineering and working with trains. Another student, now in college, is enjoying chemistry. In the most recent group of WIRE “graduates,” a student desires to pursue a career in space science. He sees WIRE as a support system to help him pursue his goals. The WIRE program planted the seed and laid the foundation by creating engaging and meaningful programming surrounding STEM for youth. They have achieved this by providing role models and the representation that BIPOC youth need to succeed.

Summary of Article I

Article I showcased how the WIRE program transitioned to remote programming during the Covid-19 pandemic. Given unprecedented times, programming was offered in an asynchronous and synchronous format, allowing the participants to engage based on their needs. Leveraging technology to connect with students allows them the interact with each other while staying at home. Google platforms were used as the method of technology because of the familiarity of it with the students. The science kits allowed the students to learn using hands-on experience. The programming allowed for various learning styles to be utilized.

Summary of Article II

As the world began to open back up, so did WIRE programming, creating the need to hire more instructors. Instead of using local K-12 educators, the LWI decided to recruit graduate students to instruct the youth. The opportunity was twofold, affording students from the university to gain valuable experience in teaching and providing the youth with a diversity of educators. This article showcases the efforts WIRE took to
ensure the instructors could engage with students from different cultural backgrounds through training. To determine the effectiveness of the training, a survey was conducted with the instructors that worked with both the WIRE summer camp and/or Saturday Academy. The responses from the survey indicated what was effective and where there were gaps. The feedback also highlighted improvement areas, focusing more on the curriculum and classroom management.

Summary Article III

Article III introduces autoethnography to examine the significance of BIPOC representation in STEM. The article utilizes my journey to becoming a geoscientist and the individuals I encountered that helped shape me into the Black woman in STEM I am today. The article highlights the influence of my mother, aunt, high school biology/chemistry teacher, and college professor. Although there was no lack of women support, there was no one to truly foster the curiosity I had as a child. It also highlights the preconceptions that URM cultures have in regard the geosciences. When it comes to the lack of URM in the geosciences, representation does matter. Suppose a percentage of URMs attending institutions that only cater to their culture, such as HBCUs or TCUs, and there are no geology programs present, in that case, that presents a gap and aids in the lack of diversity in the geosciences. Finally, this article demonstrates the efforts WIRE has promoted to introduce geosciences to BIPOC students that may never have known about the field.
Future Research

This study laid the foundation for future research to be conducted in K-12 learning. One study of interest is virtual fatigue. The students in the WIRE program spent 18 months remote learning, whether it was synchronous or asynchronous. Although the students are back in the classroom, they are still relying heavily on technology. From observations during Saturday Academy, the youth are not fully engaged with the use of technology, which has led to utilizing other means for engagement. Other studies include being diligent with pre-post assessments as the students enter the program so that it can be compared to data collected over previous years, with continuous student participants, and to measure the summer slide or Covid-19 slide more efficiently.
APPENDICES
Appendix A

HSIRB Approval Letter
Date: April 5, 2023

To: Luchara Wallace, Principal Investigator

Re: Initial - IRB-2023-111
Strategies to Increase Engagement in K-12 STEM Programs Among BIPOC Students Grades 3rd - 8th

This letter will serve as confirmation that your research project titled "Strategies to Increase Engagement in K-12 STEM Programs Among BIPOC Students Grades 3rd - 8th" has been reviewed by the Western Michigan University Institutional Review Board (WMU IRB) and approved under the Expedited 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

The conditions and duration of this approval are specified in the policies of Western Michigan University. You may now begin to implement the research as described in the application. Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes to this project (e.g., add an investigator, increase number of subjects beyond the number stated in your application, etc.). Failure to obtain approval for changes will result in a protocol deviation.

In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the IRB or the Associate Director Research Compliance for consultation.

Stamped Consent Document(s) location - Study Details/Submissions/Initial/Attachments

The Board wishes you success in the pursuit of your research goals.

Sincerely,

Robert Wall Emerson, Vice Chair, WMU IRB
For a study to remain open after one year, a Post Approval Monitoring report (please use the continuing review submission form) is required on or prior to (no more than 30 days) **March 22, 2024** and each year thereafter until closing of the study. When this study closes, complete a Closure Submission.

**Note:** All research data must be kept in a secure location on the WMU campus for at least three (3) years after the study closes.
Appendix B

Sample WIRE Activity Lesson
Mission 2: Moon Exploration

QUESTION: Does the moon change shape over time?

INTRODUCTION
The moon is the most visible object in our night sky, and it’s sometimes visible during the day. Have you ever noticed the pattern the moon takes throughout each month? These patterns are called phase.

Over the next few weeks you will:
(1) Document the changes that the moon undergoes each day
(2) Compare the changes to the moon chart

HYPOTHESIS—What do you think the hypothesis is? Write your prediction below.

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

78
MATERIALS— Moon journal, Moon Phase Calendar Calculator, Brass fastener, Scissors, Tape, Pencil, Black Pen or Marker.

PROCEDURE— Follow the below directions.

1. Obtain your Moon Journal sheet

2. Look at the moon. Record the date and time of your observations.

3. Draw the moon how it looks in the sky.

4. Repeat every day for the next month. If you can’t see the moon on any day leave the box blank.

5. Obtain the materials for the Moon Phase Calendar located in your manila envelope.

6. Using the knowledge from the Moon Journal shade in the moon phases

7. Cut out your Moon phase wheel, the moonset and moonrise panel and the viewing wheel.

8. Using a pencil or a 1-hole punch, poke a hole in all the pieces where indicated

9. Put all the pieces together using the brass fastener

10. Try it out by picking a date to see what the moon phase will be.
DATA AND OBSERVATIONS—Record Data on your Moon Journal.

### Moon Journal

Month________________________ Year___________

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80
RESULTS

What pattern did you notice about the moon after 1 week?

HELPFUL LINKS AND RESOURCES

Moon Phase Loop: https://svs.gsfc.nasa.gov/4310

Understanding The Moon Phases:

https://www.moonconnection.com/moon_phases.phtml

Moon Phases 2020 Kalamazoo:

https://www.timeanddate.com/moon/phases/usa/kalamazoo
Appendix C

WIRE Youth Development Program Staff Guide
Table of Contents

Section I: Organizational Background
  A. About Us .......................................................................................................................... 3
      a. Theme
      b. Program History
      c. WIRE Mission
      d. WIRE Vision
      e. Meet the WIRE Team
  B. WIRE Staff Information ................................................................................................. 5
      a. WIRE Staff Positions
         i. WIRE Program Manager
         ii. Parent Liaison
         iii. Instructor Job
         iv. Teaching Assistant Job
         v. Youth Justice Fellows
         vi. Volunteer
      b. Attendance Policy
      c. Time Keeping
      d. Training

Section II: Code of Conduct
  A. Do’s and Don’ts .............................................................................................................. 10
  B. Emergency Preparedness and Transportation of Minors ............................................. 11
  C. Communication Strategies ............................................................................................ 11
  D. General Reporting Obligations ..................................................................................... 12
  E. Mandated Reporters Obligations .................................................................................... 12
  F. Accountability .................................................................................................................. 12

Section III: Program Policies and Procedures
  A. Recruitment Policy ........................................................................................................ 13
  B. Inquiry Policy ............................................................................................................... 13
  C. Eligibility Policy .......................................................................................................... 13
  D. Photo- Release Policy ................................................................................................... 13
  E. Transportation Policy ................................................................................................... 13
  F. Record-Keeping Policy ................................................................................................. 13
  G. Confidentiality Policy .................................................................................................. 14
  H. Mandatory Reporting .................................................................................................. 15
  I. Behavior Policy ............................................................................................................. 16
  J. Evaluation Policy .......................................................................................................... 16

Section IV: Appendix
  A. Minors on Campus Policy ............................................................................................. 17
  B. WMU Timesheet ............................................................................................................ 17
Organizational Background

About Us

The Lewis Walker Institute was founded in 1989 as the Institute for the Study of Race and Ethnic Relations. In 2000, the Institute was renamed in honor of Dr. Lewis Walker, the first African American Ph.D. faculty member at Western Michigan University. Dr. Walker devoted his career to teaching and research about race and ethnic relations, also working for social justice through applied research and community projects. The Walker Institute continues this work in service to the University and community.
One Community: Foundational Theme for the Community Engagement work of the Lewis Walker Institute

ONE COMMUNITY draws on the American ideal of equal opportunity for all, and that our prosperity and quality of life depends on this. Unfortunately, ongoing racial disparities compounded by high poverty rates are slowing progress toward the achievement of this ideal.

ONE COMMUNITY guides the educational, service, and applied research work of the Lewis Walker Institute.

ONE COMMUNITY is intended to function simultaneously as:

- A community indicators system, highlighting indicators of well-being by race, ethnicity, and class.
- A program of community-engaged research and service.
- A change strategy that engages persons of all backgrounds in a common conversation about overcoming differences in understanding and values across racial geographic, and class lines.

Program History

The WIRE Math and Science Camp founded in 2014, is a program run by the Lewis Walker Institute under its WIRE Youth Development Program umbrella. The Lewis Walker Institute for the Study of Race and Ethnic Relations is a non-profit organization from Western Michigan University established in 1989 and renamed in 2000 in the honor, Dr. Lewis Walker. One mission of the Walker Institute is to engage in research, teaching and service to promote more equitable and inclusive communities and institutions, especially in Kalamazoo and through Michigan. Thus, WIRE Youth Development Programs correspond to one of the Walker Institute goals to support the building of the Kalamazoo community.

Mission Statement

The mission of the WIRE Math & Science camp is to ensure that children in Kalamazoo County build a strong foundation for college success and access to careers that require strong quantitative skills, such as those in science and technology.

Vision Statement

The Walker Institute’s vision is part of our long-term goal of engaging the resources of WMU to build more equitable and inclusive communities. Ensuring the educational success of all students is essential to accomplishing this goal.

The WIRE Team
Contact Information
The Lewis Walker Institute for the Study of Race and Ethnic Relations
WIRE Youth Development Programs
1221 Adrian Trimpe Building
lwir-ydp@wmich.edu | 269-387-215
WIRE Staff Information

Staff Positions

WIRE Program Manager

The WIRE Program Manager develops, manages, and implements educational and multicultural programs for targeted groups. The Program Manager ensures program quality and performance related to recruitment of students and teachers, curriculum development, program activities and other everyday operations.

Reporting directly to the Lewis Walker Institute Director and/or designee, the Program Manager primarily oversees all aspects of youth development programs. Responsibilities of the Program Manager deprogram instruction, curriculum development and revision, and material management and will carry out the responsibilities of the position as defined below:

Responsibilities:

Major Duties:

- Manages operations of a youth development program. Implements program policies and procedures.
- Provides guidance and assistance to faculty and students in the program. Facilitates individual and group meetings to provide program information and advice.
- Supervises and coordinates program activities and services. Develops retention strategies, assesses programs, evaluates service methods, researches best practices, and recommends program changes and improvements.
- Collaborates with faculty, community, and government agency directors to establish and maintain support for the program and to integrate programming into the curriculum.
- Collects and maintains data and accurate program documentation for required reports.
- Develops service-learning projects for students to meet community-identified needs while practicing course learning objectives. Plans and implements co-curricular community service and volunteer initiatives, including developing and presenting seminars and forums.

Program Coordination

- Maintain and continue curriculum development as it relates to STEM education for 3rd-8th grade.
- Plan, prepare, and deliver lessons to all students in the class that incorporate Michigan State Education standards.
- Design and coordinate the 4-week Math and Science summer program.
- Design and coordinate the monthly Saturday Academy during the academic year.
- Plan, organize, and implement; the end-of-program symposiums for the students and their families.
- Work with the Institute’s administrative assistant to purchase materials for the program.
- Plan and facilitate the field trips for the summer program.
Program Management

- Create and oversee the implementation of an ongoing teacher recruitment plan, including development of annual recruitment and quarterly activity plans, development and distribution of program marketing materials, presentations to targeted participants, and ensuring a presence at key community events, etc.
- Perform and oversee participant sign-up and required documentation.
- Develop and manage relationships with schools and other community-based organizations to secure participants and teaching staff.
- Oversee communication with parents and the administrative team to ensure quality development.
- Manage the planning and implementation of events (e.g., field trips, data collection, and end-of-program events)
- Maintain and update the program's policy and procedure manual as needed.
- Oversee program evaluation activities.
- Supervise teaching staff.
- Training of staff and volunteers within the WIRE program
- Assist other program coordinators as needed.

Qualifications:

- Master’s degree preferred with emphasis in STEM, social work, psychology, volunteer management, and/or education.
- Two or more years’ experience in mentoring and youth development, working within community organizations and/or schools preferred.
- Have expert knowledge of mentoring program policies and procedures.
- Extremely strong organizational, writing, verbal, and interpersonal skills
- Creativity and flexibility are essential in assuming significant responsibility.
- Experience working in racially, ethnically, and socioeconomically diverse urban communities preferred.
- Teaching experience preferred.

Parent Liaison Job Description (WIRE Math and Science Programs)

The Parent Liaison works closely with the Program Manager and bridges the communication between WIRE and the parents. The liaison implements and manages parent initiatives and activities to support parents to become active participants in their children’s education to ensure their child’s success. They support the Program Manager in the organization and documentation of parental involvement and assist staff with core parent issues.

Reporting directly to the Lewis Walker Institute Director and/or designee, the Liaison primarily keeps the lines of communication open between the parents and the youth development programs and assists with program development and training of the staff. The responsibilities of the Parent Liaison are parent support and community engagement.

Responsibilities:

Major Duties:
Provide coordination, assistance, and support necessary to implement effective parent involvement.

Assist the Program Manager with program development to ensure the needs of the youth are met.

Promote strategies to support successful interactions between the parents and the WIRE programs.

Provide parent resources and referral information, including student progress.

Qualifications:

- Master’s degree preferred with emphasis in education, social work, and/or psychology.
- Two or more years’ experience in mentoring and youth development, working within community organizations and/or schools preferred.
- Have expert knowledge of mentoring program policies and procedures.
- Extremely strong organizational, writing, verbal, and interpersonal skills
- Creativity and flexibility are essential in assuming significant responsibility.
- Experience working in racially, ethnically, and socioeconomically diverse urban communities preferred.
- Teaching experience preferred.

Instructor Job Description (WIRE Math and Science Programs)

The instructor serves as the lead for the 3rd-8th grade students for the WIRE Math and Science Programs and/or Saturday Academy. They oversee the implementation and/or development of the program curriculum. The instructor ensures the program quality and performance related to student outcomes, curriculum development, and other everyday operations.

The instructor reports directly to the program coordinator and is responsible for carrying out the responsibilities of the position as defined below:

Duties:

- Plan, prepare, and deliver lessons to all students in the class that incorporate Michigan State Education standards.
- Teach according to the education needs, abilities, and achievements of the students.
- Provide or contribute to the oral and/or written assessments, reports, and references relating to students.
- Communicate, consult, and cooperate with other members of staff, including those having posts of special responsibility and parents/guardians, to endure the best interest of the students.
- Provide the necessary information and advice to the designated program personnel and provide all the information regarding material requests and arrangements in connection with the teaching lessons.
- Help students develop and increase higher-order thinking skills.
Duties:

- Motivate students to increase their academic skills.
- Ensure the safety of each student, including holding students accountable to rules and expectations.
- Provide the Program Manager and/or Program Coordinator with the necessary feedback/updates/input regarding programming, student progress, and other concerns.
- Share in any possible and reasonable way in the effective management, organization, order, and discipline of students, including during and outside of instruction time and during field trips.
- Assist WIRE program staff as directed (if needed)
- Complete other duties and activities as assigned.

Qualifications

- Bachelor’s degree minimum, preferably a currently enrolled WMU graduate student in a STEM-related field.
- Experience in teaching and/or classroom management strategies preferred.
- Experience working in racially, ethnically, and socioeconomically diverse urban communities.
- Creativity, initiative, and the ability to multitask and work effectively in a team.
- Strong organizational, writing, verbal, problem-solving, and interpersonal skills.

Teaching Assistant Job Description (WIRE Math and Science Programs)

The teaching assistant is paired up with instructors for the 3rd-8th grade students for the WIRE Math and Summer camp and/or Saturday Academy. They assist in the implementation of the program curriculum. The TA ensures the program quality and performance related to student outcomes, curriculum development, and other everyday operations.

The TA reports directly to the program manager and/or coordinator and is responsible for carrying out the responsibilities of the position as defined below:

Duties:

- Work with lead instructor to develop lesson plan.
- Assist in classroom instruction.
- Teach according to the education needs, abilities, and achievements of the students.
- Provide or contribute to the oral and/or written assessments, reports and references relating to students.
- Communicate, consult, and cooperate with other members of staff, including those having posts of special responsibility and parents/guardians to endure the best interest of the students.
- Provide the necessary information and advice to the designated program personnel and provide all the information regarding material request and arrangement in connection with the teaching lessons.
- Help students develop and increase higher order thinking skills.
- Motivate students to increase their academic skills.
● Ensure the safety of each student, including holding students accountable to rules and expectations.
● Provide the Program Manager and/or Program Coordinator with the necessary feedback/updates/input regarding programming, student progress, and other concerns.
● Share in any possible and reasonable way in the effective management, organization, order, and discipline of students, including during and outside of instruction time as well during field trips.
● Assist WIRE program staff as directed (if needed)
● Complete other duties and activities as assigned.

Qualifications

● Working towards a bachelor’s degree minimum, preferably a currently enrolled WMU undergraduate graduate student in a STEM-related field.
● Experience in teaching and/or classroom management strategies preferred.
● Experience working in racially, ethnically, and socioeconomically diverse urban communities.
● Creativity, initiative, and the ability to multitask and work effectively in a team.
● Strong organizational, writing, verbal, problem-solving, and interpersonal skills.

Youth Justice Fellows Coordinator Description

The Youth Justice Fellows Coordinator oversees the justice fellows’ program. They oversee the implementation and/or development of the year-long program curriculum. The coordinator ensures the program quality and performance related to student outcomes, curriculum development, and other everyday operations related to social justice initiatives.

The Program Coordinator reports directly to the Director of the Lewis Walker Institute and/or designee and is responsible for carrying out the responsibilities of the position as defined below:

Responsibilities:

Program Coordination

● Plan, prepare, and deliver topics/lessons to all students in the program that relates to social justice initiatives.
● Design and coordinate the monthly meetings during the academic year.
● Work with the Institute’s administrative assistant to coordinate materials for the program.
● Plan and facilitate the field trips for the youth justice fellows’ program.
● Maintain relationships with community partners.

Program Management

● Create and oversee the implementation of an ongoing recruitment plan, including the development of annual recruitment and quarterly activity plans, development and distribution of program marketing materials, presentations to targeted participants, and ensuring a presence at key community events, etc.
Perform and oversee participant sign up and required documentation.
Develop and manage relationships with schools and/or other community-based organizations to secure participants.
Oversee communication with parents and the administrative team to ensure quality development.
Manage the planning and implementation of events (e.g., field trips, data collection, and end-of-program events)
Maintain and update the program's policy and procedure manual as needed.
Oversee program evaluation activities.
Training of staff and volunteers within the WIRE program
Assist other program coordinators as needed.
Complete other duties and activities as needed.

Qualifications:
Currently enrolled as a WMU graduate student, with an emphasis in social work, psychology, criminal justice, social justice, volunteer management, and/or education. Master's degree preferred.
Two or more years' experience in mentoring and youth development, working within community organizations and/or schools preferred.
Have expert knowledge of mentoring program policies and procedures.
Extremely strong organizational, writing, verbal, and interpersonal skills
Creativity and flexibility are essential in assuming significant responsibility.
Experience working in racially, ethnically, and socioeconomically diverse urban communities preferred.
Creativity, initiative, and the ability to multitask and work effectively in a team.
Strong organizational, writing, verbal, problem-solving, and interpersonal skills.
Teaching experience preferred.

Volunteer Description
The volunteer supports the WIRE program initiatives, assisting with the day-to-day. The main goal of the volunteer is to assist with preparing the WIRE activities. This involves the preparation of the materials such as office assistance work, setting up for events, and other duties deemed necessary for the success of the WIRE programs.

Attendance Policy
Staff is expected to attend all sessions held throughout the program.
Staff is expected to be at work on time every day.
Regular attendance and punctuality are important to the success of the WIRE Youth Programs.
In the event that staff member needs time off, they should notify their immediate supervisor as soon as possible.

Time Keeping
Staff will be required to clock in and out on the time clock in Sangren Hall for the WIRE STEM Programs
In the event that staff is unable to record time via the time clock, time will be submitted via time-sheet provided in the appendix.
Training

- All WIRE Programing staff will be required to attend an initial meeting before camp begins.
- Training before each yearly session will take place prior to the start of the camp.
- Training will consist of program agendas, basic guidelines, curriculum, safety issues (including mandatory reporting), and communication/relationship building skills.
- Staff and teachers should attend at least one meeting per week as a check in to make sure the program is running smoothly.
- It is the responsibility of the program manager and/or coordinator to plan, develop, and deliver all training sessions with assistance from other staff and volunteers.

Code of Conduct

The Program Manager and/or Program Coordinator must notify all Program Staff of the expectations within the Code of Conduct. Authorized Adults or Program staff should be positive role models for minors and act in a caring, honest, respectful, and responsible manner that is consistent with the mission of the University. Program staff must abide by all relevant WMU Policies and all applicable laws. Staff may be removed from the program for non-compliance with the policies.

Dos and Don’ts

Authorized Adults or Program staff covered by this policy may not do any of the following:

- Engage in any sexual activity, make sexual comments, tell sexual jokes, or share sexually explicit material with minors or assist in any way to provide access to such material to minors.
- Engage or allow minors to engage them in romantic or sexual conversations, or related matters, unless required in the role of resident advisors, counselors, or health care providers.
- Touch minors in a manner that a reasonable person could interpret as inappropriate. If touching is necessary, it should only be done in the open, in response to the minor's immediate physical needs, for a purpose that is consistent with the program's mission and culture, or for a clear educational, developmental, or health-related purpose (i.e., treatment of an injury). Respect and adhere to any resistance from the minor unless it is a life-threatening emergency;
- Use profanity, vulgarity, harassing language, or language that would violate the University Sexual Misconduct policy;
- Be alone with a minor. Program staff must follow requirements for One-on-One Interaction as set forth elsewhere in this policy.
- Meet with minors outside of established times for program activities. Any exceptions require written parental authorization and must include more than one program staff member.
- Invite individual minors to your home or other private location. Any exceptions require authorization by the Program Administrator and the Office of Precollege Programming and written authorization by a parent/guardian.
• Provide gifts to minors or their families independent of items provided by the program.

• Engage or communicate with minors through email, text messages, social networking websites, phone, internet chat rooms, multiplayer online games, or other forms of social media at any time except in the case of an emergency. Upon request, the Office of Precollege Programming may authorize such communication if there is an educational or programmatic purpose for the communication and the content of the communication is consistent with the mission of the program and the University.

• Engage in abusive conduct of any kind toward, or in the presence of, a minor, including but not limited to verbal abuse, striking, hitting, punching, poking, spanking, or restraining. If restraint is necessary to protect a minor or other minors from harm, all incidents must be documented and disclosed to the Office of Precollege Programming, the Program Administrator, and the minor's parent/guardian.

• Use, possess, or be under the influence of alcohol or illegal drugs while on duty or while in the presence of minors involved in a program.

• Provide alcohol or illegal drugs to a minor.

• Provide medication to a minor unless authorized by the program's medication management guidelines.

• Possess or use any type of weapon or explosive device unless authorized in advance by campus law enforcement.

• Engage in any other activity that could violate the University's Sexual and Gender-Based Misconduct Policy

Emergency Preparedness and Transportation of minors

• Each program must develop and document a plan or process for the notification of the minor's parent or legal guardian in case of an emergency, which may include medical or behavioral problems, natural disasters, or other significant program disruptions.

• Minors may not operate a WMU-owned and/or controlled motor vehicle while they are attending and participating in the program.

• Any staff who transports minors must have undergone and passed Michigan driver records check within the last twelve months.

• If covered programs must use private vehicles for transporting minors, the program must notify the Office of Pre-college Programming to determine any additional requirements.

• If staff are transporting minors, more than one adult or more than one minor must be present in the vehicle for the duration of the transportation.

General Reporting Obligations
All members of the University community should act immediately if they experience or witness possible criminal or questionable activity. In such instances, please take one of the following steps:

• Dial 9-1-1 to connect to the police if you require immediate emergency assistance or believe a crime is in progress.

• Call the Department of Public Safety at (269) 387-5555 for non-emergency situations.

• You may also contact WMU’s Office of Institutional Equity at (269) 387-6316 if you have witnessed or believe there has been sexual abuse or misconduct involving a minor.
Mandated reporters and their legal obligations

- All non-volunteer staff are Mandated Reporters. (MCL § 722.621, et seq.)
- Mandated reporters must immediately report known or suspected mental or physical abuse or neglect of a child directly to Michigan’s Department of Human Services by calling 855-444-3911 (24/7 toll-free number). You must submit a written report to the Department of Human Services within 72 hours of the initial verbal report.
- Reporters must also inform the Program Director or the Office of Precollege Programming. If reported to the Program Director, the Program Director must report to the Office of Pre-college programming. The Office of Pre-college Programming, in conjunction with the Office of the General Counsel, will evaluate whether further action is required.

Accountability

- If an allegation of inappropriate conduct has been made against any staff, the suspected individual shall immediately discontinue any further participation in any programs until such allegation has been resolved.
- Violations of this policy will subject the violator to appropriate progressive discipline, up to and including termination of employment (for faculty and staff) and dismissal from the University (for students).

Program Policies and Procedures

It is the policy of all program staff to adhere to the following policies and procedures when communicating and disseminating information regarding WIRE Youth Development Programs. Any inquiry regarding any WIRE Programming should be directed to the Program Managers and Coordinators.

Recruitment Policy

It is the policy of WIRE Youth Development Programs that there will be ongoing recruitment activities for students and teachers. As such, an Annual Recruitment Plan will be developed and will include recruitment goals, strategies to achieve those goals, an annual timeline, and budgetary implications. This plan will be kept current with any ongoing adjustments and should be developed at the beginning of the spring semester.

The program coordinator assumes lead responsibility for the recruitment of students and teachers. Other program staff, the executive director, and advisory board members will support the program coordinator in these activities as required.

Inquiry Policy

It is the policy of Wire Youth Development Programs that all inquiries regarding participation in the mentoring program are responded to within one business day.

Superb public relations and customer service must be provided to all potential program participants at all times, from first contact throughout program completion. All program staff handling calls from prospective mentors must be patient, courteous, and respectful in all interactions.

Confidentiality for all potential participants will be upheld from this initial point of contact forward.
Eligibility Policy
It is the policy of the Wire Youth Development Programs that each participant must meet the defined eligibility criteria. Staff should be knowledgeable of and understand all eligibility criteria required for participation in the program.

Extenuating circumstances may be reviewed at the discretion of the program coordinator and acceptance may then be allowed with the written approval of the executive director when all eligibility requirements are not clearly met. These instances are expected to be rare.

Student Eligibility Requirements:
- Be 8-14 years old: Entering 3rd-8th grade.
- Reside in the Kalamazoo County area.
- Demonstrate a desire to participate in the program and be willing to abide by all program policies and procedures.
- Be able to obtain parental/guardian permission and ongoing support for participation in the program.
- Agree to a 4-week commitment to the program

Transportation Policy
It is the policy of the WIRE Youth Development Programs that staff and volunteers may not transport participants in their own private vehicles. Students will be dropped off and picked up at the program by parents/guardians unless otherwise authorized via documented consent. Students may not be released to individuals that are not parents or guardians unless otherwise documented.

Students shall only be transported via authorized bus transportation on field trip days.

Record-Keeping Policy
It is the policy of the WIRE Youth Development Programs that each step of the camp processes be documented by creating a yearly folder on the ISRE shared drive. All forms for managing the program are included within the procedures section of this manual.

All records are to be kept confidential and are to be covered by the conditions outlined in the confidentiality policy. Archival records or those records of past applicants and participants will be maintained and kept confidential for a period of three years after the close of their participation in the program. After three years, the records will be discarded with approval from the executive director and destroyed only by approved individuals.

The program coordinator must keep stringent records of all program activities, utilizing approved forms. All files should be regularly maintained and updated within an electronic database and/or hard copy filing system.

The creation of new forms or the revision of existing forms must be documented and kept within the policy and procedure manual.

Confidentiality Policy
It is the policy of the WIRE Youth Development Programs to protect the confidentiality of its participants and their families. With the exception of the limitations listed below, program staff will only share information about teachers, participants, and their families with other camp professional staff. Further, all prospective teachers, participants, and parents/guardians should be informed of the scope and limitations of confidentiality by program staff.
In order for WIRE Math and Science Camp to provide a responsible and professional service to participants, it is necessary to ask mentors, mentees, parents/guardians, and other outside sources to divulge some personal information about the prospective participants and their families, including:

- Information gained from participants, written or otherwise, about themselves and/or their families, in application to and during program participation.
- Participants' names and images gained from participants themselves, program trips, and other events.
- Information gained about participants from outside sources including confidential references, school staff, employers as necessary.

Records are, therefore, considered the property of The Lewis Walker Institute for the Study of Race and Ethnic Relations not the institute workers, and are not available for review by teachers, participants, or parents/guardians.

Limits of Confidentiality

- Information from participant records may be shared with individuals or organizations as specified below under the following conditions:
- Information may be gathered about program participants and shared with other participants, individuals, or organizations only upon receipt of signed "release" forms from the program participant's parents/guardians.
- Identifying information (including names, photographs, videos, etc.) of program participants may be used in institute publications or promotional materials only upon written consent of the participant's parent/guardian.
- Information may only be provided to law enforcement officials or the courts pursuant to a valid and enforceable subpoena.
- Information may be provided to legal counsel in the event of litigation or potential litigation involving the institute. Such information is considered privileged information, and the law protects its confidentiality.
- Program staff and volunteers are mandatory reporters and as such, must disclose information indicating that a participant may be dangerous to or intends to harm him/herself or others.

Safekeeping of Confidential Records

The executive director is considered the custodian of confidential records. It is his/her responsibility to supervise the management of confidential information in order to ensure safekeeping, accuracy, accountability, and compliance with Board policies.

Requesting Confidential Information from Other Agencies

The agency shall respect a mentee's or volunteer's right to privacy. Requests for confidential information from other organizations or persons shall be accompanied by a signed release from the volunteer, participant, and/or parent/guardian.

Violations of Confidentiality

A known violation of the institute policy on confidentiality by a program participant may result in a written warning or disciplinary action such as termination from the program.

Mandatory Reporting Policy

It is the policy of the WIRE Youth Development Programs that all staff, volunteers, and other program representatives must report any suspected child abuse and/or neglect of institute clients or program participants immediately. All suspected reports must be made to appropriate
state and/or local authorities. Program staff must follow the mandatory reporting of child abuse and neglect procedure.

All employees, volunteers, and mentors of the program are required to attend a formal meeting as to what constitutes child abuse and neglect, what the state statutes are, and how to properly report such cases.

Any staff, volunteers, or mentors accused of child abuse or neglect will be investigated by the institute. Contact with program youth will be restricted or constrained, and/or the person in question will be suspended from employment or program participation per the decision of the executive director until such investigation is concluded.

Use of Alcohol, Drugs, Tobacco, and Firearms Policy
It's the policy of the WIRE Youth Development Programs to prohibit and discourage the use of drugs, alcohol, and firearms. Staff, volunteers, and participants are prohibited from using drugs or alcohol or possessing firearms while engaged in the program. Any suspected violations should be reported to the program coordinator.

Alcoholic Beverages:
No participant of the program will possess or consume beer, wine, or other alcoholic beverages while actively engaged or prior to actively engaging in the program or scheduled events, nor shall any participant endorse the use of alcohol.

Drugs:
No program participant will manufacture, possess, distribute, or use any illegal substance while engaged in the program or program events.

Tobacco:
The intent of WIRE Math and Science camp is to create a smoke- and tobacco-free environment. To that end, smoking and the use of all tobacco products is prohibited on the premises, and those involved with the program must refrain from the use of such products while engaged in program elements. The use of tobacco products includes but is not limited to cigarettes, cigars, pipes, chewing tobacco, snuff, or other matters or substances that contain tobacco.

Weapons, Firearms, and Other Dangerous Materials:
The possession or use of firearms, firecrackers, explosives, toxic or dangerous chemicals, or other lethal weapons, equipment, or material while participating in program activities is strictly prohibited.

Any policy violation will result in immediate suspension and/or termination of the relationship. In addition, violations of this policy may result in notification being given to legal authorities that may result in arrest or legal action and may be punishable by fine and/or imprisonment.

BEHAVIOR POLICY
It is the policy of the WIRE Youth Development Programs that unacceptable behaviors will not be tolerated on the part of staff, volunteers or participants while participating in the program. This policy is in addition to behavioral requirements stipulated in other policies or procedures within this manual. This policy in no way is intended to replace or take precedence over other policies or procedures, including, but not limited to, the following:
A number of behaviors are regarded as incompatible with program goals, values, and standards and therefore are considered unacceptable and prohibited while participants are engaged in mentoring activities:

- Unwelcome physical contact, such as inappropriate touching, patting, pinching, punching, and physical assault.
- Unwelcome physical, verbal, visual, or behavioral mannerisms or conduct that denigrates, shows hostility, or aversion toward any individual.
- Demeaning or exploitive behavior of either a sexual or nonsexual nature, including threats of such behavior.
- Display of demeaning, suggestive, or pornographic material
- Known sexual abuse or neglect of a child.
- Denigration, public or private, of any participant parent/guardian or family member
- Denigration, public or private, of political or religious institutions or their leaders
- Intentional violation of any local, state, or federal law

Any unacceptable behavior, as specified but not limited to the above, will result in a warning and/or disciplinary action, including suspension or termination from participation in the program.

EVALUATION POLICY
It is the policy of the WIRE Youth Development Programs that evaluation will be a key component in measuring the success of its program and for making continuous improvements in the effectiveness and delivery of mentoring services.

Evaluation data will be collected at the beginning and end of the program, including the following general measures: youth self-esteem, academic performance, peer and parent relationships, moods, alcohol and substance use, and sexual activity.

Program staff in connection with the executive director will be responsible for evaluation efforts.

Appendix
Minors on Campus Policy
https://wmich.edu/policies/minors

WMU Timesheet
Blank timesheet