National Center for Transportation System Productivity and Management

Summer Enrichment Program
at the University of Alabama at Birmingham

June 6 – July 1, 2016

Program Overview

The University of Alabama at Birmingham NCTSPM Summer Enrichment Program is a four-week educational development program designed to give additional training and professional exposure to college freshmen or incoming freshmen students enrolled in Alabama's historically black colleges who have an interest in careers related to engineering and transportation. The program is put on by UAB in partnership with Alabama's Historically Black Colleges and Universities (HBCUs) and the UAB Sustainable Smart Cities Research Center, and sponsored by the National Center for Transportation System Productivity and Management (NCTSPM). The program was modeled after a similar program led by the UAB Minority Health and Health Disparities Research Center (MHRC), a comprehensive educational, research, and community outreach center focused on eliminating the health disparities of racial and ethnic minorities. The purpose of the NCTSPM Summer Enrichment Program is to increase the number of well-trained minority researchers and engineers working on transportation-related issues.

This was the fourth year that UAB has offered the NCTSPM Summer Enrichment Program. Dr. Robert Peters, UAB Professor of Environmental Engineering, directed this year's program, which had seven student participants. Participants heard from experts in topics related to civil engineering and transportation, learned about engineering career options, took classes in scientific writing, worked on research projects under the leadership of a faculty mentor, and developed a comprehensive career roadmap to achieve their future goals. Classes and lectures were held in UAB's Hoehn Engineering Building (1075 13th St. S.), Ryals School of Public Health (1665 University Boulevard), Hill University Center (1400 University Boulevard), and Camp Hall (1500 10th Ave. S.). Funding provided through a grant from the NCTSPM paid for four weeks of room and board, curriculum and material costs, and a $250 weekly salary per student participant to offset time away from summer jobs.

Student Eligibility

1. Must be a college freshmen or incoming college freshmen with an interest in a career related to engineering and transportation.
2. Must be an African-American student enrolled in one of the following historically black institutions: University of Alabama at Birmingham, University of Alabama A&M, Alabama State University, Miles College, Oakwood University, Stillman College, or Tuskegee University.
3. Have at least a 3.00 grade point average on a 4.00 scale.
4. Complete the NCTSPM application.
5. Submit High School transcript and College transcript if applicable.
6. Submit two recommendation forms (one form must be from a faculty member).

7. Submit a 1-2 page essay describing personal career goals and expressed interest in a civil engineering and transportation related career.

Curriculum

Courses

- **Career Roadmaps**
  Helped prepare students on expectations as a college student. Students created individualized roadmaps of requirements to obtain a college degree in engineering and to find a job after college.

- **Cultural Competency**
  Covered health and engineering issues in the United States as well as in other countries. Students completed reports on transportation engineering issues facing a foreign country of their choice.

- **Scientific Writing**
  Discussed the process of writing in a scientific manner. Students learned and practiced how to write scientific school reports and abstracts.

Lectures

- **Environmental Engineering Laboratory Research** – Richard Hawkins, UAB Civil Engineering Laboratory Supervisor
- **Environmental Engineering** – Jason Kirby, UAB Professor of Civil Engineering
- **Library Resources** – Craig Beard, UAB Reference Librarian for Engineering
- **UAB Energy Conservation** – Matt Winslett, UAB Facilities Management Engineer
- **Urban Food Deserts** – Gail Wallace, John Hopkins University Research Fellow
- **Use of GIS for Identifying Food Deserts and Storm Drains** – Ashlyn Manzella, UAB Engineer
- **Food Nutrition** – Sharyn Gaston, Juice Plus Nutritionist
- **Engineering Ethics** – led by Richard Hawkins, UAB Civil Engineering Laboratory Supervisor
- **Stormwater Management and Storm Drains** – David Hagan, Director of UAB Environmental Management Program, and Direcus Cooper, Water Pollution Control Technician for the City of Birmingham

- **Transportation Engineering** – Andrew Sullivan, UAB Instructor of Civil Engineering
- **Structural Engineering** – Christopher Waldron, UAB Professor of Civil Engineering

Site Visits

- **UAB School of Public Health**
- **Aldridge Gardens in Hoover, Alabama** – led by Rip Weaver, Executive Director
- **UAB Women and Infants Center (WIC) / Neonatal Floor of Children's Hospital**

Laboratory Work

Under the direction of Dr. Robert Peters, students conducted investigative research on stormwater quality in Birmingham, Alabama. Students met with David Hagan, the director of UAB's Environmental Management Program, and Direcus Cooper, a technician for the City of Birmingham's Water Pollution Control, to learn about the importance and process of stormwater management. Students then took samples of stormwater from storm drains in Birmingham and tested the samples in UAB's environmental engineering laboratory for conductivity, turbidity, pH, dissolved oxygen, and other water quality levels. Using the results of their laboratory work, students analyzed the quality of stormwater in Birmingham, following which they brainstormed methods for improving the quality of Birmingham's stormwater and its management.

Final Presentations

Students created posters displaying their career roadmaps, which they presented at the Summer Enrichment Program Awards and Promotion Ceremony on the concluding day of the four-week program. The posters were exhibited on easels in a poster gallery, and ceremony guests could walk throughout the gallery and ask students about their future aspirations as well as their experience in the enrichment program. Students then gave 2- to 3-minute individual speeches on their career roadmaps and their summer enrichment program experience in front of the 50+ guests attending the ceremony. Through the process of making and presenting their career roadmaps posters, students further developed skills in information synthesis, personal engagement, and public speaking.

Student Feedback

Student Presentations

One of the student participants Marcus Hatcher said, "The program opened my perspective on how sustainability, engineering, and health science all work together." Because of what he was exposed to in the program, Hatcher said that he may enter the field of public health. Another student Brenden McNealy commented in his presentation that the enrichment program showed him how he

could apply lessons from the classroom to helping people on a real-world level. ArRion Hudson developed an interest in engineering through the program, and said that she got the most out of the classes in cultural competency, career roadmaps, and scientific writing. Participant Josh Thomas said, "It was interesting learning about how everything is connected. Knowledge is power." Raven Watts expressed her gratitude for the opportunity through the program to experience a taste of college before she begins classes as a freshman at Alabama A&M in the fall. Participant Reagan Williams enjoyed learning about various fields, socializing with the other student participants, and creating a network of fellow students that she said she looks forward to growing together with in success.

Survey Responses

Both midpoint (after two weeks) and final (at the conclusion of the program) feedback surveys were sent out online for the student participants to complete. Only four of the seven students participated in the surveys, but below is their commentary on the enrichment program:

Midpoint Survey (four participants)

1. How did you hear about the program?
    a. "Math Teacher"
    b. "Email from a family friend"
    c. "Counselor"
    d. "Counselor"

2. What are your academic interests?
    a. "Pharmacy"
    b. "Math and computer engineering"
    c. "Math and engineering"
    d. "Nursing"

3. Do you have any suggestions for marketing or recruiting students for the enrichment program?
    a. "School advertising"
    b. "I suggest that the program recruits a little early so more schools would know about it and so that more people who are interested in civil engineering will be involved."
    c. "I think it's just a problem of being more aggressive and putting yourself out there."
    d. "Sending letters to high schools around Alabama."

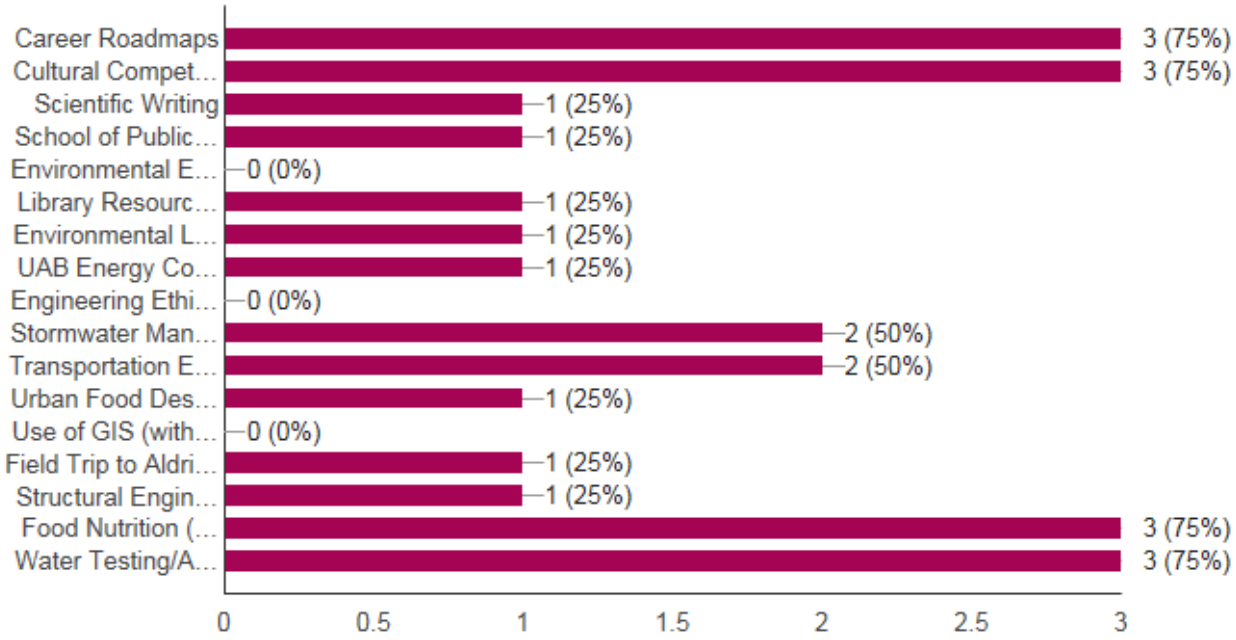
4. What have you enjoyed most so far about the program?
    a. "I have enjoyed being able to gain a greater aspect of health disparities."
    b. "I enjoyed the cultural competency class best."

c. "Learning about the different storm drain problems and water treatment methods."
d. "Cultural Competency and Lab Research."

5. What would you change about the program?
   a. "More hands-on experiences"
   b. "I would change how some of the students had to travel to UAB every day for class."
   c. "Not much. Maybe more lab time."
   d. "Just notifying people faster than usual."

6. Have you developed any new career goals or interests by participating in the enrichment program?
   a. "Public health is a new interest of mine now."
   b. "I have developed a career roadmap that has basically provided me with goals based on my major."
   c. "I'm interested in learning more about water pollution and energy conservation."
   d. "No."

7. Check the sections that, at this point, have been most meaningful to you.



8. What suggestions do you have so that we can make the last two weeks of the program even better than the first two?
   a. "None."
   b. "I would like to suggest that there be classes for engineering rather than nursing. However, the central class like career roadmaps and cultural competency are good to have."
   c. "Not sure."

d. "No."

9. Do you have any additional commentary on the program curriculum, specific speakers, or general logistics?
    a. "I enjoyed the experience in this program and it has been very remarkable."
    b. "I would like to suggest that there be classes for engineering rather than nursing. However, the central class like career roadmaps and cultural competency are good to have."
    c. "I really enjoyed all the speakers."
    d. "They were all great."

Final Survey (two participants)

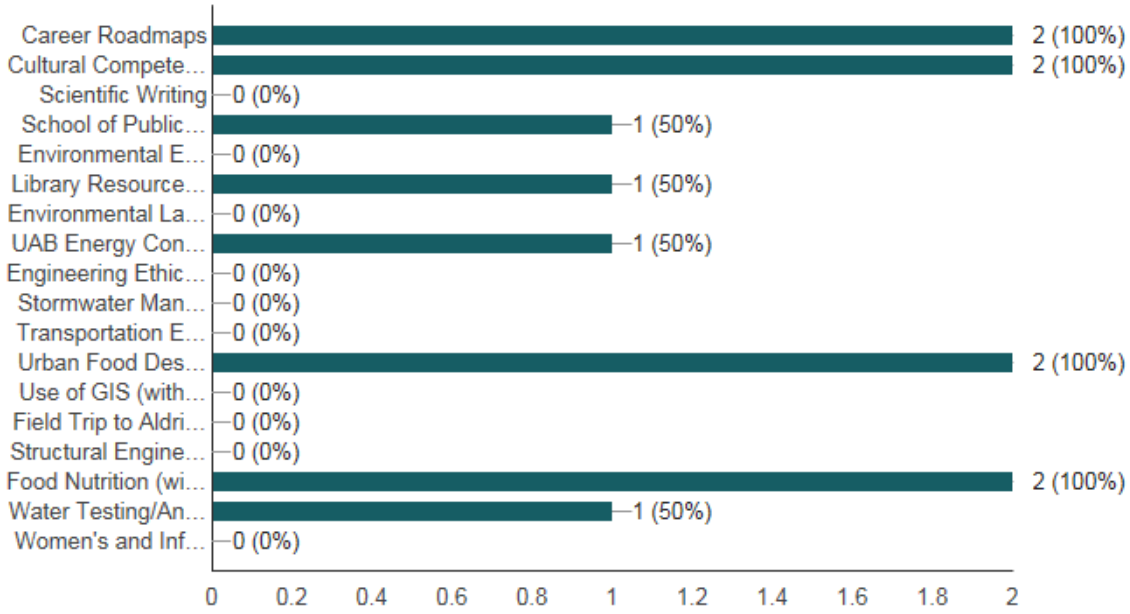
1. How did you hear about the program?
    a. "Counselor"
    b. "Counselor"

2. What insight of knowledge have you gained from participating in the program?
    a. "I have gained insight on what goes on in the environment, food deserts, and cultural competency."
    b. "I have ignited a profound interest in public health."

3. What did you enjoy about the program?
    a. "I enjoyed the cultural competency class very much."
    b. "I enjoyed the classes and the campus."

4. What would you change about the program?
    a. "I would change that everyone is able to stay on campus." – (*rising freshmen are currently not able to live on UAB's campus during the four weeks*)
    b. "Make a bigger room for scientific writing course."

5. Having now completed the program, check the sections that were most meaningful to you.



6. How do you think this program has benefited your academic and/or professional path?
    a. "Working with the MHRC program and career roadmap class benefited my profession and how to plan every detail."
    b. "The program has benefited my insight of my career path through the assignments to research more about career opportunities."

7. Do you have any additional commentary on your experience?
    a. "It was a great experience and I'm glad that I had this opportunity."

Student Snapshots

Students discuss Stormwater Management and Storm Drains with David Hagan

Students hear from Sharyn Gaston on Food Nutrition

Participants meet with Dr. Fouad, Chairman of the UAB Sustainable Smart Cities Research Center

Meeting with Rip Weaver, Executive Director of Aldridge Gardens

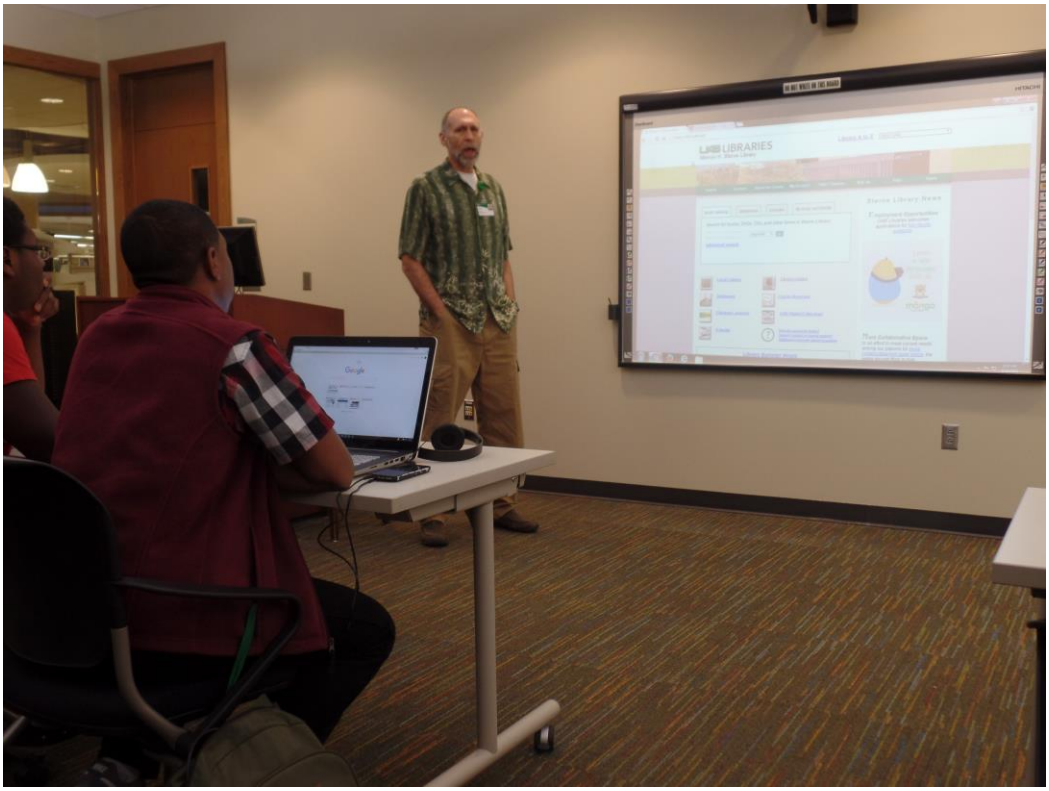
Hands-on learning at Aldridge Gardens

Hands-on learning about sustainable growth techniques at Aldridge Gardens

Lecture with Matt Winslett on Energy Conservation Practices at UAB

Lab work with Richard Hawkins

Conducting experimentation on Birmingham stormwater quality



Session on Library Resources with Craig Beard, UAB Reference Librarian for Engineering

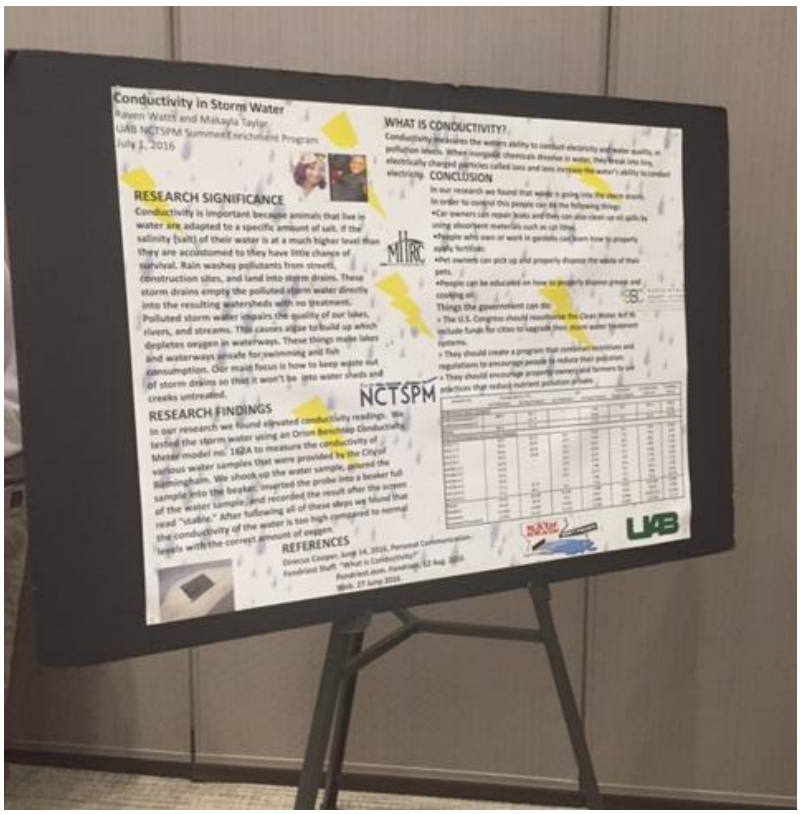
Lecture with Dr. Andrew Sullivan on Transportation Engineering

Group photo of five of the seven participants with Dr. Peters

Group photo of the seven student participants with Dr. Peters

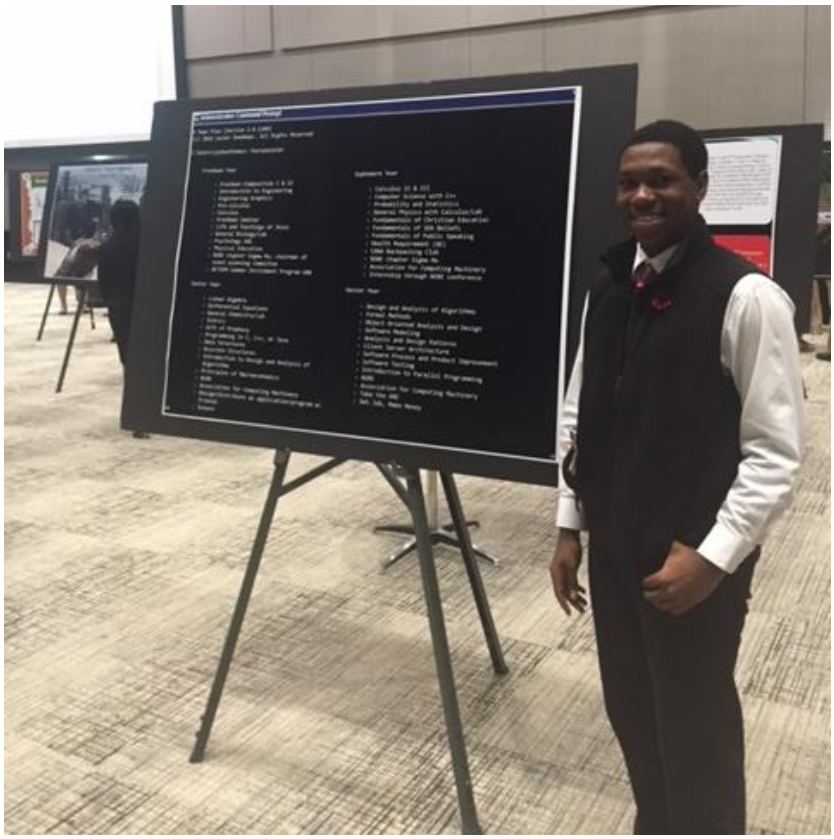
Awards and Promotion Ceremony on the final day of the program

A student presents her career roadmap poster to Dr. Fouad at the poster gallery

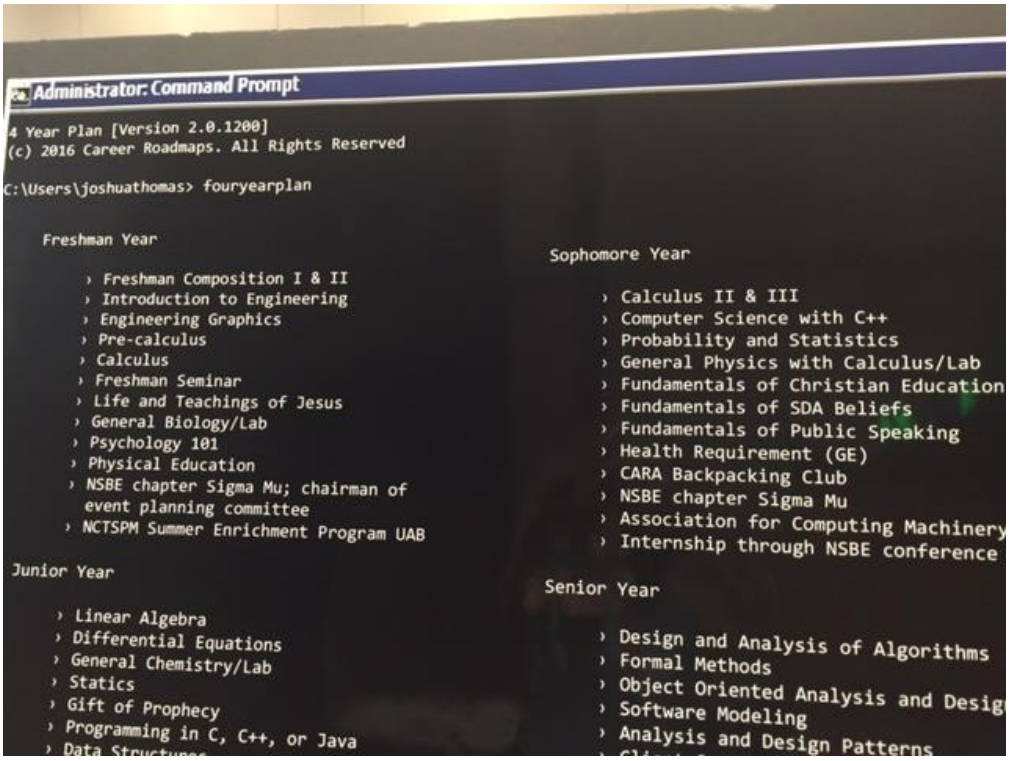


Raven Watts and Makayla Taylor's poster on Conductivity in Storm Water

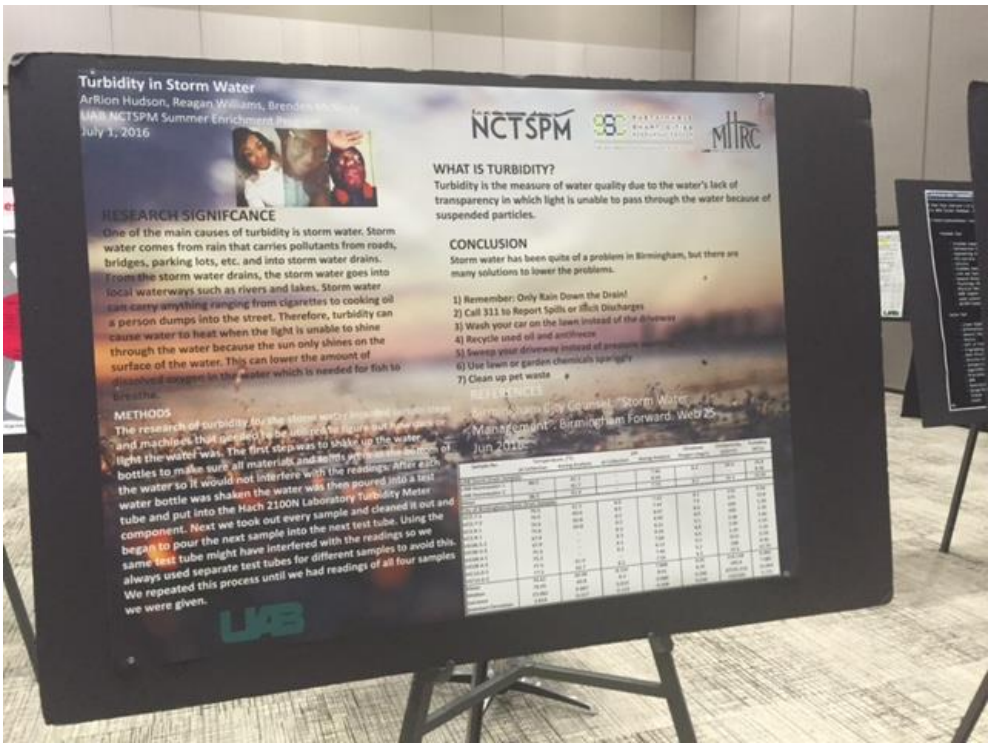
Marcus Hatcher's poster outlining his aspiring pharmacy career



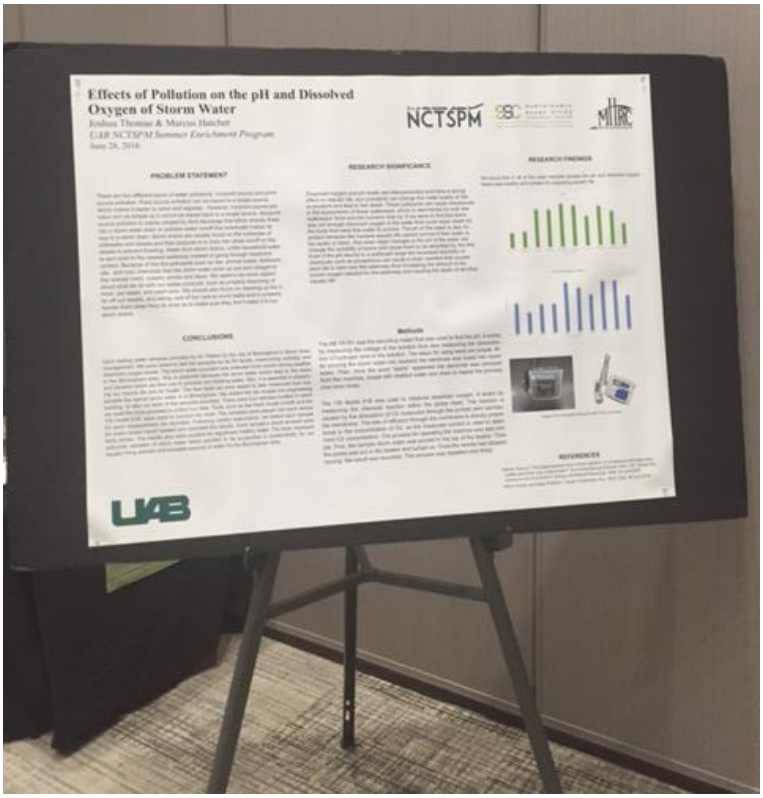
Marcus Hatcher's poster outlining his career roadmap for becoming a computer engineer



Detail of Marcus Hatcher's poster outlining his career roadmap for becoming a computer engineer



Student poster on the Turbidity of Storm Water



Student poster on the Effects of Pollution on the pH and Dissolved Oxygen of Storm Water

Participant with her career roadmaps poster

SEP Awards and Promotion Ceremony – UAB Hill Student Center

SEP Awards and Promotion Ceremony – UAB Hill Student Center

Group photo of Engineering School and MHRC participants at the Awards Ceremony

Recommendations for Improvement

Student participants this year represented the University of South Alabama, the University of Alabama at Birmingham, and Alabama Agricultural and Mechanical University, and they previously attended either Fairfield High School, Fairfield High Preparatory School, or Ramsey High School in Birmingham, or Midland Adventist Academy in Shawnee, Kansas. The students' academic interests included pharmacy, nursing, civil engineering, math, biology, optometry, software engineering, electrical engineering, and computer hardware engineering. Out of the seven participants, only three (43%) were interested in pursuing majors in engineering, and only one of those three (14%) was interested in pursuing civil engineering.

While this program greatly benefited each student through the areas of career road mapping, scientific writing, and cultural competency, as well as by introducing them to topics in civil engineering, the program would be much more applicable and successful if all of the student participants were interested in civil engineering. At the very least, participants should express clear interest in engineering, if not specifically civil engineering. With the exception of the one student who was interested in pursuing civil engineering, all of the student participants expressed that the majority of the classes and lectures – while interesting – did not apply to their career ambitions and interests.

After some investigation into the historically black colleges and universities we are recruiting students from (Alabama A&M, Alabama State, Miles, Oakwood, Stillman, and Tuskegee), it was found that only 2 of the 6 schools (Alabama A&M and Tuskegee) offer engineering classes and majors. This is the root of our problem – students from the majority of these colleges and universities cannot major in engineering. Thus, it is no wonder why we continue to receive participants in our engineering enrichment program who are not interested in engineering or who are not majoring in engineering. We have two possible routes that we could take moving forward: either we expand the colleges and universities we are recruiting from to be outside of the realm of HBCUs in Alabama, or we continue to recruit non-engineering students.

If we choose the latter option, we will continue to have problems with recruiting engineering students and we will not meet the goal of the program, which is to encourage more African-American students to enter the field of transportation engineering. If we do choose this option, however, we should also recruit students from Talladega College, which is another historically black college in Alabama which offers courses and majors in natural sciences and math, similarly to Alabama State, Miles, Oakwood, and Stillman, which all offer programs in biology, math, chemistry, and/or computer sciences.

If we choose the former option, we can ensure that all of our participants are interested in civil and/or transportation engineering and planning on pursuing careers in the field. Our program will thus directly benefit its participants and meet its ultimate goal of supporting and increasing the number of African-Americans in the field of transportation engineering. Since we already recruit students from UAB, which is not a historically black university, it should not be an issue expanding our reach to other non-

HBCU schools. If the goal is to further the education of black engineering students, then our priority should be engaging black engineering students in our program. By expanding the schools we are recruiting from and implementing earlier recruitment targeted toward African-American students expressly interested in civil engineering, we could make the summer enrichment program more successful both in terms of benefiting the student participants as well as working toward the program's central goal of bringing more minority engineers to the field of civil engineering.

An additional recommendation is to stay in close contact with past participants in the program, beyond the initial year of mentoring provided to students after the summer that they participate. By keeping in communication with these past participants, we could more closely track the long-term success of the program (i.e. bringing more minority students into the academic and professional field of civil engineering) and we could also invite successful alumni of the program to come back and speak to new participants, creating mentoring and role modeling within the program itself.

A further suggestion for improving the program (which will be increasingly important with a greater number of civil engineering student participants) is to focus more heavily on civil engineering rather than public health. While students did enjoy being exposed to public health issues, many commented that the focus should be civil engineering rather than health. The engineering summer enrichment program, while modeled after the MHRC's health summer enrichment program, should not rely too heavily on the activities and courses of the MHRC. While it is important to continue involvement in the MHRC's career roadmaps, scientific writing, and cultural competency courses (which were among the students' favorites), the remaining courses, lectures, and activities in the engineering program should be related to engineering.

Another recommendation for the program, which was made by several of the participants, is to raise enough funding for all of the student participants (both rising freshmen and rising sophomores) to be able to stay on UAB's campus for the duration of the program. With all of them living on campus and with additional bonding activities, students would have grown closer and gained more out of the program and their peers. Something that would make this recommendation more feasible would be to have a counselor (possibly an older undergraduate or graduate student who needs housing while taking UAB summer classes) live in the dorms for the duration of the four-week enrichment program in order to monitor the student participants and be the official liaison between the enrichment program and UAB housing and maintenance. Since many of the student participants are living away from home for the first time, they need adult supervision and support.

A final recommendation which would round out the program and make it much more successful is to engage UAB's American Society of Civil Engineers student chapter as well as UAB's Honors College in a buddy system within the enrichment program. Upperclassmen engineering students from both ASCE and the Honors College could serve as mentors to the enrichment program participants by offering them advice on how to succeed in college. Additionally, these upperclassmen "buddies" could show participants around Birmingham in the afternoons and on weekends and take them to sights such as Railroad Park, the Birmingham Civil Rights Institute, and the Birmingham Museum of Art. This would add a fun element to

the program and offer the buddies casual environments in which to create relationships with the program participants and allow for conversations about college, engineering, and study tips and tricks to arise naturally. If funding permits, these college buddies could be paid for their involvement, or their time could count toward community service requirements in their respective organizations.