



National University Rail Center - NURail
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Grow Our Own Minority STEM Initiative: Partnering in Outreach

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TECHNICAL SUMMARY

Title

Grow Our Own Minority STEM Initiative: Partnering in Outreach

Introduction

The railroad programs at the University of Illinois at Urbana-Champaign (UIUC) and Michigan Technological University (MTU) are supporting efforts led by Hanson Professional Services to expose underrepresented groups to railway engineering and "grow our own" next generation of civil engineering leaders. To support higher-speed passenger rail operations between Chicago and St. Louis, a long-term effort to consolidate multiple rail corridors through Springfield, Illinois is underway. The approved alternative passes within blocks of a high school and impacts minority populations in the surrounding community. Through a unique partnership, local community leaders saw the proposed rail corridor as an opportunity to introduce local youth and minority populations to possible careers in related railway transportation, civil engineering and construction fields. The aim of the project is to help students from underrepresented groups connect the highly-visible construction, operations, and maintenance activities in their community surrounding the new rail corridor to science, technology, engineering, and mathematics (STEM) topics. With a tangible connection to real-world applications of these subjects, it is hoped that more of these students will pursue careers in engineering, railroads or construction industry, growing the next generation of industry professionals.

The "Grow Our Own" Minority STEM Initiative is led by Hanson Professional Services, a civil engineering consulting firm headquartered in Springfield. Hanson is joined by the City of Springfield, Sangamon County, and the Illinois Department of Transportation in administering the initiative. Each group has pledged financial support to multiple programs including outreach to minorities through the NURail Center.

Description of Activities

NURail is involved with the "Grow Our Own" Minority STEM Initiative through two main activities: Engineering Open House at UIUC and the Summer Youth Program in Rail and Intermodal Transportation at MTU.

UIUC Engineering Open House Campus Visit

NURail and Hanson have partnered to host approximately 30 minority students from Springfield high schools and middle schools attending the annual Engineering Open House (EOH) on the UIUC campus. With bus transportation provided by Hanson, NURail graduate student Research Assistants served as tour guides to escort the Springfield students around the engineering campus. Visiting

students participated in hands-on activities demonstrating applications of STEM topics to various engineering fields. Among the hundreds of displays was the award-winning "Railway Extravaganza!" exhibit, consisting of a locomotive simulator and other interactive railway engineering activities, organized by the UIUC American Railway Engineering and Maintenance-of-Way Association (AREMA) Student Chapter and NURail-supported students. While this AREMA exhibit provided a direct link to the railway project in Springfield, other exhibits on robotics, unmanned aerial vehicles, polymers and biotechnology were also popular with the visiting students.

MTU Summer Youth Program

Thanks to travel support from Hanson and scholarships from NURail, on an annual basis, two minority students from Springfield were able to experience a more intensive introduction to transportation and engineering concepts at the Summer Youth Program (SYP) in Rail and Intermodal Transportation hosted by Michigan Technological University. Over five days, students learned about transportation infrastructure and operations through hands on activities and industry field trips. This popular MTU program also allowed students to meet peers with similar interests but from differing backgrounds all across the United States.

Outcomes

UIUC hosted the first EOH campus visit in March 2014 with 30 students. The event was a great success and in addition to broader engineering concepts, the students were educated in the rail domain, many having no prior experience with railway transportation.



Visiting students, chaperones and RailTEC hosts at the 2014 EOH

This 2014 event was followed by equally successful visits with a similar number of students in 2015 and 2016.



Visiting students, chaperones and RailTEC hosts at the 2015 EOH



Visiting students, chaperones and RailTEC hosts at the 2015 EOH

In 2014, two minority students from Springfield, Illinois travelled to MTU for the Summer Youth Program. Feedback on the event from the attendees was positive and one student even commented, "From what I have learned in the program, I am now interested in a future career with the industry." Additional minority students from Springfield attended the program in 2015 and 2016.

The "Grow Our Own" Minority STEM Initiative in partnership with Hanson will continue in 2017 under the second NURail grant. Planning is underway for the 2017 EOH and SYP activities.

Conclusions/Recommendations

Several important lessons were learned through planning the "Grow Our Own" Minority STEM Initiative activities. The first was the importance of community engagement in identifying high-achieving students with an interest in STEM subjects for participation in the program. It is difficult for the program to reach out to teachers of STEM subjects at every school in the area. Fortunately, students can express an interest in these subjects through many different avenues that may be observed by various members of the community with an interest in promoting the academic development of youth. In addition to teachers at schools in the area, the program engaged the following entities in identifying students for the program:

- Springfield School Board
- Local school principals
- Springfield Black Chamber of Commerce
- Urban League
- Boys & Girls Clubs
- Frontiers International
- Minority Fraternities & Sororities
- Ministerial Alliance
- United Way
- Lincoln Land Community College

A second lesson learned is the importance of engaging parents. Since the activities involve travel outside the local community and take place outside normal school hours, parents naturally have questions about various details of the visits and the nature of the programs. Providing as much information early in the process is key to allaying parental concerns.

A final and related lesson learned is the importance of providing transportation and arranging for food. Not only is "long haul" transportation to the distant event important but so is local transportation from home to the pick-up and drop-off point. Students are drawn from various parts of the community and due to work or other commitments, parents or guardians may not be available to transport the students to and from pick-up location. Provisions for carpools or ridesharing, or selecting a rally location with frequent transit service can help overcome this obstacle. Day-long activities also require provisions for meals. The events run much more smoothly if lunch is provided. This keeps the group together and avoids any issues with students who may not have the finances to provide their own meals.

Publications/Examples

The following articles describing the program are attached to this report:

- "Homegrown Engineers" by Roberta Codemo, originally published in *Springfield Business Journal*, December 18, 2015.
- "Putting Young Minority Achievers on an Engineering Track" by George Lorenzo, *Engineering Inc.*, May/Jun 2015.
- NURail UTC Research Brief

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Homegrown Engineers

By Roberta Codemo



Springfield Southeast High School junior Maurice Johnson wanted to be a pharmacist, until he met Kevin Seals, chief environmental scientist at Hanson Professional Services, Inc. and the coordinator for the Grow Our Own Minority Participation program.

“Three years ago I had no idea what engineering was,” Johnson said, until he attended an open house for middle and high school students at the University of Illinois Urbana-Champaign Rail Transportation and Engineering Center. “It was super cool.”

Johnson was running up and down the campus and looking at everything, so Seals pulled him aside afterwards. “I want this so bad,” said the young man, who also attended the week-long summer program for rail and intermodal transportation at Michigan Technological University.

He can't wait until he's old enough to do a summer internship with Hanson and plans to attend the University of Illinois Urbana-Champaign, where he is leaning towards majoring in civil engineering.

Johnson wants to work at Hanson following college. "It's one of the few companies that I know," he said. "Plus it's close to home."

This is the spark of enthusiasm in engineering and science that the Grow Your Own program aims to foster in local minority students. "It's been exciting watching it grow," said Seals, who has seen a lot of interest from the community since the program's rollout in 2014.

The two-year, \$60,000 program was recently renewed and is collectively funded by the city, county and Hanson. It was designed to tie in with the Springfield Rail Improvement Project and multimodal facility. There has been a lot of public interest in increasing minority participation in the project.

"We didn't know where to start," said Seals, who said the program targets high-achieving minority students from middle school through college with interest in science, technology, engineering and mathematics (STEM) to determine if this is the career path they want to take. He wants to expand the program to include a broader base of students in the future.

Students are recruited from local schools, minority-based organizations and individual referrals. The largest pool of students comes from local high schools, accounting for between 12-15 program participants. Students must secure a reference from someone familiar with their interests and submit a completed referral form to Hanson.

Hanson administers the program and works with minority-based community groups, businesses, colleges and universities, the Illinois Department of Transportation and others to connect students with organizations that offer STEM-related programs and activities. It offers mentoring, educational opportunities, job training and possible internships through its community partners to encourage students to pursue careers in engineering and related fields.

"There's not a lot of minority interest in STEM fields," said Seals. The program has 25 to 30 applicants each year, with a 70-30 breakdown between males and females. "The challenge is to identify students." Three high school students have participated in the Michigan Technological University summer camp.

Part of the reason, he thinks, relates to societal issues. "Students feel like there is a barrier and give up," said Seals. "They don't achieve their full potential." It disappoints him when he sees someone with a gleam in their eye but too afraid to venture down the road.

"I don't want to lose them because they don't think they can do it," said Seals, who encourages students to ask questions and to not take no for an answer. "We can open the door for you. Don't be afraid to knock."

The company selects three minority students each year for full-time paid internships, which helps students gain professional experience with the potential of future employment with the company. “We want to grow students locally and provide them with opportunities so they know they can come back home and that there are jobs available,” said Seals.

To date, 10 students – six the first year and four last year – have applied for internships. The City of Springfield and IDOT have also hired summer interns from the program. Seals foresees a time, however, when there will be more positions than there are applicants.

Alex Diop, who is active in the Junior Frontier’s program, plans to graduate from Southern Illinois University Edwardsville with a degree in electrical engineering in 2018. He strongly encourages anyone with an interest in technology and engineering to learn more about Hanson. “I love Hanson,” he said.

His advisor heard Hanson was accepting applications and referred him to Seals. He’s currently doing an internship and works under Robert Stidham, who is the IT manager at Hanson. Diop enjoys the work that he does.

“I’ve always had an interest,” said Diop, who liked taking devices apart and putting them back together when he was younger. His counselors suggested he pursue mechanical engineering but he’s always been more interested in electrical engineering.

His internship helped him his first year of college. “Everything made sense,” said Diop, who was able to correlate his work experience with his classes. It made him a better student.

The program’s success has inspired others. Seals has been engaged in conversations with CEOs at other local engineering firms who have expressed an interest in the program, which has received national attention. “We wanted to get some experience under our belt before we invited others,” he said. Future plans include expanding the program to local and regional engineering programs over the next year and expanding the program into fields such as banking, finance, healthcare and retail.

The program has blossomed. Hanson recently opened a project resource center for the rail project at the City of Springfield’s Office of Community Relations, 1450 Groth St., for post-high school minority adults. Individuals can learn about job opportunities and job training programs.

The program also works with minority contractors and helps them navigate the process of applying to pre-qualify as “Disadvantaged Business Enterprises” with IDOT so they can bid on construction contracts for the rail consolidation project.

“Everyone feels this is a great opportunity,” said Seals. “It’s a win-win for Hanson, the city, the county and residents.”

Roberta Codemo is a full-time freelance writer. She can be reached at rcodemo@hotmail.com.

PUTTING YOUNG MINORITY ACHIEVERS ON AN ENGINEERING TRACK

By George Lorenzo

Sergio “Satch” Pecori began his career at Hanson Professional Services when he was a high school student employed as a gofer at the firm’s headquarters in his hometown of Springfield, Illinois. At the time, “I had no idea what an engineer was,” he says.

Today, more than 40 years later, Pecori is president of Hanson, and he’s making a point of helping other young people discover engineering. His firm, which employs about 400 people in offices nationwide, coordinates a program called “Grow Our Own” that introduces young minority students to education and career opportunities in the science, technology, engineering and mathematics (STEM) arena. >>





Grow Our Own participants attend the Engineering Open House at the University of Illinois at Urbana-Champaign.





From left: Hanson summer interns Harrison Williams, Alexander Diop and Nicholas Moore.

Grow Our Own is the result of an agreement between Hanson, the City of Springfield and Sangamon County, Illinois. Each committed \$20,000 annually for an initial two-year plan with the possibility of renewal upon completion.

Since officially launching in December 2013, Grow Our Own has been a huge success. Through a variety of outreach and education programs, the initiative has exposed more than 50 promising young students (with more on the horizon) to engineering education and careers.

Generation Next

"We got involved because we thought it was the right thing to do," Pecori says. "We were looking at how we could engage these younger people with the possibility of hiring them in the future. We were looking at making our company more diverse. We are more diverse in our other offices (22 across the country) than in our office headquarters."

To generate interest, Pecori enlisted his alma mater, the University of Illinois at Urbana-Champaign, and RailTEC, its award-winning railroad engineer-

ing program. RailTEC Executive Director Christopher Barkan says, "The average person does not always appreciate the role of engineering in their lives. These neighborhoods in Springfield are suddenly confronted with a big construction project. Engineering is a tremendous career opportunity, and few students understand that these are careers that would allow them to work on designing, planning and constructing projects such as this—literally in their back yards."

RailTEC conducts research and develops advancements in rail transportation, which is undergoing a technical revolution in the United States. The nation's railways have begun to

implement new and exciting technologies as well as draw upon cutting-edge developments from other engineering fields that are vital to the constantly changing demands of today's rail transportation.

"We would like to see this expand with more people getting involved from more communities," says Tyler Dick, RailTEC's director of education. "I think it would be great for building awareness in these different science, technology and engineering careers and activities within the state of Illinois and across the country. We are excited to grow this partnership."

Reaching Out

To help achieve the goals of the program, Grow Our Own operates a website to inform and interact with the public. It also hosts annual workshops in Springfield, where local stakeholders have the opportunity to nominate students for the program. School principals, guidance counselors, teachers and representatives from minority organizations refer high-aptitude minority students enrolled in STEM courses who could benefit from involvement in the program.

Participants in the workshops identify a wide range of factors crucial to the program's success.

They discuss ways to involve parents so that students remain committed, and they receive assurances that program members will be supported with transportation assistance to attend educational events and that any administration fees for Grow Our Own activities will be covered.



"We were looking at how we could engage these younger people with the possibility of hiring them in the future. We were looking at making our company more diverse."

SERGIO "SATCH" PECORI
HANSON PROFESSIONAL
SERVICES

Kevin Seals, chief environmental scientist at Hanson and coordinator of Grow Our Own, says students selected for the program are high-achieving minority students who have an interest in STEM.

Success Factors

Hanson has sponsored 47 students from Springfield high schools and middle schools, who attended the University of Illinois at Urbana-Champaign's annual Engineering Open House in 2014 and again in 2015.

"There was a lot of enthusiasm," says Dick, who helped coordinate the open house. "There are hundreds of displays. Every single engineering and science department has displays set up, and it is largely student-driven. Upper-level undergraduates and graduate students put together these displays with the support of faculty and staff."

Hanson also hired one college-aged student and two high school seniors for a 2014 summer internship program at its Springfield office with plans to do the



Students participate in a concrete testing exhibit at the Engineering Open House.



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“Grow Our Own” Minority STEM Initiative: Partnering in Outreach

C. Tyler Dick P.E. & Dr. Christopher P.L. Barkan, University of Illinois at Urbana-Champaign

The railroad programs at the University of Illinois at Urbana-Champaign (UIUC) and Michigan Technological University (MTU) are supporting efforts led by Hanson Professional Services to expose underrepresented groups to railway engineering and “grow our own” next generation of civil engineering leaders.

From Community Impact Comes Opportunity

To support higher-speed passenger rail operations between Chicago and St. Louis, a long-term effort to consolidate multiple rail corridors through Springfield, Illinois is underway. Future construction of a rail link along 10th Street will allow for a single grade-separated rail corridor to replace multiple routes through the central business district, eliminating multiple roadway grade crossings. However, the approved alternative passes within blocks of a high school and impacts minority populations in the surrounding community.

Through a unique partnership, local community leaders saw the proposed rail corridor as an opportunity to

introduce local youth and minority populations to possible careers in related railway transportation, civil engineering and construction fields. The aim of the project is to help students from underrepresented groups connect the highly-visible construction, operations and maintenance activities in their community surrounding the new rail corridor to science, technology, engineering and mathematics (STEM) topics. With a tangible connection to real-world applications of these subjects, it is hoped that more of these students will pursue careers in engineering, railroads or construction industry, growing the next generation of industry professionals.

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Program coordinators at Hanson work with nearby schools and local organizations such as the Urban League, Springfield Black Chamber of Commerce, Boys & Girls Clubs, Frontiers International and Ministerial Alliance to identify minority students in the Springfield community with an interest in STEM topics. Students are then matched with appropriate programs to foster their interest.

UIUC Engineering Open House

In March 2014, NURail and Hanson partnered to host 30 minority students from Springfield high schools and middle schools attending the Annual Engineering Open House on the UIUC campus. With bus transportation provided by Hanson, NURail graduate student Research Assistants served as tour guides to escort the Springfield students around the engineering campus. The visiting students were able to participate in hands-on activities demonstrating applications of STEM topics to various engineering fields. Among the hundreds of displays was the award-winning “Railway Extravaganza!” exhibit, consisting of a locomotive simulator and other interactive railway engineering activities, organized by the UIUC American Railway Engineering and Maintenance-of-Way Association (AREMA) Student Chapter and NURail-supported students.

While the AREMA exhibit provided a direct link to the railway project in Springfield, other exhibits on robotics, unmanned aerial vehicles, polymers and biotechnology were also popular with the Springfield students.

After the first visit proved successful, another group of 25 students from Springfield was hosted in 2015 with plans to make it an annual activity.



MTU Summer Youth Program

Thanks to travel support from Hanson and scholarships from NURail, two minority students from Springfield were able to experience a more intensive introduction to transportation and engineering concepts at the 2014 Summer Youth Program (SYP) in Rail and Intermodal Transportation hosted by Michigan Technological University. Over five days, students learn about transportation infrastructure and operations through hands-on activities and industry field trips. The popular MTU program also allows students to meet peers with similar interests but from differing backgrounds all across the United States.

Hanson and NURail plan to sponsor participation of more Springfield minority students in 2015 and at future editions of the MTU summer program.

The authors acknowledge Satch Pecori and Kevin Seals at Hanson Professional Services for their support of NURail involvement in the “Grow Our Own” initiative, and Pasi Lautala and David Nelson at MTU for coordinating minority student participation in the SYP.

