NAF Future Ready Scholars
at the University of Wisconsin-Milwaukee
2022 Program Report

NAF Future Ready Scholars at the University of Wisconsin-Milwaukee 2022 - Program Report

Background

In 2022, UW-Milwaukee's School of Architecture & Urban Planning (SARUP) and College of Engineering & Applied Science (CEAS), in partnership with the Milwaukee Public Schools (MPS), Milwaukee Area Technical College (MATC), All Hands Boatworks, and Journey House organized a first of its kind NAF Future Ready Scholar program centered on a hands-on design-build project in architecture and engineering.

The NAF Future Ready Scholars programs engage high school students in STEM and college & career readiness activities on university campuses. The NAF Future Ready Scholars at UWM is the newest and the first to employ a design-build approach with a community client, resulting in shade pavilions and renewable power for a community garden site.

This program furthers the goals of M^3, a partnership between the Milwaukee Public Schools, MATC and UWM to foster collaboration and coordination to transform the future of Milwaukee through education.

Support from NAF, the MPS Foundation, MPS and UWM made the program possible.

Scholar Recruitment

The NAF Future Ready Scholars at UWM program sought to enroll 10th and 11th grade students, with priority for MPS students at schools with NAF Academies and MPS students involved with the partner agencies. The program was promoted by teachers in NAF schools, at the MPS job fair held at UWM and in MPS parent and staff communications with broad reach. Flyers were posted in schools.

Applicants completed an online form and attended a virtual information session. Program leaders reviewed applications and identified qualified students to invite to the program. These students and their families received UWM forms to complete and attended a mandatory orientation session.

Summer Program Design and Delivery

Program Goals

The partners set the following goals for the NAF Future Ready Scholars at UWM:

- Provide insight into a diverse range of careers within STEM fields
- Teach industry and college-necessary skills related to critical thinking, problem-solving, teamwork, leadership and communication.
- Provide learning experience with the design process
- Introduce students to concepts and vocabulary vital to the industry (e.g., sustainable design).
- Provide hands-on building experience, including introduction to tool safety with various tools
- Provide real world application of STEM skills learned in the classroom
- Provide pathways for MPS students to the university, profession, and trades (including MATC +UWM)
- Provide multigenerational mentoring experiences
- Provide experience with working and living in a university setting
- Provide an opportunity for students to engage positively with the larger community.
- Successfully design, build, and deliver a useful project to a real client

Curriculum

The project team planned a curriculum using practices with a demonstrated record for engaging students in STEAM, including collaboration, project-based learning, exposure to diverse careers and workplaces of architects and engineers, hands-on practice of new skills, resources for navigating towards post-secondary education and careers, role model interaction and team-building.

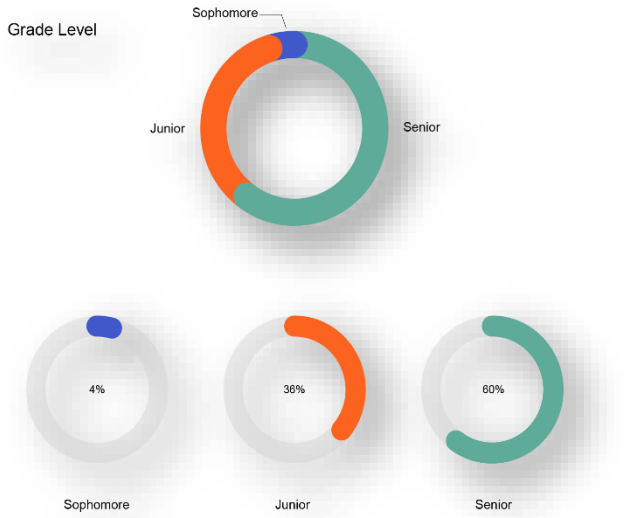
The program was structured with two cohorts: a one-week engineering group and a four-week architecture group. Both groups had a residential stay during week one. The cohorts came together for most morning activities, field trips and evening activities. The architecture cohort commuted to UWM or the project site for weeks two through four.

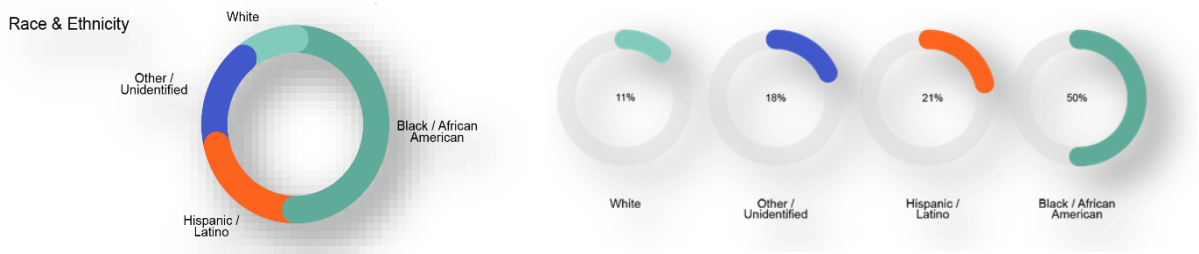
Outcomes

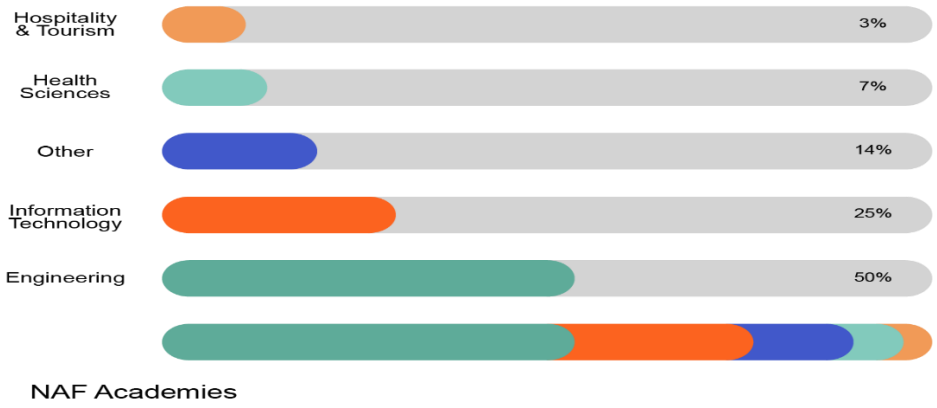
Participation

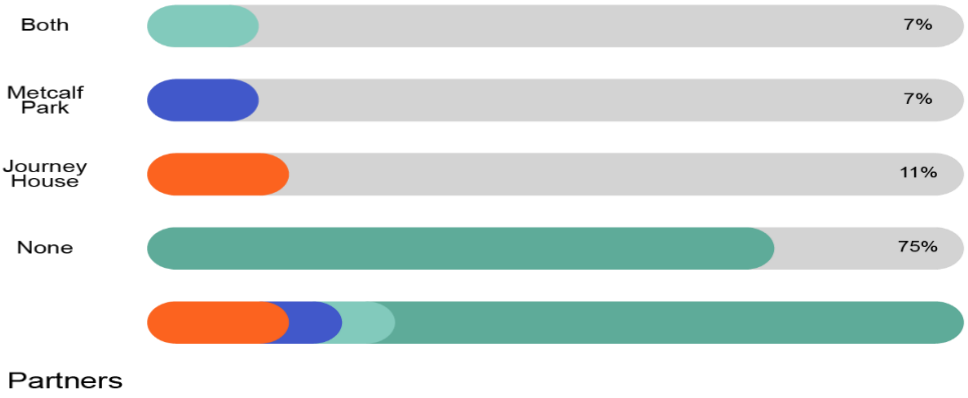
The Scholars

The program enrolled a diverse group of 28 high school students; 11 of these took part in the architecture track and 17 in the engineering track. The participants included 10 rising seniors, 17 juniors, and 1 sophomore. The students attend various MPS high schools; 9 attend Ronald Reagan High School, 4 attend Rufus King International High School, 3 attend Golda Meir High School, 2 attend Riverside High School, 2 attend Milwaukee High School of the Arts, 2 attended Marshall High School, and individual participants attend North Division, Audubon Technology, Alexander Hamilton and Bayview High Schools. Two students attend Milwaukee high schools that are not a part of MPS.









Counselors

The program hired 4 UWM students and 2 MATC students as counselors. The counselors joined the instructional team in assisting students with project work, shared information about their post-secondary studies and career paths, escorted scholars to program locations, led evening activities and provided supervision, including staying with the group around the clock during the residential week. A 7th counselor was added for overnights during the residential week to provide the required supervision to allow all students on the program waiting list to be enrolled.

Two counselors supported the weeklong residential engineering cohort, including a UWM Biomedical Engineering student active in UWM's Biomedical Engineering Society student chapter and a UWM Information Science & Technology major active in the UWM National Society of Black Engineers chapter.

Four counselors supported the architecture cohort, including one residential week and 3 weeks in which the scholars commuted to UWM or the project build site. They included two students of MATC's Architectural Technology associate degree program and two UWM architecture students, one of which was a new graduate and an experienced staff member of the School of Architecture & Urban Planning Wood Shop.

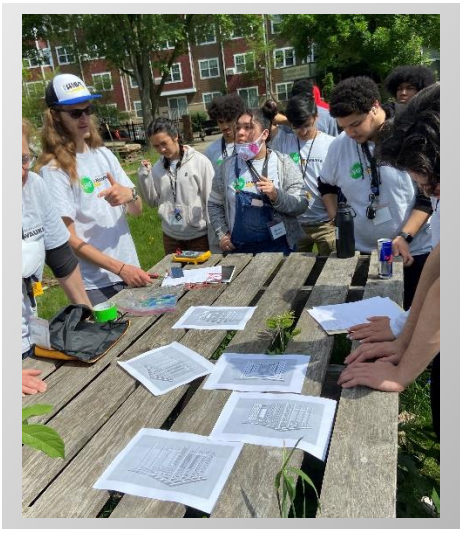
Program Planners and Instructors

Program planning was done in collaboration by UWM faculty and staff of the School of Architecture and Urban Planning and College of Engineering & Applied Science, MPS specialists in Engineering Education and Career and Tech Education and experienced educators from All Hands Boatworks and Journey House. The design-build focus benefitted from the guidance of the ACE Mentor Chicago Executive Director and helpful templates, resources and advice were provided by NAF.

A SARUP professor and educators from Journey House and All Hands Boatworks were the lead instructors of the architecture cohort. The CEAS STEM Outreach Manager and an MPS Project Lead the Way teacher were the engineering cohort instructors. Both groups were supported by the counselors and numerous field trip hosts and guest speakers.

Accomplishments

On May 31st, the Architecture building sustained a major flood on all 5 floors of the building. NAF FRS Camp started on June 6th. The team quickly made adjustments to meeting locations in another area of the building and confirmed the woodshop facilities did not receive water damage. Camp launched on June 6th as planned with a commitment to a flexible schedule and meeting locations due to the flood.



Twenty-eight scholars participated in the program and 24 completed their cohort's learning experiences and project work, earning certificates and stipends. The 24 students who successfully completed the program were eligible for high school internship credit.

All participants experienced life on a college campus, including a stay in the residence halls, campus tour, meals in a university dining hall, near-peer interactions with college students and learning and working in UWM and MATC facilities with university professors and staff. They were supported in their path to post-secondary education with and ACT prep workshop, a mock review of college applications, a resume writing workshop and a tour of MATC. All took part in evening activities including a networking event with architecture and engineering professionals, a tour and woodshop experience with All Hands Boatworks, a cookie recipe engineering challenge, a movie night and sandcastle building on Lake Michigan's Bradford Beach.

The two cohorts learned about the central project together, touring the site to gather information and meeting community members to learn about the needs of the project's end users. All took part in a discussion of the skills and background related to the project that each scholar brought. Both groups led presentations of their work on their final days.

Members of the engineering cohort experimented with circuits and assembled solar power stations using kits on loan from industry partner, Creation Technologies. After quality control checks and troubleshooting, one power station was selected for deployment and customized to suit the needs of the Metcalf Park community garden. The scholars anticipated a range of scenarios for the power station's use and selected a solar panel and battery for the system. To broaden their exposure to engineering fields, the group made metal castings with UWM's research foundry, visited the Civil Engineering Department's Virtual Reality Infrastructure Lab, took part in a game design workshop with a computer scientist, and met professors of biomedical engineering and industrial & manufacturing engineering.

Architecture cohort scholars honed their design skills through hands-on activities that included creating models of their ideal parks, paper bridge structures, a Gees Bend Quilt and collage activity and collaborating to make giant structures with Build-it disks. Tool, safety training and practice raising posts and beams prepared them for building two small pavilions offering shade, work and gathering space and rainwater collection for the community. Students raised supports, installed the roof and rain collecting gutter, fabricated a rain barrel enclosure and built-in folding table and installed versatile seating of their own design. Scholars interspersed project work with tours to showcase design, architecture and building; they visited a Habitat for Humanity building site, an architecture firm, construction firm, and a furniture company's design department and factory.

Two park structures with fold-up tables and benches were completed to provide shade, a gathering place and water collection for the Metcalf Park neighborhood garden. The solar panel chosen by the scholars was installed. The remaining components of the solar power station were completed and will be installed by a UWM student organization during the fall semester.

Parent involvement was accomplished through their participation in informational and orientation meetings, photo sharing messages sent daily during the residential week and weekly during the commuting weeks and closing celebrations on the final day for each cohort.

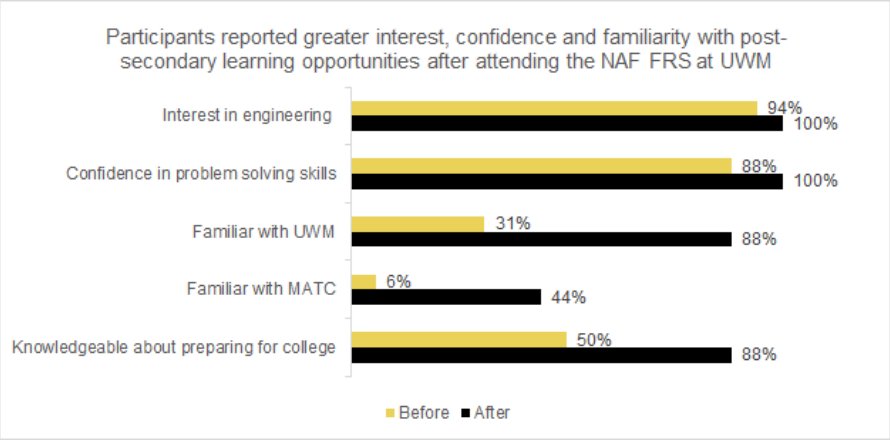
Participant Feedback

Evaluation surveys were completed on the final days for each cohort. All engineering cohort members indicated that the program met or exceeded their expectations.

Most scholars reported knowing more about UWM, MATC and preparing for college as a result of their participation; exceptions were students who began the program already knowing about these. Engineering cohort members indicated that they began the program with interest in engineering and confidence in their problem-solving skills; by the close of the program, their interest and confidence were maintained or increased.

Participants were asked to name their favorite aspects of the program. The highlights were different for each scholar; over half included the stay in the residence halls and many appreciated the people they met and working with the solar energy project. Guest speakers and field trips were on multiple lists, particularly the visit to the All Hands Boatworks woodshop.

The scholars were asked to recommend changes for future NAF Future Ready Scholars at UWM programs. Although many appreciated the guest speakers, a frequent request was to present more



hands-on learning opportunities and fewer lecture-style talks. Some were critical of the high level of supervision required of university programs serving minors. Others recommended having access to more areas of the university (the Union and some other facilities were closed for construction) and other suggested more free time.

Participants in the engineering cohort provided feedback on the components of the program that drove their decision to attend. All of them stated that the one-week program length was essential to their decision to attend (31%) or a factor in the decision (69%). The stipend was essential or a factor for 69% of the students and the early June timing was important to 75%. 56% indicated that receiving credit was not important to them; they would have attended without it.

Partner Reflections and Recommendations

The inaugural year of the NAF Future Ready Scholars at UWM served as a pilot program and allowed the project team to identify strong elements of the program and aspects to improve in the future. Feedback from campers and the staff and partners was gathered to guide refinement.

- The project team would like to explore changing the program length to 2 weeks, including 9th grade students and limiting the residential experience to a one-night dorm stay. This would address competing job demands for students 16 and over and complications posed by the residence hall requirement to assign rooms by gender.

- The project-based, design-build format of the curriculum was beneficial and allowed participants to explore a range of fields related to design, architecture, engineering and construction. The instructors can build on the experience to better anticipate time allocations, supply needs, transportation and site needs for a similar project in the future.

- The instructors noted features of activities that successfully engaged the students and can share these insights with guest speakers and tour leaders and use them to make improvements.

- Rather than separate into cohorts, the students might be best served by staying together to gain experience in both fields, with instructors delivering the full program as a team, bringing in more assistance from MATC.

- Refinements for the wrap-around activities aimed at guiding student navigation towards post-secondary learning were identified. For example, the ACT prep workshop was of less value to rising 12th graders who already completed the ACT.

- The counselors were effective guides and mentors for the students. They endured a rigorous schedule; the project team recommends restructuring the time demands of the role, adding to training and retaining counselors from year to year when possible.

- The partnership approach to planning and delivering the program was enriching, strengthening connections between STEAM education providers.

Statements from Scholars

"It's a good experience, it's a good way to throw yourself into what college life could be like and how it all works."

"It was a good way to test what you are interested in if you don't really know if you are interested in engineering or architecture doing this was a good way to help decide."

"Going to the boathouse was really fun and seeing how everything worked."

"Expect to have a lot of fun, it was a lot of work during the week but it was a lot of fun."

"This program helped educate me further on different types and different levels of engineering as well as how I can pursue different jobs/education in this area."

"A favorite experience was making the solar station, even though it was a very difficult process. It was a very satisfying one at the same time, once we finally figured it out. It allowed us to think outside the box to get the results we wanted."

"*Being able to see a bunch of people around my age who are interested in similar subjects as me was really a beneficial experience and also all the real-world people who are actively working in these fields were beneficial and interesting to see. I wouldn't have seen them without being in this program."*

"I knew going into this that I was interested in engineering. I now have more knowledge on the different branches."

"I live nearby, but living on campus and being in the different buildings has deepened my familiarity with UWM."

"I had never been to MATC before."

"It helped me get a better understanding of the applications of engineering as well as the variety."

"I became more familiar with the facilities and educational experience of UWM."

"I had a great time and learned a lot about different engineering courses and applications."

"The counselors were the best."

"It was a great time."

Acknowledgements

Thanks to our partners - NAF, UWM, MPS, MPS Foundation, MATC, Journey House, All Hands Boatworks and our teaching team - Chris, Wiz, Marc, John, Will, and Krisann for taking the journey on this new pilot program and turning it into a great success.

Thanks also to those who worked behind the scenes like Sue McDonald to make the program happen.