



Background of Omaha STEM Ecosystem

As the demand for professionals skilled in science, technology, engineering, and mathematics (STEM) continues to increase, employers across Nebraska struggle to find the workers they need.¹ This workforce shortage is a significant threat to the state’s economy, both now and in the future. In response to this challenge, professionals from all sectors of the Omaha community—including educators from PreK through higher education and leaders from the business, industry, non-profit, and philanthropic sectors—are working collaboratively to strengthen the STEM educational pipeline and develop pathways to STEM careers. These collective and ongoing efforts are supported by the Omaha STEM Ecosystem (OSE).

The OSE was officially established in 2016 by the University of Nebraska Omaha (UNO) and Omaha’s Henry Doorly Zoo and Aquarium (OHDZA), and it is now a growing network of STEM-related businesses and community partners who are committed to developing STEM pathways to careers in and around Omaha. The OSE director collaborates closely with dedicated staff and leaders in key partner organizations, including OHDZA’s Education Department and the new STEM Teaching, Research, and Inquiry-based Learning Center at UNO. As a catalyst to organizational collaboration across the Greater Omaha metropolitan area, the OSE strives to work collectively with partners to address the shortfall of STEM professionals in and around Omaha by helping to strengthen educational pathways from the cradle to career.

The challenge of preparing Nebraska’s students to meet STEM workforce needs is daunting, as current STEM pathways erode early. For example, 54% of Nebraska students are proficient in mathematics in 5th grade, and by 8th grade, that number drops to 47%. In science, 69% of 5th graders are proficient in science, and by 8th grade, science proficiency drops to 63%.² Nebraska also has difficulty retaining and attracting talent for the STEM workforce and is now ranked 39th among all states. The state also has one of the lowest growth rates (0.5%) for the population of people ages 25–29 years (2013–2018) that enter the STEM workforce. In addition, Nebraska is losing people in the competition for STEM talent, and even our wider population, to other states. In 2018 for example, the state lost roughly 3,300 residents to other states.³

To address these challenges, we need to ensure effective communication and collaborative action—rather than isolated and poorly communicated “random acts of STEM.” The OSE, supported by its many partners, facilitates the coordination, communication, and collaboration necessary to engage individuals and organizations across the community in shared efforts to improve STEM education for all learners. By creating a strong and engaged network of community organizations, OSE serves as a springboard to refining STEM-related education and career pathways to help develop the STEM workforce in Omaha, Nebraska, and the wider United States.

Accomplishments to Date

Over the past three years, OSE has evolved into a strong backbone organization that supports collective impact initiatives around developing STEM pathways in and around Omaha. The power of collective action comes from the coordination of differentiated partners and activities through mutually reinforcing plans of action. Since the OSE was formally established in 2016, the number of persons engaged in OSE activities has increased by 349%—from 180 in 2016 to 809 in 2019. These engaged persons represent 95 local organizations, including school districts, out-of-school-time programs, colleges and universities, businesses, non-profits, science centers, museums, state government organizations (such as the Nebraska Department of Education), and city organizations (such as the Omaha Chamber of Commerce). Individuals participate regularly in OSE activities and are committed to furthering STEM efforts within the collective OSE mechanism. Examples of OSE’s accomplishments in the last year alone include the following:

- Organized into five working committees, seventy-two OSE members led more than twenty different initiatives. Recent activities of these five committees include the following:
 - The *Research and Advocacy Committee* developed a best practice self-assessment tool to help STEM programs identify their impact on STEM engagement (available on the OSE website). The tool also will be used to help identify examples of excellence for the online portal to be piloted in 2020.
 - The *Quality STEM Programs Committee* completed a template document to capture STEM program mapping across the OSE, and this document will be used to facilitate the collection and curation of content for the online portal. The committee contributed to piloting the Phase I online portal with UNO’s College of Information Science and Technology. The portal is designed to facilitate access to information about STEM related opportunities and resources in and around Omaha.
 - The *Professional Development and Training Committee* created a shared vision document, which identifies the need to develop common STEM terminology to inform future OSE-related conversations. They also assisted with shared OSE events, such as the TIES Conference, Nebraska Robotics Expo, Nebraska City Nature Challenge, the Nebraska Science Festival, and the Metro Science and Engineering Fair, to name a few. In addition, the committee worked closely with area school STEM nights, as led by Prairie STEM.
 - The *Communication Committee* completed message mapping and initiated communications strategic planning for OSE. They also secured a grant from Nebraska Public Relations Society of America (NEPRSA) to review OSE communication plans and to promote recommendations moving forward. In addition, they facilitated monthly OSE articles in the OPS Newsletter that reaches 50,000 area families, and they trained members of the OSE Steering Committee on effective message mapping.
 - The *Diverse & Engaged Stakeholder Committee*
- Assisted in a \$4.2-million EPSCoR[–] grant proposal by UNO related to STEM pathways as submitted to the National Science Foundation (NSF; currently under review) and helped to secure a \$1.2-million NSF grant for bringing hands-on biomechanics science activities into Omaha-area elementary school classrooms by training interested teachers.
- Facilitated coordination between the Metropolitan Omaha Educational Consortium and the Omaha Chamber of Commerce to align PreK–16 initiatives related to workforce development.
- Hosted conversations about internships and externships, with a national leader in STEM workforce development as the keynote speaker in an effort to build critical workforce skills.
- Expanded the dissemination process for co-hosted and co-funded events with partner organizations on various workforce and educational initiatives, which included shared cost support models from various organizations.

Among the many community STEM efforts facilitated by OSE in 2019, the event series called “Bridging the Gap in the STEM Workforce: Business + Industry + Education” was particularly effective in helping OSE partners develop a shared understanding about key issues in STEM. At the first of these two events, held in April, more than 60 area STEM leaders representing over 40 organizations met for a facilitated work session that resulted in some excellent ideas and key strategies for building skills in PreK–16 students in preparation for future STEM careers. Following the event, the OSE’s Professional Development Committee developed a position statement around the top three skills that the stakeholders agreed were important. At the second event, held in August, more than 70 community leaders

[–] EPSCoR (Established Program to Stimulate Competitive Research) was first established by Congress in 1979. The mission of EPSCoR is to enhance research competitiveness of targeted states, territories, or commonwealths by strengthening STEM capacity and capability. Nebraska has had a designated EPSCoR office since 1991. To find out more, visit epscor.nebraska.edu.

representing 56 organizations shared their ideas about how to more effectively facilitate the sharing of resources and opportunities between educational organizations and businesses. Efforts such as these help OSE stakeholders identify and implement programs and activities that mutually reinforce the STEM education and outreach efforts of participating partners.

What's Next?

As more and more partners join, there is an ever-increasing need for clear, consistent communication about STEM in the region, how STEM impacts Nebraska's future, and how to get involved. To meet this need, OSE must focus on: 1) implementing a communication plan and 2) measuring impact to ensure continued progress.

Expanding communication—We must develop a shared and well-articulated communication plan and process. The plan will establish shared communication and outreach goals, with a focus on clearly communicating the overarching purpose of Omaha's collective impact initiatives in STEM and establishing a strong partnership identity with colleagues in OSE's founding organizations, including UNO, OHDZA, Metropolitan Community College, the University of Nebraska Medical Center, Clarkson College, the University of Nebraska Lincoln, the Applied Information Management Institute, Union Pacific, OPPD, and others. Expanding communication—by developing a communication plan and process that includes event-related summaries, newsletters, joint position papers, research overviews (such as on internships/externships, interdisciplinary teamwork and collective community action), and many other communication-related efforts—will better enable all OSE organizations to work together. As first steps, the Research and Advocacy Committee recommends the following:

- Provide a clear vision of what OSE “communicates”
- Clarify the mission statement
- Formalize stakeholder roles and objectives within OSE
- Establish a common vocabulary and shared definitions among stakeholders
- Determine what STEM workforce/employers define as success in STEM growth and develop a plan to communicate this to other stakeholders
- Create an FAQ page on the website to facilitate communication

Measuring impact to ensure continued progress—Aligned with the communications plan, we also must establish a shared, robust, and focused process to measure impact and ensure continued progress. To effectively answer questions about what is happening in STEM now, and what impact OSE and its partners are having, we must identify shared indicators of success and determine how best to measure and track those indicators over time. Broadly speaking, the Research and Advocacy Committee recommends identifying metrics, including baseline data and benchmarks of success, related to the following:

- Number of students who are on-track to succeed in STEM (with measures appropriate for students at different levels across the PreK–16 pipeline)
- Extent and quality of STEM programming available (number and type of programs offered, tools for measuring quality in STEM programming)
- Number of STEM graduates who stay in Nebraska and work in STEM fields
- Number and type of policies that support STEM education and careers in Nebraska (e.g., tax incentives to encourage STEM-related companies to stay in and/or move to Nebraska)
- Economic indicators associated with STEM-related professions in the state
- The unrealized capacity of STEM programs in the city

To accomplish this, common terminology must be established. For example, different institutions and organizations within OSE have different definitions of terms such “stakeholders” and “curriculum.” Clear communication depends on establishing a shared set of definitions for key terms. Further, common measures are defined and a shared process must be established to report findings. For example, an online form could be developed that would allow stakeholders to input data related to the common measures. We

also recommend that the infrastructure is established to facilitate a collective impact approach to research and improvement of STEM education from PreK through college.

Through the dedication of OSE committee members, partners, and supporters, significant progress has been made in identifying and leveraging community strengths and resources in STEM. To capitalize on this momentum and enhance our efforts to meet workforce needs and move Omaha and Nebraska forward in STEM, we now must focus our efforts on an effective, iterative, and cyclical process of ongoing communication and accountability. We believe that expanding our communication outreach, establishing clear indicators of success, tracking our progress, and continuing to work together to address shared challenges will have a positive impact on Omaha STEM initiatives, now and in the future.

¹ Cordes, H. J. (2019, March 31). 'We have a workforce crisis': Nebraska leaders sounding alarm about unfilled jobs. Omaha World Herald. Retrieved from https://www.omaha.com/news/state_and_regional/we-have-a-workforce-crisis-nebraska-leaders-sounding-alarm-about/article_7be720a9-de6b-536e-bfa9-49450a004009.html

² Nebraska Department of Education. (2019). Nebraska Student-Centered Assessment System. Retrieved from <https://nep.education.ne.gov//State/Index/00-0000-000?DataYears=20182019&type=state#> (see Mathematics detail and Science detail pages)

³ Blueprint Nebraska. (2019). Growing the good life: Working to create a new standard of sustainable economic prosperity for all Nebraskans. Retrieved from <https://blueprint-nebraska.org/>