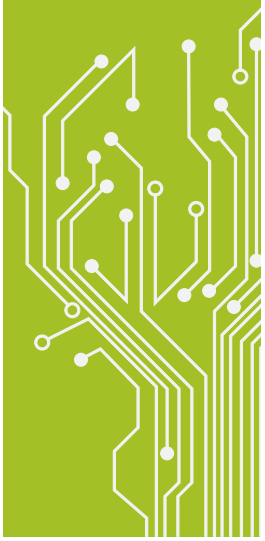
education northwest

CREATING STRONG SCHOOLS & COMMUNITIES

What district and school leaders can do to prepare rural students for a brighter future

Lessons from college readiness and STEM learning initiatives



How can rural students and their communities mutually benefit from STEM (science, technology, engineering, and mathematics) education?

Research shows rural students are less likely to attend selective colleges, have greater gaps between high school graduation and entering college, and are less likely to be continuously enrolled in college (Byun, Irvin, & Meese, 2015). In addition, many rural students don't see the connection between their high school education and careers. STEM programs, though, can help rural students aim high while providing real-world, experiential learning opportunities.

STEM learning can motivate students to engage in more rigorous coursework, envision pursuing postsecondary education, and prepare for high-demand careers that are located in their own backyard (Peterson, Bornemann, Lydon, & West, 2015). For rural communities, the payoff is a pipeline of skilled workers for hard-to-fill jobs in areas such as resource management, clean energy, water conservation, and telecommunications and the ability to entice talented young people to return to the places where they grew up (Peterson et al., 2015).

This white paper discusses the importance of college and career preparedness for rural youth and how STEM contributes to postsecondary readiness by helping students learn meaningful skills connected to career pathways, particularly in rural settings. We include examples of school-community STEM collaborations and takeaways from Education Northwest's work, including researching rural students' college-going and facilitating STEM instruction and teacher professional development.

Addressing an inequity

Improving rural students' college-going is an equity concern—not only because *all* children are entitled to equal access and opportunity in education, but also because rural youth comprise a substantial

proportion of the student population in the United States. The Rural School and Community Trust estimates that a fifth of U.S. students, nearly half of all school districts, and almost a third of our schools are rural.

These students face a number of barriers to pursuing postsecondary education, including geographical isolation, limited opportunities for rigorous college prep courses, and rural schools' difficulty in attracting and retaining highly qualified math and science teachers who are certified in their main teaching assignment field (Barton, 2012).

Overcoming these challenges requires innovation, creativity, and collaboration. Tapping into technology and community partners is an ideal way to fill gaps, providing mentors and other resources.

While there are no easy fixes, the potential rewards are great—particularly as technological advances and STEM industries make new demands on the educational level and skills that students need to fill traditional jobs and to enter fields that are just emerging in rural areas.

Laying the groundwork for STEM

In a recent issue of the *Peabody Journal of Education,* edited by Education Northwest, Peterson and colleagues argue that STEM is paving the way for rural communities to reimagine themselves and to "allow rural students to find meaningful and challenging work in the communities they love" (Peterson et al., 2015, p. 284). Helping to prepare students for STEM careers can take many directions. The authors cite examples such as a 21st Century Community Learning project that asks elementary school students to redesign a common household device and build a prototype incorporating their improvements; a program that partners grade 4 students with farmers to collect and analyze data on horny lizard toads; and a high school's use of Project Lead the Way curriculum to ignite interest in the engineering and health sciences fields.

The authors also describe how rural communities are banding together or turning to external partners to leverage scarce resources: Collaborations between rural school districts and postsecondary institutions offer mentors, dual credit options, and rigorous extracurricular activities for secondary-level students. A rural alliance allows consortia of school districts to collaboratively design online courses and spread the administrative costs of college prep programs such as AVID (Advancement Via Individual Determination). Outreach to a federal agency allows students to video chat with STEM professionals.

The bottom line is that forging partnerships, taking advantage of existing resources, and refocusing existing programs can help jumpstart students' interest in STEM and connect this learning to further educational and occupational pursuits.

Equipping teachers for project-based learning and STEM partnerships

An Oregon middle school with a high-poverty and diverse student body is aiming to improve student outcomes by refashioning itself as a STEM-oriented school. The ambitious approach fosters critical thinking; gives students a choice

of challenges to work on in general engineering, environmental/sustainability science, and information technology; provides strategies for problem-solving and teamwork; and highlights writing to articulate thinking.

Industry partners loan hardware, software, and specific tools that enable students to carry out authentic STEM projects. They also agree to visit classrooms and assist teachers with designing projects that help students build such essential skills as collaboration, problem-solving, and critical thinking that industry partners feel many current job applicants lack.

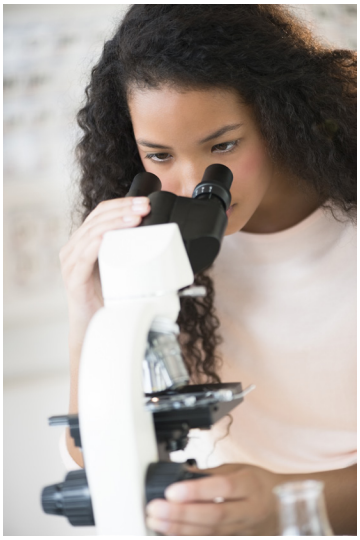
To prepare teachers for the shift to a STEM-focused approach, Education Northwest was called in to lead an in-depth professional development program. It included facilitating grade-level interdisciplinary planning teams and coaching teachers on research-based approaches to professional learning communities. Education Northwest also served as a conduit between the school and the University of Oregon, which provided graduate student scientists to work with teachers on lesson and project plans.

While this approach to STEM requires considerable funding and a whole school commitment, it's paying off in improved student engagement. By instilling a climate of high expectations, high-quality instruction, and comprehensive supports, the school has also seen growth in science scores on state assessments.

One consideration is that it takes a lot of time and materials to plan and present engaging hands-on STEM lessons. To make it work, teachers need adequate prep time, dedicated time for collaboration, scaffolding in STEM subjects, and a designated person to coordinate classroom visits by STEM professionals.

Recognizing that one size doesn't fit all rural students

Whatever approach education leaders take to engage rural students in STEM and promote higher education, it's important to remember that these students are not a homogeneous group. That's one of the takeaways of a recent Regional Educational Laboratory (REL) Northwest study on rural versus nonrural college-going published by Education Northwest researchers (Pierson & Hanson, 2015). The study found that rural Oregon students were less likely than nonrural students to enroll in postsecondary education after high school graduation and to persist to the second year of college at all levels of high school student achievement in math and reading. The authors found differences, though, along demographic lines. For example, rural Hispanic students may have different barriers to college enrollment and persistence than their rural white peers.



The lesson learned is that education leaders should design programs and policies to overcome barriers facing all rural students, while being mindful of differences among those students.

While STEM education in rural settings provides new opportunities for hands-on exploration of real-world problems and careers, students who are sparked by their STEM learning may still need help forging and maintaining a path that connects their bourgeoning interests to a clear plan for the future. ■

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