Contextualizing STEM: Aligning Organizational Support with Local Needs in Rural Education Systems

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STEM education organizations • STEM Industry & community partners • Education policymakers • School district administrators • School administrators • Educators

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Executive Summary

This study examined how well STEM education resources provided by organizations align with the needs of K-12 educators across Idaho and particularly, in rural regions. Through surveys of 79 organizations and focus groups with 14 teachers across three regional clusters, we identified critical gaps between what organizations offer and what teachers can access and implement.

Key Findings:

- Organizations offer diverse resources (curriculum, funding, professional development, student programs), but significant barriers prevent teachers from using them effectively
- Three main barriers emerged: time constraints, geographic accessibility, and lack of awareness
- Organizations understand regional industry differences, but teachers report difficulty connecting resources to local contexts
- Teachers need networking opportunities and liaison roles to bridge connections between schools and community resources

Bottom Line: Resources exist, but access and implementation challenges prevent them from reaching their full potential. Organizations must move beyond resource creation to actively support discovery, adaptation, and implementation.

1. Background & Methodology

Across the United States, STEM education is supported by a mix of government agencies, nonprofit organizations, universities, and industry partners. These external organizations are essential—particularly in rural regions where schools may lack access to specialized expertise, equipment, and training. Yet despite significant investment in STEM education support, little is known about how well organizational resources align with the specific needs of rural educators and the contexts in which they teach.

This study focuses on the state of Idaho, characterized by diverse ecological regions and natural-resource-based industries, ranging from forestry and mining to energy production, ranching, and agriculture. It examines:

- What types of STEM resources organizations provide to elementary and secondary schools
- Whether those resources align with teacher needs, especially in rural areas
- How alignment differs across geographic regions with distinct industries and educational contexts

The goal is to turn these findings into actionable guidance for organizations, policymakers, and educational leaders.

1.1 Methods Summary

A survey was developed to understand what organizations saw to be the biggest challenges facing rural STEM education in terms of resources that supported teacher learning or student understanding of STEM concepts. These data were categorized by using the Idaho Department of Education's regions to group survey responses into three main clusters that share similar ecological, economic and geographic similarities:

- Regions 1 & 2: Mountainous, forestry-driven, rural with two university hubs
- Regions 3 & 4: Semi-arid agricultural region with the state's largest urban center
- Regions 5 & 6: Remote eastern region, mixed mountainous/semi-arid, most geographically isolated

Such data was summarized and presented to teacher participants that were recruited during the 2025 i-STEM conferences that take place around the state. Educators were asked about their reactions to organization's perceptions on how they support their needs, and how they tailor resources and lesson plans to their local context.

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3. Key Findings

3.1 Organizational Perceptions of Local Industries Are Generally Accurate—But Often Incomplete

Survey respondents identified farming, water management, and outdoor recreation as consistently important across regions. Regions with strong forestry or hydroelectric sectors were also correctly identified.

However, focus groups revealed disconnects:

- Mining was rated low by organizations but is a major economic driver in some communities (including gravel and aggregate extraction, which organizations often overlooked).
- Organizations often misjudged contemporary vs. historical industry importance, particularly in remote rural areas.
- Because 67–77% of respondents do not live in Idaho, their understanding of local context may be secondhand.

Implication: Organizations recognize broad regional patterns but miss fine-grained, locally specific realities that teachers rely on for place-based instruction.

3.2 Types of Resources Provided

Across the state, organizations most commonly provide:

- Curriculum (19–27%)
- Student programs (21–28%)
- Funding or grants (9–13%)
- Professional development (varies by region)
- Parent/community engagement (particularly high in regions 5 & 6)
- Policy work (very low across all regions)

Teacher Feedback:

- Teachers were *surprised* to see curriculum rated as widely available—many had not heard of, seen, or used organizational curriculum.
- Teachers often needed to adapt provided curriculum to local contexts or available materials, which required time they did not have.
- Professional development was least accessible in geographically remote regions.

Implication: Supply exists, but visibility, accessibility, and usability remain major problems.

3.3 Persistent Gaps in Meeting Educator Needs

Organizations generally rated themselves highly (especially in rural Regions 5 & 6) in meeting teacher and community needs. Teachers strongly disagreed, in which three critical gaps emerged:

1. Awareness: Teachers often do not know resources exist. Teachers repeatedly asked, “Who are these organizations that say they support us? Why don’t we know them?”

2. Accessibility: Geographic distance and timing make resources hard to reach. Remote teachers face barriers to PD travel, scheduling, and coverage.

3. Time & Capacity: Teachers must spend their own time adapting curriculum or reaching out to partners. While willing to do so, time is the dominant implementation barrier. Teachers described:

- cold outreach to organizations that didn’t respond
- partners who provided support one year but not the next
- significant prep time required to make curriculum usable

3.4 Local Industry Context Strongly Shapes Teacher Needs

Teachers emphasized the necessity of place-based STEM learning:

- using salmon runs, fish ladders, and water quality stations (Regions 1 & 2)
- agriculture and soil science (Regions 3 & 4)
- energy infrastructure, hydroelectric plants, and water rights (Regions 5 & 6)
- tribal partnerships and cultural knowledge (multiple regions)

Teachers expressed that place-based examples are critical to student engagement, especially in rural communities where school and community are deeply connected. However, teachers, not organizations, bear the burden of making curriculum relevant to their place.

3.5 Emergent Themes Not Captured by the Survey

Theme 1: Teachers rely heavily on peer networks—not organizations—to find resources.

Across all regional panels:

- Teachers exchanged free lesson plans and virtual field trips.
- Multiple teachers swapped contact information during sessions.

Theme 2: Teachers want a centralized, searchable system for external STEM resources.

It is important to note that multiple online resource hubs exist, in addition to STEM libraries around the state. However, they are created by independent organizations that may or may not include all resources that are relevant and exist for a given region.

Educators want:

- A single directory of organizations
- Contact info
- A menu of resources each organization provides
- Searchability by topic and region

Teachers also suggested dedicated liaison roles within organizations and school districts to limit the burden of outreach and partnership building that usually falls onto educators.

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4. Recommendations

The following recommendations translate research findings into concrete steps for STEM organizations, policymakers, and school leadership.

4.1 For STEM Organizations

1. Create dedicated outreach and liaison positions. Organizations should not wait for teachers to initiate partnership. Proactive outreach is essential, especially in rural areas.

2. Centralize information about offerings. Develop:

- a statewide STEM resource portal
- a single directory of organizational contacts
- a database searchable by region, topic, grade level, and resource type

3. Connect curriculum and programs directly to local industries. Ensure materials are:

- explicitly place-based
- tailored to regional economies
- easy to adapt with minimal teacher effort

5. Offer hybrid or traveling professional development. Bring PD to rural educators, not the other way around. Teachers argue that while such may require more funds per individual, the impact on rural education justifies increased costs. Small student populations still require high-quality STEM experiences from teachers.

4.2 For Education Policymakers & State Leaders

1. Fund regional STEM liaison positions within districts or service regions. Roles could include:

- partnership coordination
- resource dissemination
- teacher networking support

2. Support a statewide STEM resource clearinghouse. A central repository reduces redundancy, improves access, and supports rural equity.

3. Incentivize or require organizations to report:

- Resource types offered
- Geographic reach
- Local industry connections
- Teacher uptake and feedback

4.3 For School District & School Administrators

1. Allocate staff time for partnership coordination. Teachers cannot initiate and maintain partnerships on top of full workloads.

2. Build internal rural educator networks. Host quarterly regional resource-sharing meetings or virtual convenings.

3. Support local fieldwork & place-based learning. Prioritize logistical support (transportation, substitutes, permissions), or easing barriers/timelines for educators to get approval for such

4.4 For Educators

1. Use local industries and community assets as STEM contexts. Continue leveraging:

- local agriculture
- water systems
- tribal resources
- forestry and energy industries

2. Advocate for place-based alignment when organizations provide curriculum. Request adaptations that reduce your preparation time.

3. Maintain peer networks. Teacher-to-teacher resource sharing is a major strength.

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5. Conclusion

This study identifies a fundamental misalignment between what organizations believe they provide and what teachers can access, use, or recognize. The biggest barriers are not lack of resources but time, awareness, and geographic accessibility. Organizations are committed and well-intentioned. Teachers acknowledge that effort. But meaningful alignment requires:

- Less burden on teachers
- More structured outreach from organizations
- Place-based contextualization
- Stronger networks and clearer information pathways

By implementing the recommendations above, STEM organizations and educational leaders can more effectively support STEM teaching and learning in rural communities and strengthen pathways between classrooms, local industries, and regional economies.

For questions or to learn more about this project, including data and figures, please contact Braelyn W. Shields at braelynshields@boisestate.edu