

**Project Title:**

Interconnected Science: Connecting Science Education and Nebraska's Workforce

**Timeline:**

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**Amount of Funds Requested: \$70,458****Contact Name(s) and Information:**

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**Abstract of Proposal:**

Through this experience, authentic instructional units and related resources will be developed that highlight how science is used in the workforce. It will essentially answer the notorious question posed by students, “When will I ever use this?”

Working collaboratively with employers and CTE teachers, teams of secondary and postsecondary science teachers will spend time in industry and with business professionals exploring how science skills and knowledge are used throughout careers in Nebraska. Teacher teams will develop authentic problems and resources that showcase how the science is used. The resources created will be available to high school and postsecondary educators to use within the courses they teach.

Multidisciplinary and project-based learning strategies will be the cornerstones of instructional design for the project. Teacher teams will be trained to develop and implement relevant, career-centered activities, scientific phenomenon, and three-dimensional assessment tasks.

**Vision and Purpose:**

This project aligns with the PFI Purpose Statement and Areas of Focus by providing professional development for CTE teachers and science teachers. Further, it promotes collaboration between secondary and postsecondary educators, between CTE teachers and core academic teachers, and between educators and employers.

Partnering with employers to develop instructional resources is not new to CTE teachers. However, for many of our science teachers, this will be their first experience connecting with employers. With the adoption of “Nebraska’s College and Career Ready Standards for Science,”

it becomes imperative for science teachers to have access to instructional units and resources that highlight how science knowledge and skills are used in the workforce.

The overall outcome for this experience is to develop authentic instructional activities and resources that highlight how science is used in Nebraska's leading industries. The experience will include secondary and postsecondary educators representing science and CTE.

**Needs Statement:**

With an intensified focus on college and career readiness, educators are often left wondering what is meant by “college and career readiness.” Achieve (2015) defines college and career readiness as a measure signaling a “high school graduate has the knowledge and skills necessary to qualify for and succeed in entry-level, credit-bearing postsecondary coursework without the need for remediation as required for their chosen career.” This definition implies that students should have the opportunity to learn traditional subjects (science, math, and English language arts) through the context of career options. In order to prepare students for college and careers, theoretical knowledge is not enough. Students must have the opportunity to learn and apply core academic knowledge through relevant, work-based contexts. This is critically important within science education. Nebraska's College and Career Ready Standards for Science provide a clear integration of *science and engineering practices* and applying *disciplinary core ideas* while making connections to *cross-cutting concepts* – a 3-D model of teaching and learning for science.

Contextualized teaching and learning is a strategy to increase student engagement in core academic classes. Despite knowing this, many educators are not comfortable with the idea of teaching in context or across disciplines. While a teacher may be an expert in their domain, they may not have the knowledge or resources to provide instruction that blends core academic subjects within work-based contexts. For example, through 2015 Nebraska Mathematics and Science Partnership Needs Assessment (approximately 1,400 respondents), K-12 math and science teachers indicated they were in most need of professional development to help them “develop authentic learning experiences in partnership with community partners, local businesses, etc.” They also expressed a need to “understand and integrate multiple disciplines into the instructional design.” There is a clear need to develop instructional resources that are authentic, connect with businesses, and that can integrate core academic subjects with CTE.

The resources developed will highlight the interconnected nature of science as it is practiced and experienced in the “real world.” Given the importance of science and engineering in Nebraska's economy, students will need a contextual understanding of scientific knowledge, how it is acquired and applied, and how science is connected to Nebraska careers. All students, no matter their career path, must have a solid science education in order to be prepared for college, careers, and citizenship.

**Goals and Objectives:**

The overall goal of this experience is to utilize secondary and postsecondary educators to develop authentic instructional activities and resources that highlight how science knowledge and skills are used in Nebraska's leading industries. The specific objectives include:

- Recruit 9-12 teachers across secondary and postsecondary science and CTE to participate in the professional development experiences and business engagements.
- Coordinate with six businesses and industry professionals who will host educators during the training experience and communicate throughout the project.
- Develop at least six **quality**, full instructional units and related resources, including career connections and three-dimensional assessments. Teams will include a mix of content areas and secondary and postsecondary educators. Quality will be achieved through the use of strong models, hands-on experiences, learning opportunities, iterative writing, and piloting the resources with students.
- Develop a guide for administrators to plan and lead professional development with their teachers on creating authentic, multidisciplinary instructional units and resources. The guide will include a coaching guide so that administrators have resources to coach their teachers in the implementation of multidisciplinary instructional units.
- Develop a dissemination plan that includes a timeline for sharing with participant's local schools and ESU.
- Develop a framework for a professional development session that can be presented at a state conference for science, math, ELA, and CTE.

### **Impact on Career and Technical Education:**

This experience will directly impact 9-12 science and CTE teachers. Through the rollout of the resources, teachers will gain access to the exemplar resources and models for their use in their local schools. Additionally, between 6 businesses and industry professionals will be recruited to host and communicate with teachers throughout the experience. With a targeted dissemination plan, the number of CTE teachers and students who will be reached will expand. Our hope is that the contextualized activities and resources will also be used in core academic classes, thus reaching a broader range of students and teachers beyond CTE.

As described earlier, the contextualized activities and resources have the potential to impact students in core academic content areas, thus increasing student engagement. These resources will help teachers communicate the importance of core academic content areas, and they will also provide a level of authenticity that is often missing from these areas. Through the project, teachers will become stronger instructional developers, more aware of influential businesses in the state, and better connected to colleagues in secondary and postsecondary education.

Because of the strong link between CTE and workforce/economic development, the businesses identified will be targeted industries, as identified by the Nebraska Department of Economic Development and Nebraska Department of Labor. We plan to work with state and local economic development and labor representatives to identify businesses and industry professionals.

**Statewide Impact:**

The resources developed from this experience will be made available statewide, and it will be promoted with secondary and postsecondary educators. Through various promotional channels (email distribution lists, social media, webpages, conferences, etc.), our hope is that all high school educators will have access to the resources that are developed.

As mentioned previously, the businesses included in this activity will reflect targeted industries as identified by the Nebraska Department of Economic Development and Nebraska Department of Labor. We anticipate the businesses will fall into multiple Career Fields depending on the community where the connections are made. This approach will ensure collaboration with a variety of stakeholders including secondary and postsecondary education, business and industry, and other government and community organizations.

Because of the nature of the expected outputs and outcomes from this project, teacher teams will experience professional development in both face-to-face and virtual formats. The statewide dissemination plans also include a variety of methods including face-to-face and virtual methods.

**Evaluation:**

The following outputs will be used to evaluate the project:

- Number of teachers who participate in the experiences;
- Pre- vs. post-experience teacher knowledge related to authentic instructional design, business partnerships, and assessment development;
- Number of businesses and industry professionals who host educators;
- Number of instructional units and resources developed as a result of the experience;
- Number of presentations given at regional and statewide meetings promoting the activities and resources;
- Once activities are posted online, analytics can be pulled to determine how frequently the materials are being accessed.

**Dissemination of Knowledge:**

The results and output of the experience will be shared in multiple formats. This includes:

1. Presentations by participants at their local school and/or ESU;
2. Presentations at the Nebraska Career Education Conference;
3. Report (or presentation) to the PFI Leadership Council;
4. Presentations at the Nebraska Association of Teachers of Science and Nebraska Association of Teachers of Mathematics;
5. Presentation to postsecondary faculty (as requested by institutions);
6. Report (or presentation) to Nebraska Department of Labor and Nebraska Department of Economic Development; and
7. Dissemination via social media (Twitter, Facebook, Google+, etc.).

**Budget Plan and Narrative:**

The budget plan includes costs associated with training and supporting teachers throughout the 18-month project, writer stipends, lodging expenses, mileage, and meals. The table below includes specific details:

<b>Activity</b>	<b>Personnel: Stipends/Presenter Fees/Substitute Fees</b>	<b>Supplies</b>	<b>Travel &amp; Conference Expenses: Lodging, Mileage, Meals</b>	<b>In-Kind (not required)</b>	<b>TOTAL</b>
<b>Develop Scientific Phenomenon &amp; 3- Dimensional Assessments</b>	<b>\$9,744</b>				<b>\$9,744</b>
<b>Creation &amp; Iteration of Instructional Resources</b>	<b>\$12,098</b>				<b>\$12,098</b>
<b>Train &amp; Support Teacher Writing Teams</b>	<b>\$20,142</b>	<b>\$325</b>	<b>\$5,200</b>		<b>\$25,667</b>
<b>Instructional Design &amp; Facilitation</b>	<b>\$12,863</b>				<b>\$12,863</b>
<b>Creation of planning guide and administrator/coaching guide</b>	<b>\$10,086</b>				<b>\$10,086</b>
					<b>\$70,458</b>