ITEST Program

Scaling, Expanding, and Iterating Innovations

Program Overview

ITEST is an applied R&D program to advance the ***equitable and inclusive*** integration of technology in the learning and teaching of science, technology, engineering, or mathematics from Pre-K to High School.

The ITEST Solicitation 22-585 has three Program Pillars. The Pillars are the *conceptual underpinnings* of the ITEST program and are *required* to be addressed in all proposals:

1. *Integrating Technology in Learning*
2. *Partnerships for Career and Workforce Development*
3. *Strategies for Equity in STEM Education.*

In addition, ITEST has **Solicitation-Specific Review Criteria** required to be addressed in all ITEST project types: *Exploring Theory and Design Principles (ETD), Developing and Testing Innovations (DTI) , and Scaling, Expanding, and Iterating Innovations (SEI).*

We have prepared this session to guide your conceptualization of SEI proposals.

Early Preparation for Scaling

Successful scaling of research—whether across schools or grades—or more widespread, across geographic regions with diverse populations, is a highly complex problem in education research that requires much consideration of a range of variables, including, but not limited to settings, selected populations, and determining learning processes.

The literature supports beginning as early as possible in your research to consider questions related to future expansion— as well, to seek opportunities *to test your ideas* and *aggregate additional supporting evidence* for scaling a project to new audiences.

Conceptual Questions for SEI Projects

1. How do you know when you have sufficient evidence or the right types of evidence that support scaling?

- Discuss your findings. Build a research case around *how and in what ways* the prior evidence is a basis for scaling. How will scaling afford new opportunities to demonstrate potentially field-advancing effects as an expansion of the prior innovation?

2. How do you design scaling to retain fidelity to the original intervention?

- Consideration should be given to designing research to understand the **effects of scaling** on the intervention itself, and how scaling may result in modifications and iterations based upon emergent findings. Examine issues of transferability and generalizability and factors that support or inhibit scaling.

Conceptual Questions for SEI Projects

3. How are you designing for unpredictable challenges that may emerge during the scaling process, as scaling is not linear and requires experimentation?

- Planning for formative corrections and adjustments as a project expands over time is essential to ensure success. Aggregate formative findings to study relevant effects and influences on the intervention.

4. Given your original project may have worked with communities where you have established, enduring partnerships …

- Consider how the proposed work will build the necessary trust within new communities and consider the needs of different populations.

Pillar 1:
Integrating Technology in Learning

Discuss:

- The focal disciplinary or transdisciplinary content, concepts, and practices that will be **integrated with technology**.

- How teaching and learning will be studied as an *integrated learning process and measured.*

- How engagement with technology strengthens disciplinary knowledge in the target population.

- How the key design features of the technology is grounded in relevant scholarly literatures and/or evidence from practice.

- How the learning process will be scaffolded between the discipline and the technology.

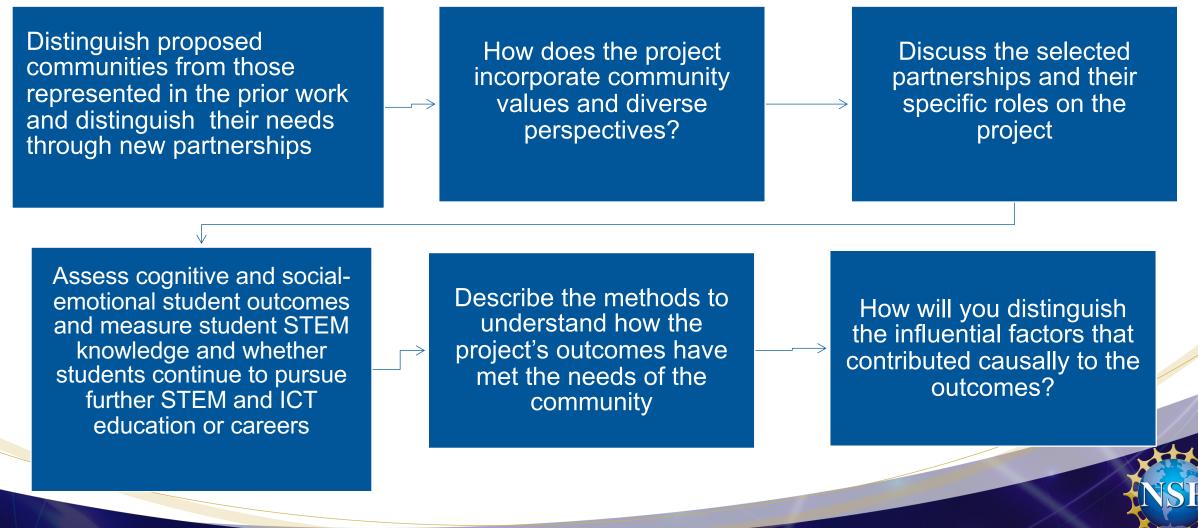# Building an SEI Case for **Pillar 1**: *Integration of Technology*

Propose research questions that will reveal new insights related to the scaling process and integration of the technology

How will the integration of the curriculum, technology, and/or instructional design will be measured/studied **as you scale**?

Discuss how your proposed research builds upon the prior findings and how you will study and measure impact on new audiences / locales

Discuss how evidence from your prior work has demonstrated innovative learning, improvement or deepening of students' conceptual and disciplinary understandings *through the use of technology*

Pillar 2: Partnerships for Career and Workforce Development

- What is the role of the selected partnership(s)? Will they add necessary expertise?

- Will the partnership provide relevant opportunities for STEM education or career preparation and/or participation, i.e., internships, mentoring, other activities? (businesses libraries, museums, and other informal settings)

- Does the project incorporate community values and diverse perspectives? Is there a collaborative theory of action reflecting voices, knowledge, and experiences of participants and their communities?

Building an SEI Case for **Pillar 2:** Partnerships for Career and Workforce Development

Distinguish proposed communities from those represented in the prior work and distinguish their needs through new partnerships

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How does the project incorporate community values and diverse perspectives?

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Discuss the selected partnerships and their specific roles on the project

Assess cognitive and social-emotional student outcomes and measure student STEM knowledge and whether students continue to pursue further STEM and ICT education or careers

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Describe the methods to understand how the project's outcomes have met the needs of the community

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How will you distinguish the influential factors that contributed causally to the outcomes?

Pillar 3. Strategies for Equity in STEM Education

What are the inequities to be addressed:

| Individual | Relationship | Community | Societal |

Describe how strategies interrogate the interconnected factors that shape a learning environments' challenges (e.g., inequitable practices, culture and climate)

Involves project team stepping outside of normative, dominant comfort zones and explicating your positionalities

Building an SEI Case for Pillar 3: Strategies for Equity in STEM Education

Describe the rationale for scaling up with the proposed community and how the project will address specific equity issues

What are the specific inequities to be addressed in the proposed work that may not have been identified in the prior work?

Solicitation-Specific Criteria

1. To what extent does the proposal include **explicit and adequate strategies for recruiting and selecting participants from underserved and underrepresented populations** in STEM professions, careers, or education pathways?

2. To what extent does the proposal describe **approaches to address diversity, access, equity, and inclusion** in PreK-12 learning environments to ensure that **all students**, particularly those from underserved and underrepresented populations actively engage with STEM disciplines and fields that stimulate effective instruction and learning?

Solicitation-Specific Criteria

3. To what extent does the proposal describe specific **research-informed instructional approaches to build on the strengths and challenges** that students and their educators bring to classrooms and informal learning environments, <u>particularly with students from underserved and underrepresented populations</u> in STEM fields?

4. To what extent does the proposal explain how planned **innovations with the technology are developmentally and age-appropriate for students and suited for the specific populations** of students and educators, <u>from underserved and underrepresented student populations</u>?

Final Comments

Broaden the implementation and research of an innovation at a significant scale 5-10X greater than the original implementation:

=> Extend to different student populations, regions of the country, grade levels or ages of students with varying skills, and educators' capacities in PreK-12 formal and informal settings.

=> Think of impact: What is the payoff for the field; for students and teachers in formal or informal settings; and the goals of ITEST?

Awards for *Scaling, Expanding, and Iterating Innovations* (SEI) have durations up to five yrs and budgets up to **$3.5M.**

Due date for proposals: August 11, 2023

ITEST Solicitation: 22-585

ITEST SEI Concept Worksheet

1. What have you learned in your prior research?
2. What do you hope to learn by scaling?
3. What are your specific research questions related to scaling?
4. What field-advancing impacts are you seeking through SEI research?

Send worksheet to: <u>DRLITEST@nsf.gov</u>

Deadline for submitting worksheets to NSF: June 9

Questions?