

# Ingredients of a Competitive ITEST Proposal



ITEST  
Program Officers  
May 2023



# Agenda

1. Overview & Demystifying ITEST
2. Project Categories, Funding Levels
3. Required ITEST Pillars
4. Research & Evaluation
5. Solicitation-Specific Review Criteria
6. Encouraging EPScOR Applicants
7. ITEST's Emerging Workforce Priorities



# Overview

- ITEST is an applied research and development program with goals to advance the equitable and inclusive integration of technology in the learning and teaching of science, technology, engineering, or mathematics (STEM) from pre-kindergarten through high school.
- The program's objective is to support all students' acquisition of the foundational preparation in STEM disciplines. **Preparation for the current and future workforce is increasingly dependent upon the application and use of technology and computing.**



# Overview

- ITEST is responsive to societal needs and emerging areas of STEM and related careers.
- Emerging areas may include, but not limited to, quantum computing, artificial intelligence, computational thinking, cybersecurity, environmental science, and STEM entrepreneurship.
- ITEST welcomes proposals with well-designed strategies to integrate these emerging areas into effective learning and pedagogical innovations.



# Demystifying ITEST

## ITEST only funds proposals situated in formal education

ITEST funds projects in both formal and/or informal settings.

## ITEST proposals are primarily submitted by people from K-12 schools

Most PIs are university faculty, and STEM educational leaders and researchers from other organizations such as museums, libraries, etc. PIs are encouraged to work with PreK-12 schools, informal learning organizations or other related organizations to develop ideas for their proposed activities.

## University faculty members and student cannot be paid because ITEST is a program targeting PreK-12 students

PIs can budget stipend for university faculty members, undergraduate and graduate student assistants as they do for other research programs

## Colleges/universities cannot charge indirect cost because ITEST is a program targeting PreK-12 students

A college/university can charge indirect cost as they do for other research programs and the rate of charging indirect costs stays the same.



# Demystifying ITEST

## My university will not reward me for my grants on supporting PreK-12 education

We recommend that you check with your chair, dean, and provost about this. We know that many universities have recognized and rewarded faculty's contribution for K-12 STEM education in the tenure and promotion process.

## ITEST just focuses on "outreach"

ITEST is an R&D program that supports innovative technology experiences for preK-12 students and teachers. Competitive proposals should incorporate research in a way that contributes to national efforts to support increased participation in STEM education and careers.

## ITEST is about fun after-school experiences

ITEST can support experiences in any location and any time that matches with the goal of supporting increased participation in STEM education and potential careers. ITEST projects could take place at schools, community locations, museums and science centers, or at university or industry sites, and occur before, during, or after regular school hours as well as in the summer or on weekends as appropriate for the project's goals.



# Project Types & Funding Levels

Conference or Workshop Projects	Synthesis Studies	Exploring Theory and Design Principles (ETD)	Designing and Testing Innovations (DTI)	Scaling, Expanding, and Iterating Innovations (SEI)
Up to 1 year	Up to 2 years	Up to 3 years	Up to 4 years	Up to 5 years
Up to \$100,000	Up to \$400,000	Up to \$500,000	Up to \$1,300,000	Up to \$3,500,000
<ul style="list-style-type: none"> <li>Establish timeliness/value to community of the identified issue</li> <li>Describe expertise and selection criteria for participants</li> <li>Include conceptual framework</li> <li>Include draft agenda</li> <li>Describe expected outcomes &amp; dissemination</li> </ul>	<ul style="list-style-type: none"> <li>Focus on a question, issue, or topic of critical importance to ITEST pillar(s)</li> <li>Present current state of knowledge</li> <li>Explain or justify methods. May include literature reviews, qualitative meta-syntheses, meta-analyses</li> <li>Generate products useful by researchers and practitioners</li> </ul>	<ul style="list-style-type: none"> <li>Investigate conditions in the field</li> <li>Explore factors intended to increase knowledge and interest</li> <li>Research should build and advance theory, produce design principles or frameworks for innovations</li> </ul>	<ul style="list-style-type: none"> <li>Design and test or implement the innovation</li> <li>Analyze outcomes</li> <li>Research should attend to how the design principles influence knowledge and interest in STEM careers or pathways</li> </ul>	<ul style="list-style-type: none"> <li>Broaden an innovation at a significant scale</li> <li>Extend innovation to new populations, regions, ages, contexts</li> <li>Research should be transferable and generalizable to scale Assess cognitive &amp; socio-emotional outcomes, STEM/ICT knowledge &amp; or career pursuit</li> </ul>
<p><b>Proposers should contact a program officer prior to submission.</b></p>				



# Three REQUIRED ITEST Pillars



**ITEST requires** that proposed activities engage learners in the use of technologies that will support foundational preparation in STEM and information and communication technologies.

## Pillar 1: Integrating Technology in Learning

**When responding to this Pillar consideration should be given to:**

- The design features of the technology.
  - Why choose this technology? What is the evidence or literature that supports this technology choice for this population, setting, and content?
- How specific STEM disciplinary concepts will be taught.
  - How does the technology support this instruction?
- How use of the proposed technology will be supported.
  - How will it be integrated into the learning environment? How will instructors/teachers/facilitators be supported via the technology design and/or via professional development?
- What will be studied?
  - Which aspects of the technology or its deployment are novel? What outcomes will be attended to, and for whom?



## Pillar 2: Partnerships for Career and Workforce Preparation

Core to this Pillar is the call for investigators to work with **community stakeholders** to identify and define **opportunities** to support students' awareness and preparation for STEM/ICT careers.

- **Opportunities** may include: entrepreneurship, apprenticeships, externships, internships, and mentoring
- **Community stakeholders** may include: neighborhood or community groups, nonprofit or philanthropic organizations, businesses, libraries, museums, educational institutions, and other agencies.

The voices, knowledge, values, diverse perspectives and experiences of individuals who have been underrepresented and/or underserved in STEM should be considered to play a key role (e.g., project leadership, research positions, conceptualization of the partnership, decision-making processes, and interpretation and dissemination of evidence and research results). Proposals should:

- Describe how partnerships will strengthen existing collaborations and/or develop new connections between partners
- Specify how partnerships directly engage the target audience(s)
- Discuss the collaborative theory of action, how it is being implemented, and the ways in which the partnership will benefit target audience(s) and stakeholders. The theory of action should speak to how trust is developed among partners in order to identify and negotiate differences between policies and culture.



# Pillar 3: Strategies for Equity in STEM Education

The ITEST program seeks to advance NSF's vision of STEM inclusivity by leveraging diversity of intellectual and cultural perspectives to meet the goal of a fully inclusive and fully diverse STEM workforce

1. **Operationalizing.** Which specific audience(s) are being supported, and what inequities do they face that the proposed strategies seek to address?
2. **Conceptualizing.** How are your strategies for equity in STEM exploring (ETD) or building (DTI) on theories, methodologies, and/or design principles?
- 3a. **Connecting to Pillar 1.** How is that technology engaging and effective for the target audience, given their unique assets and histories?
- 3b. **Connecting to Pillar 2.** Are the voices, knowledge, and experiences of communities who will be most impacted at the center of strategic partnerships?



# Solicitation Specific Review Criteria

- **Required** in proposal narrative

To what extent does the proposal:

1. Include explicit and adequate strategies for recruiting and selecting participants
2. Describe approaches to address diversity, access, equity, and inclusion
3. Describe research-informed instructional approaches to build on strengths and challenges of the target audience
4. Explain how innovations with technology are developmentally and age-appropriate



# Research and Evaluation

*Relates to the Merit Review Criteria questions:*

What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields ?

Does the plan incorporate a mechanism to assess success?



# *Relation* between Research and Evaluation

## **Objectives of Research**

- Developing understanding of the project elements, processes and outcomes
- Developing valid and reliable measures of important learning processes and outcomes for students and teachers
- Addressing fundamental questions or issues significant to the field
- Advancing new knowledge and evidence base on important questions

## **Objectives of Evaluation**

- Is the project making satisfactory progress toward its goals?
  - Recommending evidenced-based adjustments to project plans.
- To what extent are the products and processes effective?
  - Attesting to the integrity of outcomes reported by the project.



# Key Elements of an Evaluation Plan

## Kinds of Evaluation

- **Formative** approaches that guide the project through its development and implementation, yielding suggestions for how the work might be improved.
  - *Internally* focused.
- **Summative** approaches that provide evidence to demonstrate whether the approach worked as intended.
  - *External* analysis.

## Project Evaluation Personnel

- **Advisory Board:** Internal analysis; Formative advising, Especially appropriate for Exploratory and early-stage work.
- **External Evaluator:** Formative and summative analysis of project implementation and results; Strongly recommended for design & development studies.

- Resources available at the ITEST Resource Center website: <https://stelar.edc.org/search#evaluation>
- Additional resources at <https://www.informalscience.org/evaluation>



# Key Elements of a Research Plan

Well constructed research plans contain:

- An overview of relevant research that establishes:
  - The rationale for the importance and validity of the research
  - The rationale for the design of the learning experience
  - The potential of the proposed research to contribute new knowledge to the field
- Research questions that are clear, specific and can be investigated empirically
- Specific plans for collecting quantitative and/or qualitative data that can inform the research questions
  - Justification for why the proposed research methods are valid and aligned with the research questions
- A description of the research team's roles and expertise.



# Encouraging EPSCOR Applicants

- EPSCoR: **E**stablished **P**rogram to **S**timulate **C**ompetitive Research
  - EPSCoR program pursues a mission to enhance the research competitiveness of targeted jurisdictions
- Eligible states:
  - Alabama, Alaska, Arkansas, Delaware, Guam, Hawaii, Idaho, Iowa, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Puerto Rico, Rhode Island, South Carolina, South Dakota, Vermont, US Virgin Islands, West Virginia, and Wyoming
- EPSCoR likes funding projects that:
  - Catalyze the development of research capabilities
  - Establish sustainable STEM education, training, and professional development pathways
  - Broaden direct participation of diverse individuals, institutions, and organizations
  - Support sustainable engagement of project participants and partners through data-sharing, communication, outreach, and dissemination
  - Impact research, education, and economic development beyond the project at academic, government, and private sector levels
- For more information:
  - <https://new.nsf.gov/funding/initiatives/epscor>
  - <https://new.nsf.gov/funding/initiatives/epscor/2023-epscor-pi-meeting>



# EMERGING WORKFORCE PRIORITIES

- AI
- Data Science
- Computational Thinking
- Quantum Information Science and Engineering



General inquiries regarding this program and program solicitation should be made to:

[DRLITEST@nsf.gov](mailto:DRLITEST@nsf.gov)

**What should you do if you have a specific inquiry regarding your project or proposal?**

Using the email address above, in the body of the email or as in attachment, send a brief (max 2 pages) summary of the research or R&D you are planning to conduct. The synopsis should include a very brief rationale for the work, how it will contribute to the knowledge base on informal learning, and what you believe the broader impacts to be. Be sure to also include your specific questions.



# We look forward to receiving your proposals

## Solicitation:

<https://www.nsf.gov/pubs/2022/nsf22585/nsf22585.pdf>

**Full Proposal Deadline: August 11, 2023**  
(due by 5 p.m. submitter's local time):

