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Innovative Technology Experiences for Students and Teachers (ITEST): Solicitation 22-585

ITEST Program Officers, Division of Research on Learning

Link to solicitation: https://www.nsf.gov/pubs/2022/nsf22585/nsf22585.pdf

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ITEST Program

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**.

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ITEST Highlights

- 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, data science, 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.

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Changes since last solicitation

- ITEST Solicitation-Specific Review Criteria are required of all proposals.
- Required components for proposals in Section B of the Program Description are revised.
- Project types are revised.
- Proposals must be submitted using Research.gov or Grants.gov.
- Proposals must be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 22-1).

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Funding level changes for each project type

- Exploring Theory and Design Principles (ETD): $~~400,000~~; NOW $500K
- Developing and Testing Innovations (DTI): $~~1,500,000~~; NOW $1.3M
- Scaling, Expanding, and Iterating Innovations (SEI): ~~$3,000,000~~; NOW $3.5M
- Syntheses: ~~$300,000~~; NOW $400K
- Conferences: $100,000. NO CHANGE
- Resource Center: ~~$4,000,000~~ ~~in FY 2020~~. NOW $5M

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Scaling, Expanding, and Iterating Innovations (SEI)

All SEI proposals must touch on all four areas:

(a) broaden the implementation and research of an innovation at a significant scale of five to ten times greater than the original implementation;

(b) extend an innovation 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;

(c) examine issues of transferability and generalizability and the factors that support or inhibit scaling; and

(d) 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.

It is essential that all SEI proposals describe what was learned in previous empirical and evaluation work that led to the SEI proposal.

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ITEST Projects: Overview

- Projects should build on evidence from prior research, relevant literature, and/or practice
- Advance the field through the development of innovative research, assessment, resources, models and tools
- Generate knowledge through research, development, & evaluation, asking “what is happening,” “to what extent,” “why,” “how,” “what works for whom,” and “under what circumstances”

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ITEST Projects: Overview

- Audience: Public and/or Professional
- Students / PreK-12 learners are required participants
- Projects proposing teacher professional development are required to address how student outcomes will be examined in relation to educator learning outcomes or learning processes.

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Three required ITEST Pillars (II.A)

Pillar 1: Innovative Use of Technologies in Learning and Teaching

Pillar 2: Partnerships for Career and Workforce Preparation

Pillar 3: Strategies for Equity in STEM Education

Note: Each Pillar is required to be discussed in all proposals.

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Pillar 1: Innovative Use of Technologies in Learning & Teaching

- Discuss how key technology design features provide developmentally appropriate and innovative STEM learning experiences.
- Discuss how engagement with technology-infused disciplinary learning strengthens cognitive, social and affective outcomes.
- Discuss professional development for PreK-12 teachers or other educators in the use of technology in classroom or informal settings.

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Pillar 2: Partnerships for Career and Workforce Preparation

Discuss how partnerships:

- Strengthen existing or create new collaborations with educational institutions, employers, and communities to support apprenticeships, entrepreneurship, and mentoring to support STEM engagement.
- Actively incorporate and work with the values, strengths, and diverse perspectives of underrepresented participants.
- Seek to develop trust between partners that address differences in policy and culture that will benefit students, educators, and partners.

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Pillar 3: Strategies for Equity in STEM Education

- Discuss specific strategies for engaging participants from underrepresented groups, including those from diverse ethnic/racial groups, persons with disabilities, participants from disadvantaged backgrounds, women, and participants from LGBTQ communities.

- Discuss strategies needed to address challenges or inequities that exist in current practices or organizational climates that affect inclusion.

- Discuss explicit strategies for addressing specific characteristics of underrepresented or underserved participants.

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Project Types

Exploring Theory and Design Principles (ETD)	Designing and Testing Innovations (DTI)	Scaling, Expanding, and Iterating Innovations (SEI)
Up to 3 years	Up to 4 years	Up to 5 years
Up to $500,000	Up to $1,300,000	Up to $3,500,000
• Investigate conditions in the field • Explore factors intended to increase knowledge and interest • Research should build and advance theory, produce design principles or frameworks for innovations	• Design and test or implement the innovation • Analyze outcomes • Research should attend to how the design principles influence knowledge and interest in STEM careers or pathways	• Broaden an innovation at a significant scale • Extend innovation to new populations, regions, ages, contexts • Research should be transferable and generalizable to scale Assess cognitive & soc-emo outcomes, STEM/ICT knowledge & or career pursuit

Additional types: Conference, 1 year, $100,000; Synthesis, 2 years, $400,000

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Thoughts on Developing Projects

- Proposals should describe the STEM/ICT content, learning experiences (as the context for the research) and intended impacts
- Consult the IES/NSF Common Guidelines
  - ETD: Type 2; DTI: Type 3; SEI: Types 4, 5, and 6
  - Link: https://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf

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High-Quality Research Design

- Research questions grounded in scholarly literatures
  - theory-oriented
  - explain the relation between the innovation's design features and the impacts on knowledge and interest in preparation for STEM careers
- Plans for collecting quantitative and/or qualitative data
  - relevant for addressing the research questions
  - cognitive and social-emotional outcomes
- Well-defined analytical methods appropriate to address the research questions
- Valid and reliable measurement instruments (or plans to develop such instruments)

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Project Evaluation

What steps will the project take to provide feedback on the work, both formatively and summatively?

- Articulation of evaluation questions related to the scope of work
- Delineation of activities and data to be undertaken
- Description of how the project will use evaluation findings

The form of evaluation is not prescribed. External evaluators and/or advisory boards can serve this purpose. The expertise, questions, and activities/data are the most critical components.

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Dissemination of Findings

A creative communication strategy for reaching broad audiences with project findings.

- Elements of the communication plan
  - Target audiences
  - Channels
  - Technologies/aspects of the innovation
- Dissemination appropriate to the partnership audience
  - Publications
  - Presentations
  - Materials

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Designing Innovations that Meet ITEST Program Goals

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Innovative Use of Technologies

- Using new or leading-edge technologies
- Using existing technologies in innovative ways

On the student side, this should include:

- Details about how learners will be directly interacting with the technology
- Measurement of the ways in which the technology experience influences cognitive and socio-emotional learning outcomes
- Explain how the technologies used are developmentally and age appropriate

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Innovative Learning Experiences

Describe the innovation and the key aspects of the design.

Make connections to the research literature, and explain how it advances this literature.

Demonstrate how the design builds *knowledge and interest* in preparation for STEM careers.

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STEM Workforce Development

- Connect workforce learning environments to PreK-12 learning opportunities
- Make the connection to knowledge of and interest in STEM/ICT workforce pathways – not just building STEM/ICT knowledge, but how it is explicitly connected to workforce & careers.
- Engage students in awareness of or participation in entrepreneurship, apprenticeships, internships, or mentoring

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Solicitation-Specific Review Criteria – Broadening Participation

- Include explicit strategies for recruiting and selecting participants
- Describe approaches to address diversity, access, equity, and inclusion
- Describe research-informed instructional approaches to build on strengths and challenges
- Explain how innovations with technology are developmentally and age-appropriate

Note: All proposals **MUST** address the Solicitation Specific Review Criteria.

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Reminders and Resources

Reminders

- ITEST Proposals must be submitted via Research.gov (NSF's Fastlane no longer used)
- Make sure to register with Research.gov
- Submit early

Resources

- STELAR Resource Center: stelar.edc.gov
- Nsf.gov for award search and much other information
- Proposal & Award Policies & Procedure Guide: https://www.nsf.gov/pubs/policydocs/pappg20_1/index.jsp

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Online Resources

NSF Advanced Award Search:
www.nsf.gov/awardsearch/advancedSearch.jsp
Secret Information: Element Codes

- ECR: 7980
- DRK-12: 7645
- ITEST: 7227
- AISL: 7259

STEM Video Showcase:
https://stemforall2021.videohall.com/pages/about/about-event

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Resource Centers

AISL: Center for Advancement of Informal Science Education (CAISE) informalscience.org

DRK-12: Community for Advancing Discovery Research in Education (CADRE) cadrek12.org

ITEST: STEM Learning and Research Center (STELAR) stelar.edc.org

***CIRCL**:* http://circlcenter.org

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

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 1-page 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.

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NSF Important Notice: Research.gov is now required for submission of ITEST proposals

Resources available to guide you through the proposal submission via Research.gov:

Research.gov Video Tutorial:
https://www.research.gov/common/attachment/Desktop/psmvideo1.html

How a PI Initiates a New Proposal in research.gov:
https://www.research.gov/common/attachment/Desktop/How_PIs_Initiate_New_Rgov_Proposals_Final_508.pdf

Full library of NSF Proposal Preparation Resources:
https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html

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Questions and Discussion

DRLITEST@nsf.gov