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Innovative Technology Experiences for Students and Teachers (ITEST): Solicitation 19-583

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Link to solicitation: https://www.nsf.gov/pubs/2019/nsf19583/nsf19583.htm

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ITEST Program

ITEST is an applied research and development program designed to broaden participation in STEM/ICT careers and career pathways through providing pre-K through 12th grade youth with technology-rich learning experiences in formal or informal settings.

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Laying the Groundwork

Key Definitions and Parameters

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STEM-Related Workforce Fields

- Traditional STEM disciplines
- Information and Communications Technology (ICT)
- Computing, Computer Science, Data Analytics, Data Science, and related fields
- Professionals at all levels, including technicians, technologists, scientists, engineers, computer scientists, and mathematicians
- *STEM teachers are a part of the STEM workforce!*

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What makes it an ITEST project?

- …research on knowledge of and interest in STEM with an emphasis on careers and career pathways
- …directly engages PreK-12 learners using technology
- …grounded in relevant research
- …contains explicit strategies to broaden participation of underrepresented and/or underserved populations in STEM careers and career pathways

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Other Important Considerations

- Examples of possible cognitive outcomes
  - Knowledge and understanding of STEM content
  - Knowledge and understanding of STEM careers
  - Understanding of STEM career pathways
- Examples of possible socio-emotional outcomes
  - Dispositions towards STEM fields and disciplines
  - Interest in STEM careers and career pathways
  - Motivation to pursue further STEM learning
  - Identities in STEM

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Other Important Considerations

- Innovative ***use*** of technology
  - A new cutting-edge technology not previously used in formal or informal education settings
  - An innovative educational use of an existing technology
  - Technologies should be clearly related to preparation for STEM careers or career pathways
- Engaging learners through partnerships in formal or informal settings
- Collaborations between researchers and practitioners in STEM disciplines, STEM education, career development, psychology, sociology, anthropology, or other fields related to the project

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Project Types

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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 $400,000	Up to $1,500,000	Up to $3,000,000
• 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 (5-10x original) • Extend innovation to new student populations, regions, ages, contexts • Research should attend to transferability and generalizability and factors related to scale

Additional types: Conference, 1 year, $100,000; Synthesis, 2 years, $300,000

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Thoughts on Developing Projects

- Consider the balance between research and development
- Consult the IES/NSF Common Guidelines
  - ETD: Type 2; DTI: Type 3; SEI: Types 4, 5, and 6
- Projects must have high-quality research design, project evaluation, and dissemination of findings

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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 outcomes
  - social-emotional outcomes
- Well-defined analytical methods appropriate to address the research questions

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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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Five Key Components

- Innovative Use of Technologies
- Innovative Learning Experiences
- STEM Workforce Development
- Strategies for Broadening Participation
- Strategic Partnerships

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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

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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.

Be clear about the roles for all stakeholders and how they relate to the overall timeline.

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STEM Workforce Development

- Connecting workforce learning environments to PK-12 learning opportunities
- Making the connection to knowledge of and interest in workforce pathways – not just building STEM knowledge, but explicitly connecting to workforce
- Engaging students in awareness of or participation in entrepreneurship, apprenticeships, internships, or mentoring

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Broadening Participation

Broadening participation is more than just ***working with*** underserved or underrepresented populations.

- How will you specifically recruit and retain these populations?
- How does the design of the innovation specifically address these populations?
- In what ways are you conceptualizing and leveraging the *assets* that these populations bring to the table?

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Solicitation-Specific Review Criteria

To what extent does the proposal

- include explicit and adequate 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

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Strategic Partnerships

Examples of partners:

- Colleges and universities (particularly HBCU, HSI, MSI, and tribal colleges)
- Businesses
- Libraries, museums, and other places of informal learning

Proposals should describe how the strategic partners are integrated into the work and how they will engage learners and educators through project activities.

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Questions and Discussion

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