NSF ITEST Program
Proposal Development Workshop for EPSCoR Jurisdictions

Wednesday, October 25, 2023

This material is based upon work supported by the National Science Foundation under Grant Nos. DRL-1312022, 1614697 and 1949200. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation

Agenda

- Welcome and Goals
- STELAR Introduction
- The NSF ITEST Program
- Q&A Session
- Networking Session
- Birds of a Feather Session

Goals for the Event

- Learn about the NSF ITEST Program & STELAR Center
- Understand what is needed for a strong ITEST proposal
- Understand the NSF proposal submission process
- Connect with NSF program officers
- Connect with each other!

stelar

STEM LEARNING AND RESEARCH CENTER

STELAR's mission is to build capacity and magnify the results of ITEST projects to deepen the impact of the ITEST program.

What STELAR Does

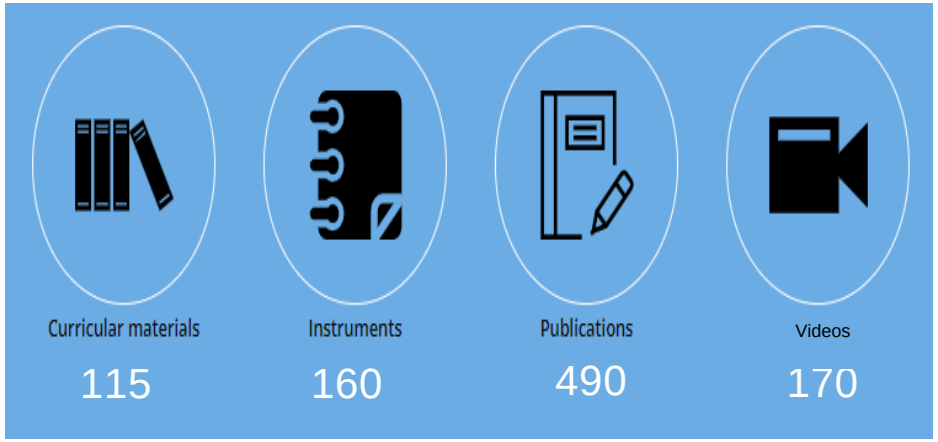
- Facilitate projects' success through technical support
- Inform and influence the field by disseminating ITEST project findings through project syntheses
- Deepen the impact and reach of the program by broadening participation in the ITEST portfolio

ITEST Resources

Project Profiles

Project STEMulate, University of Hawaii (DRL 1657625)

ITEST Resource Library

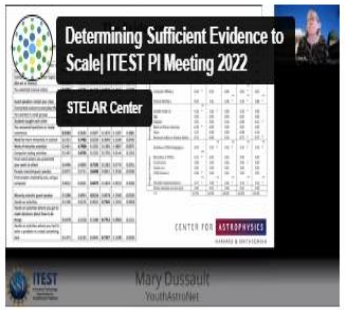


ITEST Proposal Development Resources

As the resource center for the NSF ITEST Program, STELAR is charged with supporting those new to the program in developing competitive proposals. In doing so, we encourage individuals from areas, organizations, and institutions that are underrepresented in the ITEST portfolio.

Prepare to Scale, Expand, and Iterate your STEM and ICT Learning Innovations

To support those interested in applying for an SEI grant, STELAR is planning webinars and workshops to answer questions and provide feedback for grant developers. Below you will find a series of videos of ITEST Principal Investigators sharing SEI work at different stages.



Our Affiliation with NSF

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Questions?

Networking Breakout Prompt

What did you hear about the ITEST program that excited you?

- I used to think...
- Now I know...

Take a break!

Return by 12:30 ET / 11:30 CT

Networking Breakout

- Introductions (name/location/org)
- Share an aspect of your STEM interest: discipline, technology, participants
- What did you hear about the ITEST program that excited you?
  - I used to think...
  - Now I know...

Take a break!

Return by 1:45 ET / 12:45 CT

Birds of a Feather Breakout Rooms

1. Emerging Technologies and Careers
    - AI, cybersecurity, quantum, blockchain, microelectronics/ semiconductor
2. Scope and stage of the planned project work/project type
    - Theory and Design (ETD), Developing and Testing (DTI), Scaling (SEI)
3. Accounting for diversity, inclusion, and intersectionality of learners
4. Science Education
    - Citizen science, interactive spaces
5. Engineering and teacher education

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- Connect with each other!

Agenda

- Welcome & Introductions
- Logistics, Theory of Change, Logic Model
- Project Description
- Q&A
- Research and Evaluation
- Dissemination
- Budget and Budget Justification
- Putting it all together
- Finalizing and uploading to Research.gov
- Q&A

ITEST PROPOSAL DEVELOPMENT COURSE

brought to you by the STEM Learning and Research (STELAR) Center

Course Disclaimer: This course was developed by Education Development Center/STELAR. Completing the course does not guarantee the participants' proposals being more likely to receive funding from NSF or the ITEST program.

Module 1: Introduction

The Logistics of Proposal Development

Proposal Timeline

Resources

NSF Resources

- ITEST Solicitation (NSF 22-585)
- Proposal & Award Policies & Procedures Guide (PAPPG)
- Research.gov / Demo Site
- ITEST Solicitation Webinar
- DRLITEST@nsf.gov

STELAR Resources

- ITEST Project Profiles
- Instruments and Resource Libraries
- Proposal Development Resources
- Proposal Development Course
- STELAR *is* a Resource
- stelar@edc.org

Theory of Change & Logic Model

Theory of Change & Logic Model

Theory of Change:

- A higher-level model that describes why you think your intervention will have a particular impact on the target population
- Should be informed by the literature

Logic Model:

- Spells out more specifically how these mechanisms will work in your project

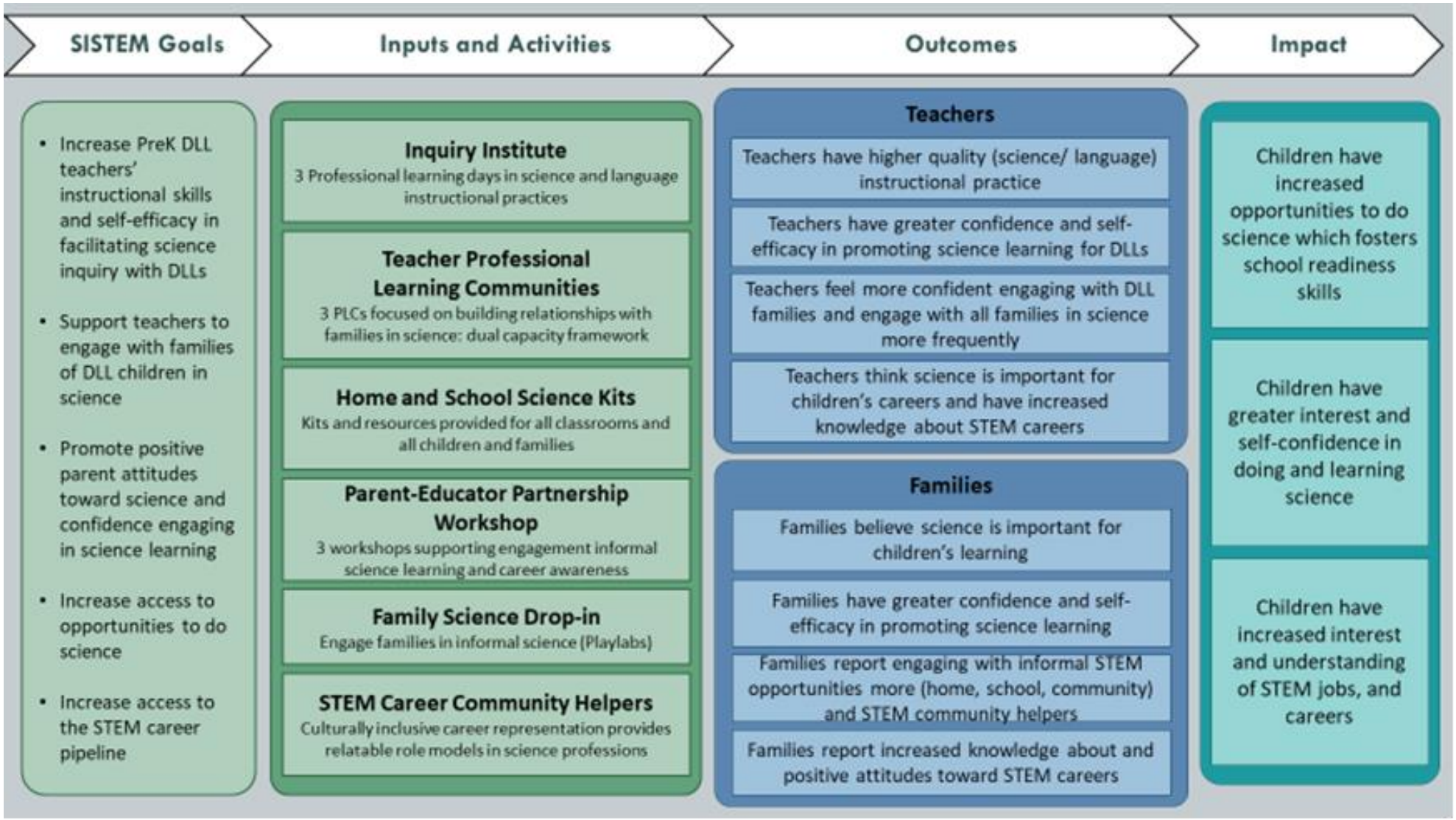
Why Develop a Logic Model?

- Helps team think through what they want to do and why
- Provides:
  - framework/checklist for proposal development
  - snapshot of how your project operates
  - connection between your planned work and intended results
- Illustrates the relationships between resources, activities, and intended outcomes
- Guides evaluation

Basic Logic Model

Inputs -> Activities -> Outputs -> Outcomes

Sample ITEST Logic Model



Sample ITEST Logic Model

APPROACH: Empower **families** as DLL children's STEM advocates: Create and strengthen **home/school partnerships** using the Dual-Capacity Building Framework: Promote **educators'** capacity & confidence in teaching science to DLLs incorporating POLL to support DLLs' language learning

	INPUTS	ACTIVITIES	OUTPUTS (Y2, Y3, Y4)	OUTCOMES
Families	• LASErS family resources • EDC/CSC expertise in family science • PEEP for parents	• Family drop-in events at Play Lab • Family science kits and guidance for using PEEP	• 50% of families/DLL families visit Play Lab for drop-ins • Family science kits given out to all families in Y2, Y3, Y4 (3 topics)	• **DLL families** have increased perceptions of themselves as partners in their children's learning and increased engagement, confidence, and skills in supporting their DLL children's science inquiry • **PreK teachers** have increased perceptions of themselves as partners in DLL children's learning and increased skills and self-efficacy in facilitating science inquiry with DLL children • **Teachers, families and children** have greater knowledge of STEM careers • **DLLs** have increased science, language and literacy skills and increased interest and self-confidence in science.
Home/school partnerships	• Dual Capacity-Building Framework • LASERs DLL science/ language approach • CSC STEM community helpers and informal science expertise	• Collaborative parent/teacher science workshops • STEM helper visits to workshops, classrooms, and Play Lab • Annual "I love science!" CSC capstone event	• 3 collaborative parent/teacher workshops with 80% of teachers and 50% of DLL parents • Two STEM helpers visit collaborative workshops, classrooms, Play Lab • 50% of DLL parents, 75% of teachers, 50% of DLLs attend annual CSC capstone event	
Educators	• LASErS teacher resources • CSC Inquiry Institute • POLL • EDC/CSC's coaching expertise • CSDNB's commitment to PreK STEM	• Two-day Inquiry institute • Teacher science kits and guidance for using PEEP • F2F coaching • Online PLCs	• 90% of teachers participate in Inquiry Institute • 75% of teachers participate in F2F coaching • 60% of teachers participate in on-line PLCs • 75% of teachers implement and facilitate 3 inquiry-based lessons with DLL students	

Innovative use of technologies: provide digital resources to catalyze children's science explorations at home & school; provide online teacher PLC
Innovative learning experiences: engage parents and teachers in collaborative learning opportunities; provide play-based science inquiry for DLLs
STEM workforce development: enlist STEM community helpers to promote STEM awareness and be culturally diverse STEM models for children
Broadening participation: use Dual Capacity-Building Framework to welcome DLL families in schools, POLL to build literacy skills using science
Strategic partnerships: build on existing partnerships with CSC and CSDNB and jointly cultivate partnerships with local STEM businesses

Logic Model Template

Project Title

Project goal 1:
Project goal 2:

Inputs	**Activities/Key components**	**Outputs**	**Short/medium/ long term outcomes**
This project will provide: Specific resources Specific partnerships	Key activities and/or products that will be implemented and with whom Teachers will participate in professional development that will build x, y, z skills Youth will participate in summer program that does x, y, z	## teachers will participate in professional development ## youth will participate in summer program ## modules will be developed	Youth outcomes Teacher outcomes

Assumptions
Belief systems of participants

Expanding Your Logic Model

Theory of Change: Using _____ framework, this proposal addresses ITEST pillars

_____ and hypothesizes that _____ activities will lead to _____ changes.

Output description	**Output measure**		**Outcome description**	**Outcome measure**
Example: Youth participate in summer STEM program	*Example: 50 youth attend 3-week summer STEM program*		*Example: Youth increase interest in computer engineering*	*Example: After participating in summer program, 50 youth matriculate in high school CS course*

Concept Paper Components

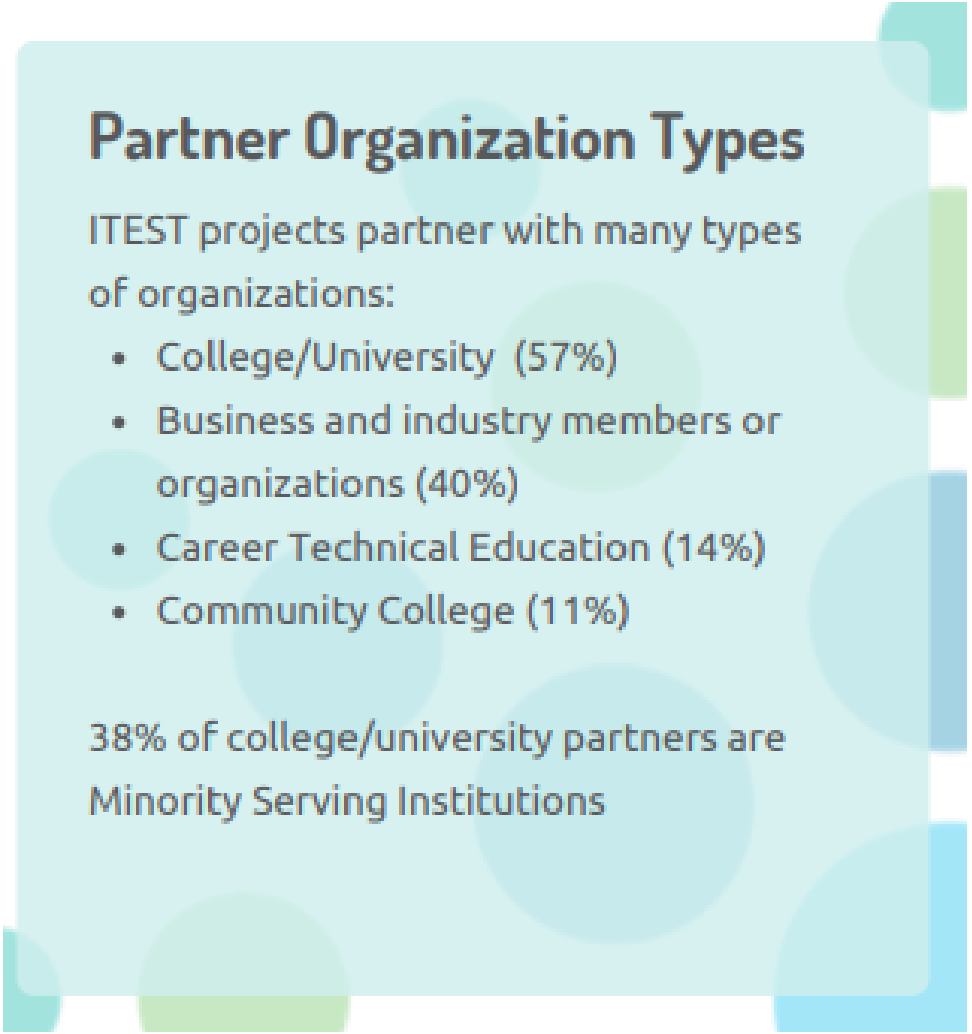
- A description that includes what, when, where, who, and why:
  - What: what will you implement if you get funded?
  - When: when will you implement each part of your idea?
  - Where: what location are you proposing? Think about both geography and setting (e.g., classroom, after school)
  - Who: who will be participating in your project?
  - Why: why is this a compelling idea?
- Statements of the intellectual merit and broader impacts from the activities summarized above
- Include information about the design elements that address the three pillars:
  - Innovative Use of Technologies in Learning and Teaching
  - Partnerships for Career and Workforce Preparation
  - Strategies for Equity in STEM Education
- Identify your project type as: Exploring Theory and Design Principles (ETD), Developing and Testing Innovations (DTI), or Scaling, Expanding, and Iterating Innovations (SEI)

Module 2: Forming Partnerships

Partnerships

Partnerships are vital to the success of your project.

- Spend time identifying and recruiting your project partners that can provide additional expertise and diverse perspectives
- Meet with partners to clarify roles and responsibilities so that, once funded, your project will operate smoothly



Source: [2022 ITEST Portfolio Overview]

Develop Your Project's Picture

Your project concept will likely change during the proposal development process, but the Picture provides a starting point for conversations with potential partners.

Some questions to think through before reaching out to partners:

- Does our organization want to lead on the project?
- What activities do we want primary responsibility for?
- What activities do we want partners to take responsibility for?
- What are our non-negotiables?

Examine Partner Priorities

To understand the institutional self-interest of potential partners:

- Consider their mission and vision. Look into what they do, how they hope to grow, etc.
- Hold one-on-one meetings with the leadership of potential partners to discuss their vision, their needs, and areas of mutual interest
- Consult others who have worked with the potential partner

Measure Partnership Value

You should assess the extent to which potential partners strengthen the overall proposal.

Your assessment should address questions like:

- Does a potential partner fill an otherwise unfillable “gap” in the proposed project?
- Does a potential partner have previous experience in similar kinds of projects or with NSF as a funding source?
- Does the current proposal offer a chance to test whether a potential partner might be a prospect for a long-term relationship?

How to Find Potential Partners

- STELAR's People Connector Directory
  - Search for the expertise that you need
  - Register yourself for others to find
- Search the STELAR site for similar projects
  - stelar.edc.org/projects - search by discipline, grade spans, states, etc.
- Check out other NSF programs
  - Similar programs like DRK-12, AISL, INCLUDES, etc.

Module 3: Project Description

Example Outline of a Project Description

1. Project Overview, Rationale, and Importance
    - Project Goals and Objectives
    - Project Activities
    - ITEST Pillars
    - Solicitation Specific Criteria
2. Results from prior NSF support
3. High-Quality Research Plan
4. Project Evaluation
5. Dissemination
6. Expertise and Management
7. Intellectual Merit & Broader Impacts

ITEST Merit Review Criteria

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge

- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes

Project Overview & Rationale Checklist

- Overview of the project
- Include strong statements describing why this project is necessary
- Build upon prior research
- Describe your theory of change
- Review of the literature/theoretical grounding of your theory of change
- Describe the Intellectual Merit of your project
- Include a heading and section that describes the Broader Impacts of your project
- Make a strong case for how your project will advance research in the field

Goals & Objectives Checklist

- Flow from your Rationale as next step to advance field
- Provide an understanding of how project parts are connected/lead to intended outcomes
- Clearly state how your project is designed to address the ITEST Pillars
- State the goals/objectives and research questions clearly
- Align to and include your logic model
- Make a clear connection between the project description text and the logic model
- Provide reader with understanding of how the parts of the project are connected to the outcomes

Project Activities Checklist

- Provide further detail on activities
- Include a timeline and responsibility matrix
- Describe participants, recruitment, selection, and compensation
- Provide a high-level overview of key events
- Connect activities to your theory of change
- Explain professional development
  - Who will provide, when, and how often
  - How will feedback be collected
  - What pedagogical approaches will be used

ITEST Pillars

Innovative Use of Technologies in Learning and Teaching

Partnerships for Career and Workforce Preparation

Strategies for Equity in STEM Education

Adapted from NSF 22-585
STELAR 2022

Results from Prior Support Checklist

1. Include the NSF award number, amount, and period of support; the title of the project
2. Provide a summary of the results of the completed work, including accomplishments, supported by the award
3. List publications resulting from the NSF award
4. Provide evidence of research products and their availability
5. If the proposal is for renewed support, describe the relation of the completed work to the proposed work
6. If the project was recently awarded, describe the major goals and broader impacts of the project.

Note that the proposal may contain up to five pages to describe the results.

Expertise & Management Plan Checklist

- Describe the management structure that will be used to administer the project
  - Role of lead organization, team meetings, expectations for reporting progress, etc.
  - Frequency and method of communication with partners
- Describe partners/institutions and the role they will play in the proposed project
- Describe the expertise of key personnel (PI, Co-PIs, PD, Evaluator) and their primary project responsibilities
- Describe the Advisory Committee members
  - Affiliations, why selected, role/responsibilities for guiding project activities
  - Process for gathering and using input

Review Criteria for all NSF Proposals

- Advances knowledge/understanding, benefits society/advances desired societal outcomes
- Activities suggest/explore creative, original or potentially transformative concepts
- Is well reasoned, well-organized, based on a sound rationale; assesses success
- Team, organization, individuals are well qualified
- Resources adequately support activities

Solicitation Specific Review Criteria

- Includes specific/adequate strategies to recruit populations underserved in STEM
- Describes approaches to address diversity, access, equity, and inclusion in PreK-12 learning environments
- Describes research informed approaches to build on student and educator strengths
- Explains how technological innovations are developmentally/age-appropriate for students and suited for target populations

What would a reviewer want to know?

- What do you want to do? (Summary/Overview)
- What do we already know? (Lit Review)
- What are you doing to help us learn more? (Goals/Objectives)
- What new knowledge will be generated? (Research)
- How will you know your project is successful? (Evaluation)

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Questions?

Take a break!

Return by: 12:30 ET / 11:30 CT

Module 4: Research

Designing Your Research

- Identify research questions
- Research design is a critical component
- Part of a coherent framework
  - Rationale, Logic Model, Project Activities, Research Plan, Evaluation Plan

Designing Your Research

1. How will your project incorporate the ITEST Pillars?
2. How will your research address the goal of increasing knowledge of, and interest in, STEM and ICT careers?
3. Which type of ITEST project is most appropriate?
4. What is the stage of your research?

Identifying a Researchable Question

- The stage of your technology innovation
- Scholarly literatures
- Your Theory of Change and Logic Model
- Your research questions should be

  (a) critical to the field (Intellectual Merit)

  (b) of use to stakeholders

  (c) interesting to you

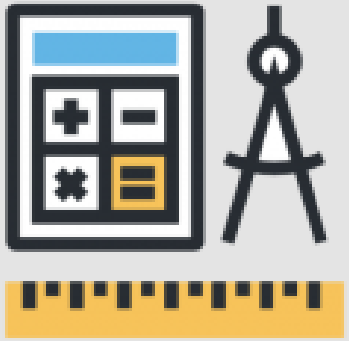
Research Stages

ITEST Project Type	Common Guidelines for Education Research and Development
Exploring Theory and Design Principles for Innovations (ETD)	*Type 2: Early Stage or Exploratory Research*
Developing and Testing Innovations (DTI)	*Type 3: Design and Development Research* *Type 4: Efficacy Research*
Scaling, Expanding, and Iterating Innovations (SEI)	*Type 5: Effectiveness Research* *Type 6: Scale-up Research*

U.S. Department of Education and the National Science Foundation (2013) https://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf

Research Plan

- Research questions
- Sample and recruitment strategy
- Specific plans for collecting quantitative and/or qualitative data
- Valid and reliable instruments and measures
- Well-defined analytical methods
- Methodological expertise



Module 5: Evaluation

Research & Evaluation

Research

- Includes questions that address the ITEST Pillars
- Includes a carefully described research plan with all the components described in the Research Module
- Contributes to the Intellectual Merit of the proposal

Evaluation

- Is the project making sufficient progress toward meeting the goals and objectives?
- What are the intellectual merits and broader impacts of the project with respect to its intended outcomes?

Aligning Research & Evaluation

Research

- Activities designed to contribute to the field

Evaluation

- Activities designed to build understanding of the specific project

Evaluation

Three things to consider:

- Identify evaluation questions
- Decide how the evaluation will be designed
- Align your research plan and evaluation sections

External Evaluation

- Includes a formative or development component
- Serves as a critical friend
- Clarify theory of change in proposal
- Identify changes in the middle
- Provides ongoing feedback

Evaluation

What ITEST looks for:

- Mechanisms for providing independent oversight and review of proposal activities
- Evaluation questions
- Evidence gathering
  - Activities
  - Data
- Use and purpose of evidence gathered
- Inclusion of activities in the project timeline

Resources

- ITEST Instrument Database
- STELAR Resources
- People Connector Directory
- ITEST Proposal Development Course

Module 6: Dissemination

Dissemination

- Dissemination allows others to build on what you learn and develop.
- The ITEST solicitation specifies that certain components *must* be included in the dissemination section of your proposal.
- Include a dissemination plan that identifies your target audiences, the key elements you'll want to communicate about your project, and the channels, media, or technologies you'll use to reach people, particularly *in addition to* other academics that you'll reach through scholarly publications and presentations in conferences.

Dissemination—Peers

Consider *what* your project will produce, *who* the audience for it is, and *how* to reach them.

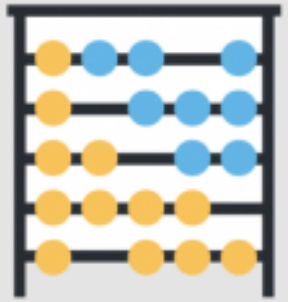
- A Product (e.g., curriculum modules)—teachers, administrators—practitioner journals; conference presentations

- Research Findings—researchers, developers—peer-reviewed journals; conference presentations and webinars; STELAR

Additional methods: online; white papers and reports; media

Dissemination—General Public

- Commitment to diversity and inclusion can include sharing findings with study participants and their community.
- If your institution or organization has a communication department, they can assist you in writing and distributing press releases.
- The full STELAR proposal development course provides detailed information on dissemination options, including many resources.



Module 7: Budget

Proposal Types

Proposal Type	Number of Awards	Maximum Duration	Maximum Budget
Exploring Theory and Design Principles for Innovations (ETD)	8-10	3 years	$500,000
Developing and Testing Innovations (DTI)	8-10	4 years	$1,300,000
Scaling, Expanding, and Iterating Innovations (SEI)	3-5	5 years	$3,500,000

Key Budget Components

For the proposed work…

- Staff time and salaries
- Travel costs
- Participant support costs (e.g., teachers)
- Direct costs for partners (e.g., sub-awards, consultants)
- Other direct costs
- Indirect costs (administrative/financial)

Budget & Budget Justification

- The budget outlines the cost of each line item that is needed to perform the work
- The budget justification describes the intended use of every line item of the budget
- It should show how the funds will be used and why that amount is needed
- The budget justification cannot exceed 5 pages

Module 8: Putting it All Together

Proposal Components

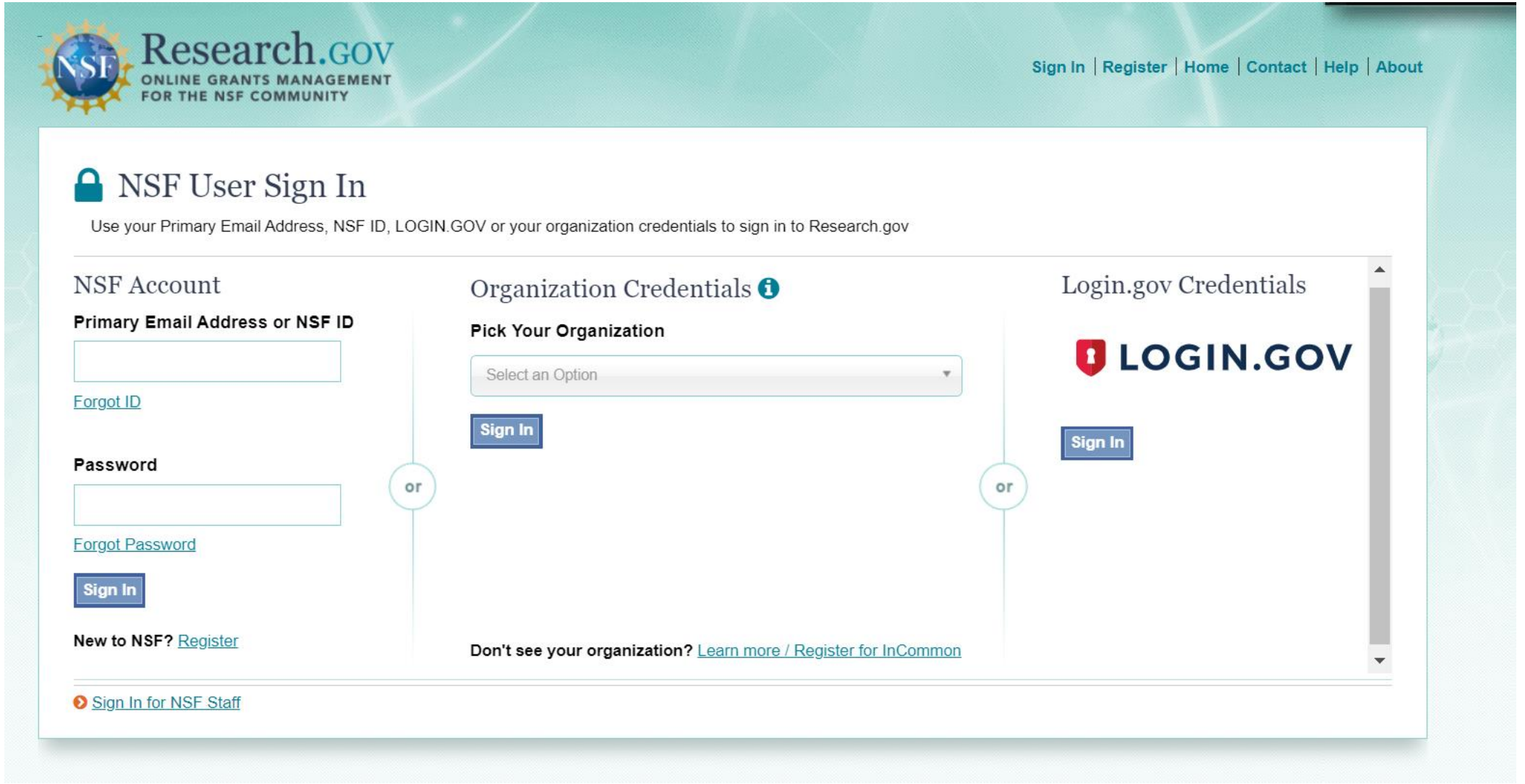
Proposal Component	Length
Cover Sheet	1 page/online form
Table of contents	Generated by research.gov
Project Summary	1 page
Project Description	15 pages
References Cited	No limit
Budget	n/a
Budget Justification	5 pages

Proposal Components

Proposal Component	Length
Data Management Plan	2 pages
Postdoctoral Researcher Mentoring Plan (if applicable)	1 page
Biographical Sketches	3 pages per staff member
Current and Pending Support	1 form per staff member
Collaborators and Other Affiliations	1 form per staff member

Module 9: Research.gov

Research.gov



Proposal Actions

- Share Proposal with SPO/AOR
- Check Error(s) and Warning(s)
- Manage Personnel and Subaward Organizations
- Print Proposal
- Delete Proposal

Proposal Details

Proposal Status:
Not Shared with SPO/AOR

Helpful Links

View Submitted Proposals

Proposal and Award Policies and Procedures Guide (PAPPG)

Demo Site FAQs

Proposal Sections	Last Updated	Compliance Status [Key]
Required		
Cover Sheet		Form not checked
Project Summary		Document unavailable for check
Project Description		Document unavailable for check
References Cited		Document unavailable for check
Budget(s)		Form not checked
Budget Justification(s)		Document unavailable for check
Facilities, Equipment and Other Resources		Document unavailable for check
Senior Personnel Documents		Document unavailable for check
Data Management Plan		Document unavailable for check
Postdoctoral Mentoring Plan *Conditionally required*		Document unavailable for check
Optional		
Other Personnel Biographical Information		Document unavailable for check
Other Supplementary Documents		Document unavailable for check

Questions?

Take a break!

Return by: 1:45 ET / 12:45 CT

Welcome back!

Questions with NSF POs

Thank you for your interest in the ITEST program