This document is STELAR's high-level summary of the required elements of your ITEST proposal. This summary is not intended to replace a careful review of both the ITEST Solicitation as well as the PAPPG. Check out STELAR's ITEST Proposal Development Course for a more detailed explanation of any of the sections listed below (note: registration for the course is free but required to access).

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1. PROPOSAL SECTIONS

The following table provides a high-level summary of each of the proposal components and page length (where applicable).

Proposal Component	Brief Description	Length
Cover Sheet	The Cover Sheet is an online form you'll complete through Research.gov.	1 page
Table of contents	Your Table of Contents will be created automatically as you upload the other documents. However, you will still need to add page numbers to each of your uploaded documents (Research.gov does not automatically paginate for you).	n/a
Project Summary	Your Project Summary will be one-page in length (approx. 4,500 characters) and consists of an overview, a statement on intellectual merit, and a statement on broader impacts. <u>The first sentence of the overview must indicate the type of ITEST project being submitted</u> (e.g., ETD, DTI, SEI). The contents of your summary is submitted via text box through Research.gov.	1 page
Project Description	The Project Description is the cornerstone of your proposal and can be no longer than 15 pages in length. The page limit does not apply to bibliographic citations, which are to be included in your References Cited section. See the next section for an outline of the elements of the Project Description.	15 pages
References Cited	References Cited contains the bibliographic citations from your Project Description. There is no page minimum or maximum for this section and is uploaded in document format through Research.gov.	No limit
Facilities Equipment, and Other	This section of the proposal is where you describe the resources you will use to implement your proposed program (i.e., the elements described in your Project Description). There is no page minimum or maximum for this section and is uploaded in document format through Research.gov.	No limit

Proposal Component	Brief Description	Length
Budget	This section contains budget information for each year of the proposed project. The information will be submitted through the Budget Form in Research.gov. You can download (and print) a pdf version of your budget to review the components beforehand. View a pdf [sample budget](#) or download a [fillable template](#).	n/a
Budget Justification	This is a narrative justifying each of the line items in your budget. Your Budget Justification cannot exceed 5 pages in length and is uploaded in document format through Research.gov. For more, see [Preparing and Justifying a Proposal Budget](#) from our colleagues at CADRE.	5 pages
Data Management Plan	This section outlines the standards and policies for collecting and disseminating the research results for your proposed program. Your Data Management Plan cannot exceed 2 pages in length and is uploaded in document format through Research.gov.	2 pages
Postdoctoral Researcher Mentoring Plan (if applicable)	This section will describe the mentoring that will be provided to postdoctoral researchers supported by the project (if applicable). Your Postdoctoral Researcher Mentoring Plan cannot exceed 1 page in length and is uploaded in document format through Research.gov.	1 page
Letters of Collaboration from Project Partners	These letters will be collected from your project partners (advisors, consultants, evaluator, schools, etc.) stating their intent to collaborate. NSF provides a [template](#) for these letters, and they are uploaded in document format through Research.gov.	1 page each (per collaborator)
Biographical Sketches	Biographical Sketches are required for all senior personnel listed in your proposal. Be sure to review the current version of the PAPPG for information about acceptable formats, as NSF is shifting to Science Experts Network Curriculum Vitae (SciENcv). Biosketches for Senior Personnel (PIs, co-PIs, and other key personnel) are uploaded under "Senior Personnel Documents." All others are	3 pages per staff member

Proposal Component	Brief Description	Length
	uploaded under "Other Personnel Biographical Information."	
Current and Pending Support	Each staff member on your team (PI, Co PI, senior staff) must complete one of these forms in order to identify all sources of funding for his/her work. Be sure to review the current version of the PAPPG for information regarding acceptable formats. You will upload one pdf per staff member through Research.gov. See NSF Guidance for additional information.	1 form per staff member
Collaborators and Other Affiliations	Each staff member on your team (PI, Co PI, senior staff) must complete this form in order to identify possible conflicts of interest to ensure the NSF reviewers of your proposal are impartial and unaffiliated. Have each staff complete the "Collaborators and Other Affiliations" form (template). Each file will then be uploaded through Research.gov.	1 form per staff member
Postdoctoral Researcher Mentoring Plan (if applicable)	If your proposal includes postdoctoral researchers, you must include a description of the mentoring activities that will be provided for such individuals. You will upload one pdf per staff member through Research.gov.	1 page per postdoc

2. PROJECT DESCRIPTION

The required sections of your 15-page Project Description are outlined in the table below. The descriptions in the table are excerpts from the ITEST Solicitation unless otherwise noted.

Project Overview, Rationale, and Importance	The proposal must show how the project addresses critical STEM educational needs and the potential for intellectual merit and broader impacts within the context of the ITEST purpose. The proposal provides an overview of the project goals or objectives, and a rationale for how the work will improve knowledge of and interest in STEM/ICT career pathways for students and advance teachers' understanding of STEM/ICT content and career pathways. The proposed work addresses how the planned STEM education innovations differ from existing practice, and why the study has the potential to improve student and teacher learning and other educational outcomes beyond what current practices provide.
Results from prior NSF support	In cases where the prospective PI or any Co-PI has received more than one award (excluding amendments to existing awards), please report only the one award that is most closely related to the proposal. If the project was recently awarded and therefore no new results exist, describe the major goals and broader impacts of the project. Note that the proposal may contain up to five pages to describe the results. Results may be summarized in fewer than five pages, which would give the balance of the 15 pages for the Project Description. The following information must be provided: 1. the NSF award number, amount and period of support; 2. the title of the project; 3. a summary of the results of the completed work, including accomplishments, supported by the award. The results must be separately described under two distinct headings: Intellectual Merit and Broader Impacts; 4. a listing of the publications resulting from the NSF award (a complete bibliographic citation for each publication must be provided either in this section or in the References Cited section of the proposal); if none, state "No publications were produced under this award." 5. evidence of research products and their availability, including, but not limited to: data, publications, samples, physical collections, software, and models, as described in any Data Management Plan; and 6. if the proposal is for renewed support, a description of the relation of the completed work to the proposed work. *For more, refer to the PAPPG "Results from Prior NSF Support".*
High Quality Research Plan	The following details are essential for clear descriptions of this required component: 1. Research questions that are appropriately framed and motivated by scholarly literatures relevant to STEM learning, teaching, student interest in and awareness of STEM / ICT careers, broadening participation, innovative uses of technology, and/or strategic partnerships. 2. Research questions that are theory-oriented and enhance the

	ability to explain the relation between the proposal's design and the anticipated outcomes. 3. Specific plans for collecting quantitative and/or qualitative data that can inform the research questions. Such data may include but are not limited to cognitive and social-emotional outcomes, mediating factors (e.g., patterns of engagement, discussion, and affect), characteristics of participants, features of the innovative technologies, and participants' interactions with them. 4. Well-defined analytical methods appropriate for drawing inferences from the collected data to address the research questions. 5. A description of the research team's roles and expertise including their qualifications for working with the target student population and other research participants.
ITEST Project Types & Alignment with Common Guidelines	*It is recommended that you align your research design with NSF's* [*Common Guidelines for Education Research and Development*](#) *based on your project type. You do not need to explicitly state the Common Guidelines research type in your proposal, but this can be a helpful resource to guide the development of your Research Plan. It is up to the proposal writer to justify the research design that is the best fit for their project. The following section provides a general outline of the alignment between the ITEST Project Types and the Common Guidelines Research Types.* Exploring Theory and Design Principles (ETD) [ITEST Solicitation] ETD projects describe and explore extant conditions and factors in the field intended to increase students' (and educators') STEM knowledge and motivation, participation, persistence, confidence, and resilience in STEM and ICT fields. ETD studies build core knowledge, interrelated theory, design principles and methods. [Common Guidelines, p. 9] Foundational Research and Early-Stage or Exploratory Research (Types 1 & 2) contributes to core knowledge in education. Core knowledge includes basic understandings of teaching and learning, such as cognition; components and processes involved in learning and instruction; the operation of education systems; and models of systems and processes. Developing and Testing Innovations (DTI) [ITEST Solicitation] DTI projects draw on existing theory and evidence to design and iteratively develop interventions, including testing individual intervention components, to provide feedback in the development process. DTI proposals involve designing a theoretically driven innovation, pilot-testing or implementing the innovation and analyzing its outcomes. Several different research types might be the right fit for your DTI project: [Common Guidelines, p. 9] • Type 3: Design and Development Research, develops

	solutions to achieve a goal related to education or learning, such as improving student engagement or mastery of a set of skills. • Type 4: Efficacy Research, which allows for testing of an intervention under "ideal" circumstances, including a high level of support or developer involvement than would be the case under normal circumstances. • Type 5: Effectiveness Research, which estimates the impacts of the intervention when implemented under conditions of routine practice. Scaling, Expanding, and Iterating Innovations (SEI) [ITEST Solicitation] SEI studies are designed to build on and expand an existing innovation that has evidence of success (including DTI projects or similar innovations previously developed within or outside of the ITEST portfolio). [Common Guidelines, p. 9] Type 6: Scale-up Research, which examines effectiveness in a wide range of populations, contexts, and circumstances without substantial developer involvement in implementation or evaluation.
Project Evaluation	The following details are essential for clear descriptions of this required component: 1. Articulation of evaluation questions relevant to the project's scope of work. What does the project need to learn to assess success? 2. Delineation of the activities and data that will be employed to generate evidence addressing the evaluation questions and stipulate the project staff that will be responsible for this evidence. How does the project propose to address these information needs? Explicit consideration should be given to the mechanisms for providing independent oversight and review of these activities (e.g., an independent, third-party evaluator or an external advisory board). 3. Description of how the project plans to use the evaluation evidence, including how feedback will be shared, with whom (e.g., project leadership, external advisors), and for what purpose (e.g., to inform ongoing project management, to supplement research findings and contribute to the generation of knowledge).
Dissemination	The following details are essential for clear descriptions of this required component: 1. Key elements of the communication plan, such as target audiences and the channels, media, or technologies appropriate for reaching specific audiences. 2. Dissemination strategies that reach the audiences that are appropriate to the strategic partnership, in particular those in addition to scholars reached through publications and presentations in conferences and other similar environments.

Expertise and Management	The project team should reflect the types of expertise needed to successfully implement and manage the project, such as interdisciplinary teams of STEM education researchers, development experts, school district personnel, or experienced teachers; STEM content experts or researchers; researchers in career and workforce development, psychology, sociology, anthropology, or any other field related to the work. An advisory group or consultants who can provide guidance in research design and methodologies, including quantitative or qualitative research methods, implementation, or development of measurement instruments are highly recommended.

Intellectual Merit & Broader Impacts	The **Intellectual Merit** criterion encompasses the potential to advance knowledge.
	
	 The **Broader Impacts** criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.
	
	 The following elements should be considered in the review for both criteria:
	
	 1. What is the potential for the proposed activity to:
	    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
	    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
	 2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
	 3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
	 4. How well qualified is the individual, team, or organization to conduct the proposed activities?
	 5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
	
	 Review this section carefully in the solicitation, as both criteria must be fully addressed.

ITEST Pillars	In the 2022 solicitation the ITEST Program Goals have been replaced by the ITEST Pillars. The high-level summaries for each pillar are outlined below. Be sure to thoroughly review the solicitation for the full requirements for each of the pillars.
	1. <u>Pillar 1. Innovative Use of Technologies in Learning and Teaching</u>: ITEST requires that proposed activities engage students and/or informal learners in the use of technologies that will support acquisition of the foundational preparation in STEM and information and communication technologies.
	2. <u>Pillar 2. Partnerships for Career and Workforce Preparation</u>: Core to this Pillar is the call for investigators to work with community stakeholders to identify and define opportunities for proposed research to support students' awareness and preparation for careers in the technological and computational workforce.
	3. <u>Pillar 3. Strategies for Equity in STEM Education</u>: "The goal of broadening participation is not only an issue of fairness and equal opportunity but is the means of bringing diversity and intellectual breadth to the transformation of science itself." (NSF GPRA Report 2009 and in CEOSE 2011-2012).
Solicitation Specific Review Criteria	Consistent with Pillar 3 (Strategies for Equity in STEM Education), all ITEST proposals are required to address the Solicitation Specific Review Criteria identified below. Proposers must address these four questions within the project description with appropriate headings:
	1. To what extent does the proposal include explicit and adequate strategies for recruiting and selecting participants, particularly those from underserved and underrepresented populations in STEM professions, careers, or education pathways?
	2. To what extent does the proposal describe compelling 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 a broad range of STEM disciplines and fields that stimulate effective instruction and learning?
	3. To what extent does the proposal describe specific research-informed instructional approaches to build on the challenges and strengths that students and their teachers bring to classrooms and informal learning environments, particularly with students from underserved and underrepresented populations in STEM fields? *(Check out <u>Leveraging Student Strengths in STEM: Tips for ITEST Proposal Writers</u> for tips from STELAR on how to think about this criteria)*
	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 teachers, particularly for underserved and underrepresented student populations?