RFP Overview for NSF ITEST – Deadline: August 19th

Innovative Technology Experiences for Students & Teachers (5 years; up to $3M total)

Period of Performance: July 1, 2020 - June 30, 2025

PARTNERS AND ROLES

- MSU (Prime) – Assist with partner school deployment (RCU), provide development support on the JS side to support integration of CPI and JS (NSPARC).
    - PI, Shelly Hollis – MSU's Center for Cyber Education (RCU)
    - NSPARC personnel – Mike Taquino; Steven Grice; Jonathan Barlow
    - College of Education – Yan Sun (Instructional Systems and Workforce Dev)
- YWCA – Project direction & consultation, provide development support on the CPI side of the integration, assist with partner school deployment.
- UA – Project Evaluation (Karl Hamner), plus Jeff Gray in an advisory capacity.
- MS Department of Education
    - Director of CTE: Amy Brown – advisory capacity

Highlights of ITEST SEI Track (Scaling, Expanding, & Iterating Innovations) -designed to build on and expand DTI projects, or findings from innovations previously developed within or outside of the ITEST portfolio. SEI projects:

- (a) broaden 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 whether students continue to pursue further STEM and ICT education or careers.

It seems our planned project is hitting ALL of these goals above; as such, our performance indicators should be built around these measures.

Possible Performance Measures (overarching goals > objectives > outcomes) from this project's initially-proposed goals:

1. (goal) Improve overall career awareness by students in MS (I think this is vague AND I don't think this goal is "big" enough for a scale-up focused project)
    a. How many/what percentage of students self-report an increase in knowledge of (or, based oon data generated from the tool, engage with unique content about) career titles, functions, roles, and skills/qualities required
    b. Data collected by the tool/modules reflects a broad variety (what is standard deviation?) of potential careers explored/accessed per student following each period of engagement
    c. The number of students in the cohort, as a representative proportion of all students in MS compared to the baseline of "all students in MS"

*Potential challenge – how do we measure adherence to standards of implementation or ensure fidelity to the original methods in the scale up and "broadening" of the intervention?

2. (goal) Increase STEM-focused (and ICT-specific) career engagement by students in MS, especially by groups traditionally underrepresented in STEM

Commented [HS1]: Reminder that this mechanism includes teachers, too!

Commented [HS2]: YWCA personnel for whom the budget does not allow may have a role in an advisory capacity

Commented [HS3]: How do we establish a baseline for how aware Mississippi students are of potential careers? Whatever that standard is should be how we measure the results after intervention in our population

a. Targeted populations of students (traditionally underrepresented in certain careers) demonstrate greater breadth of awareness of opportunities based on the trajectory of their individual modules in the tool – could be measured by the frequency of "hits" in a career area or the number of times they are directed to a similar module?
b. Teachers report measurable increase in students' use of CPI within assignments and increased time engaged per assignment/opportunity to use tool (the technical functionality of the actual CPI tool and it's ease of use could also be measured by how well students work in the tool without needing teacher's help)or further instructions to use the tool.)

3. To increase active engagement among all careers (STEM & Non-STEM by promoting additional self-awareness regarding career interests (this is very similar to first goal)
    i. Potential baseline info may be available from self-reported info. For example, Starkville schools are moving to a "house" model in which 10th grade students must choose a "house" based on potential career interests. The houses will provide learning community- style activities in line with the career themes (health, education, business, etc.)
4. To improve students' preparation for all (many?) careers, in part, by providing paths to STEM content for all careers – even for non-STEM-centric careers.
    i. Students recognize multiple paths to meaningful work/careers in their areas of greatest interest (which also correlate to aptitude and abilities – i.e. interest and aptitude for work in computer field, but intellectual ability less than required for higher-order work, such as analytics or computer engineering, so they become a data manager (random example) Nonetheless, they are AWARE of the scale of opportunities in the general area of interest – could this be measured by the outcomes of the course/track selection processes as students are selecting academic/college prep vs. Career and technical ed?
    ii. Students recognize not only the benefits and opportunities of various careers, but also, via engagement with the modules, they recognize challenges and limitations, such as workforce demand, market consideration, and training requirements/credentials/etc. for their career(s) of interest.

Commented [HS4]: Beyond minorities and women in STEM or computing, this could apply to men in healthcare/nursing or women in career & technical fields, too, for example.

Estimated Activity Timeline:

Year 1

- July 1, 2020 – December 31, 2020: Initial development of intervention; needs assessment for tool; aggregate baseline data for performance measures; prepare resource and training materials; plan logistics for intervention and deployment activities (IRB details?)
- January 1, 2021 - June 30, 2021: Pilot initial intervention with local school district (Grade 7/8?) formative and summative assessments of ease and appropriateness of adopting the tool, student/teacher interest & engagement, design & functionality, etc.

Year 2

Commented [HS5]: We need to clarify specific activities in order to prepare a developmental IRB approval for the submission. Full IRB would be handled upon award

Commented [HS6]: If we start each cohort in 7th grade, we will have three years of intervention data (through 9th grade) with which to work for summative evaluation of all student participants. If starting in 8th grade, students will be tracked through 10th grade, at which time they make career-driven course and "track" selections. (thinking out loud…may be best to start in 8th, but that prevents us leveraging the uniqueness of MSU/SOCSD partnership school)

- July 1, 2021 – August 31, 2021 ongoing data-based decision-making throughout pilot to inform improvements/first iteration; logistics preparation for introduction to initial cohort (gather baseline info on initial cohort)
- September 1, 2021 – June 30, 2022 – implementation and formative assessment of first cohort assessments, improvements, etc.; (approx. 25 schools/ approx. 200 potential participants per school = 5,000 students in cohort 1)

Year 3

- July 1, 2022 – August 31, 2022 ongoing data-based decision-making, iterative improvements to tool, formative and summative assessments of first cohort intervention; tracking curriculum choices, etc. for cohort 1 participants; prepare for logistics of cohort 2)
- September 1, 2022 – June 30, 2023 – implementation and formative assessment of second cohort (approx. 25 schools/ 200 potential participants per school = 5,000 students in cohort 2); continued formative assessment of cohort 1, ongoing iterative improvements and summative evaluations of performance measures.

Year 4

- July 1, 2023 – August 31, 2023
- September 1, 2023 – June 1, 2024: Cohort 1 begins year 3 of intervention; Cohort 2 begins year 2 of intervention

Year 5

- July 1, 2024 – August 31, 2024
- September 1, 2024 – April 30, 2025 Summative assessment of cohort 1 (will have completed three years of intervention activities); cohort 2 begins year 3 of intervention
- May 1, 2025 - June 30, 2025: Summative assessment of cohort 2 (will have completed three years of intervention activities); summative assessment of all project measures.

Commented [HS7]:

Commented [HS8R7]: Since we are doing 2 cohorts, we could really use the same 25 schools, huh? 5K students in first year, another 5K in second year yields the same 10K – plus however many we hit in pilot.

Required Proposal Components and Formatting Info:

A. Cover Sheet – populated by Fastlane/Research.gov (SEI track denoted)

B. Project Summary/Abstract – 1 page (Overview statement, Intellectual Merit, Broader Impacts sections)

C. Project Description – 15 pages, typically 11pt. font, 1-inch margins; Required headers include:

1. Project Overview, Rationale & Importance

a. need (where are the gaps in innovative use of technologies, innovative learning experiences, STEM workforce development, broad participation?)
b. potential for intellectual merit & broader impacts
c. Goals and Objectives (outputs/outcomes if applicable)
d. rationale for how work will improve knowledge and motivation for students, advance teachers' understanding, and how planned innovations/activities/interventions differ from existing practice, etc.

2. Project Design

a. Activities/research design/procedures (match activities to stated goals – breakdown by component AND by Required Design/Research Elements below)
b. Timeline (chart with timeline, person responsible, etc.)
c. Considerations (challenges, limitations, mitigation strategies) Broader participation
d. Evaluation plan – (see below: efficacy, effectiveness, and scale-up measures)
e. Dissemination plan – broad and appropriate audiences (scholars and public stakeholders)

3. Results from Prior NSF Support – 1 per PI max as applicable

4. Expertise & Management

a. Organizational structure of project personnel, roles and responsibilities
b. representation of broad and diverse stakeholders
c. role, contributions, and description of advisory committee/consultants for research activities.

D. Budget

E. Budget Narrative Justification

F. References Cited

G. Facilities, Equipment, and Other Resources

G. Biographical Sketches (Need to confirm if COA and C&Ps are required; not clear)

H. Supplementary Documentation

1. Letters of Collaboration
2. Data Management Plan
3. PostDoctoral Mentoring Plan (if applicable)

Project Description Components

Required Design Elements:

1. Innovative use of Technologies
    - Providing an explicit rationale for how students' and teachers' engagement with innovative technologies will develop STEM knowledge, skills, and dispositions needed to contribute to the future STEM and ICT workforce. This includes specifying the anticipated learning outcomes of the technology experiences, explaining how the experiences will result in the targeted outcomes, and describing the evidence that will be used to measure the extent to which the targeted cognitive and social-emotional learning outcomes will be achieved.
    - Explaining how innovative technology experiences are developmentally and age-appropriate for students and suited for target populations of students and teachers, particularly for underserved and underrepresented student populations.
2. Innovative Learning Experiences
    - Projects should include clear descriptions linking the design of the innovation to the potential for such learning experiences. Descriptions should address the key features of the design, articulating their basis in relevant scholarly literatures and explaining how these design features are intended to realize the innovative learning experiences. Descriptions should also articulate how the students' learning experiences will strengthen knowledge and interest in STEM and ICT careers. A work plan should outline the activities that will be carried out, the personnel that will be responsible for them, and the expected impacts they will have on the participants. Innovations should be considered broadly to involve not only students in the PreK-12 grade range, but also teachers, instructors, mentors, coaches, administrators, or any other participants involved in the innovation.
3. STEM Workforce Development
    - Focusing on workforce-oriented learning environments that connect PreK-12 learning and workforce needs.
    - Clearly defining an innovation that directly engages both students and educators in experiences that promote awareness of, interest in, and capacities to participate in STEM and ICT careers or career pathways.
    - Describing how the innovation advances knowledge of promising workforce-related activities, such as entrepreneurship, apprenticeships, internships, and mentoring, and the conditions that promote interest in and knowledge of STEM and ICT careers.
4. Strategies for Broadening Participation
    - Proposals should explicitly identify effective ways to promote knowledge of and interest in STEM and ICT careers or career pathways for students from populations that are currently underserved or underrepresented in STEM.
    - Describing strategies for recruiting and selecting participants from a population or populations currently underserved or underrepresented in STEM professions, careers, or education pathways.
    - Identifying the specific strengths of and challenges faced by the underserved or underrepresented populations selected to be served.
    - Articulating strategies for building on the participants' strengths and addressing the challenges they typically face in STEM learning and interest through the technology experiences, learning activities, and entrepreneurial experiences embedded in the innovation.

- Explaining how the technology experiences and learning activities are developmentally and age appropriate.

5. Strategic Partnerships

- The ITEST program is particularly interested in innovations that integrate appropriate entrepreneurial educational experiences that are inclusive and increase the participation of underserved and underrepresented groups. Strong proposals should stipulate the ways in which strategic partnerships contribute to the sustainability of the project and the benefits for students, educators, and each strategic partner.
- Describing how strategic partnerships strengthen existing collaborations and develop new connections between educational institutions, employers, and their communities.
- Specifying how strategic partnerships engage students and teachers in STEM career-based learning experiences with local employers, internships, apprenticeships, or research experiences as appropriate.
- Visibly positioning mathematics and statistics education as magnets for STEM and ICT career interest through engagement in applied partnership contexts as appropriate.
- Describing how strategic partnerships capitalize on formal and informal learning contexts to support academic and technical learning as preparation for higher education, and also support teachers to scaffold this learning as appropriate.

Required Research Elements:

TEST projects **must** include a research component that measures the outcomes of the innovation relative to the goals of increasing knowledge of, and interest in, STEM and ICT careers. Measuring knowledge and interest includes attending to cognitive outcomes (such as changes in knowledge related to STEM and ICT domains and careers), and social-emotional outcomes (such as changes in motivation, engagement, interest, dispositions, or attitudes towards STEM and ICT careers) for individual and groups of students. Research designs and methodologies **must include** the following three components:

1. High Quality Research Design

- Research questions that are appropriately framed and motivated by scholarly literatures relevant to STEM learning, teaching, workforce preparation, broadening participation, innovative uses of technology, and/or partnerships. Research questions should be theory-oriented and should enhance the ability to explain the relation between the innovation's design features and the impacts on knowledge and interest in STEM and ICT careers. Research questions should aim to inform theory locally. Specific plans for collecting quantitative and/or qualitative forms of data that are most relevant for addressing 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.
- Well-defined analytical methods appropriate for drawing inferences from the collected data in order to address the research questions.

2. Project Evaluation

SEI projects are consistent with the three types of impact research described in the IES/NSF Common Guidelines: **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; and **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.

This plan should describe the steps that will effectively provide feedback on all aspects of the work both formatively throughout the duration of the project and summatively at the end. For projects with external evaluators, PIs are encouraged to include reports of evaluation activities as part of their annual and final project reports.

- Articulation of evaluation questions relevant to the project's scope of work. What does the project need to learn to assess success?
- 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).
- 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).

3. Dissemination of Findings

- Must include a creative communication strategy for reaching broad audiences, including scholars, practitioners, policymakers, and the public. While the potential results of the proposed research are expected to be of sufficient quality and significance to merit peer-reviewed publications, approaches that reach broader audiences are also expected.
- Key elements of the communication plan, such as target audiences and the channels, media, or technologies appropriate for reaching specific audiences.
- 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.