U.S. Department of Education - EDCAPS
G5-Technical Review Form (New)

Status: Submitted
Last Updated: 08/13/2023 12:41 PM

Technical Review Coversheet

Applicant: Sonoma State University (S411B230042)
Reader #1: **********

	Points Possible	Points Scored
Questions		
Selection Criteria		
Significance		
1. Significance	15	15
Strategy to Scale		
1. Strategy to Scale	40	31
Quality of Project Design		
1. Project Design	15	8
Quality of the Project Evaluation		
1. Project Evaluation	30	0
Sub Total	100	54
Priority Questions		
Competitive Preference Priority		
Competitive Preference Priority 1		
1. Promoting Equity	5	5
Sub Total	5	5
Total	105	59

Technical Review Form

Panel #3 - EIR Mid-phase - 3: 84.411B

Reader #1:   **********

Applicant: Sonoma State University (S411B230042)

Questions

Selection Criteria - Significance

1. **The Secretary considers the significance of the proposed project. In determining the significance of the proposed project, the Secretary considers the following factors:**

Reader's Score: 15

> **Sub**

> 1. **The extent to which the proposed project involves the development or demonstration of promising new strategies that build on, or are alternatives to, existing strategies.**

> **Strengths:**

> The applicant proposes to bridge the digital divide by scaling the intervention to rural districts in the United States (p. e25). Additionally, the project aims to improve the implementation of Technology use, Engineering skills, and Coding practices (TEC) in rural, high-poverty settings by providing professional development (pp. e25-e26). The project includes the development of an innovative assessment instrument that measures computational thinking skills (p. e26).

> **Weaknesses:**

> None noted.

> **Reader's Score: 15**

Selection Criteria - Strategy to Scale

1. **The Secretary considers the strategy to scale the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: 31

> **Sub**

> 1. **(1) The extent to which the applicant identifies a specific strategy or strategies that address a particular barrier or barriers that prevented the applicant, in the past, from reaching the level of scale that is proposed in the application.**

> **Strengths:**

> Four main barriers to scaling are identified in the project and are supported by several strategies, most of which are likely to be successful (pp. e27-e33). For example, the second barrier relates to increased professional

development, which the applicant plans to address by building the capacity of the team to train teachers and engaging master teachers to further expand training capacity (pp. e30-e31).

Weaknesses:

For Barrier 4.1, "barriers to obtaining strong evidence", the applicant details challenges in recruiting districts and schools for the proposed study, based on experience with their early phase project (pp. e32-e33), but the proposed strategy (recruiting trips) may not sufficiently address this barrier. The uncertainty of settings for the study makes it possible that it will be unsuccessful.

Reader's Score: 8

2. **(2) The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.**

Strengths:

The color-coded timeline provided in Figure 1 gives an overview of main project-related activities and the trimester (s) in which they will occur, showing that the sequence of these activities has been considered (p. e36). Each organization's role and responsibilities are detailed in the narrative, making it likely that project components will be completed successfully, on time, and within the budget (pp. e34-e36). Key personnel members have experience aligning with the proposed project roles, making it likely that the project will be implemented with quality (pp. e34-e36, e61-e85).

Weaknesses:

The management plan lacks clear milestones, making it unclear how the applicant will know if the project is progressing as intended (pp. e34-e36). Some of the months in the two timelines are conflicting (e.g., recruitment ends in March vs. ends in April) (p. e36, e52).

Reader's Score: 3

3. **(3) The applicant's capacity (e.g., in terms of qualified personnel, financial resources, or management capacity) to bring the proposed project to scale on a national or regional level (as defined in 34 CFR 77.1(c)) working directly, or through partners, during the grant period.**

Strengths:

The leadership team for the proposed project is comprised of personnel involved in the early-phase study, making it likely that the systems and capacity to properly manage the project are sufficient (pp. e37-e38). The use of a Web application will support the ability to scale to a national level (p. e37). Both Hispanic-serving institutions involved in the proposed project have experience with large federal grants and have state-level partnerships making it likely that scaling will be successful (e.g., Sonoma State University will work with County Offices of Education for professional development) (p. e38).

Weaknesses:

None noted.

Reader's Score: 10

4. **(4) The mechanisms the applicant will use to broadly disseminate information on its project so as to support further development or replication.**

Sub

Strengths:

The partner organizations intend to present implementation practices with other educators at annual state and national conferences (e.g., Science Teachers Association of Texas) making it likely that educators in attendance will be able to replicate the project (p. e39). Research findings will be shared through journal articles and at research-centric conferences, such as American Educational Research Association, to inform the field about the impact of the intervention and assessment (p. e39).

Weaknesses:

The applicant does not discuss how educators who do not attend conferences will have access to information about the implementation practices, making it unlikely that this information will be disseminated broadly (p. e39).

Reader's Score: 8

5. **(5) The likely utility of the products (such as information, materials processes, or techniques) that will result from the proposed project, including the potential for their being used effectively in a variety of other settings.**

Strengths:

The web application is suited to be used in settings beyond middle and high school, such as at the university level (p. e39).

Weaknesses:

The applicant anticipates that other educators will use the assessment tool, but no details are provided about how educators outside of the project will be able to access the assessment and if there is a cost associated with its use (p. e39). It is unclear if the full LbyM and STEMACES curricula will be available as open educational resources, making it uncertain if the products will be able to be accessed and used in other settings (p. e39).

Reader's Score: 2

Selection Criteria - Quality of Project Design

1. **The Secretary considers the quality of the design of the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: 8

Sub

1. **(1) The extent to which there is a conceptual framework underlying the proposed research or demonstration activities and the quality of that framework.**

Strengths:

The project is grounded in a Theory of Action which shows how the three main project components may increase student learning and academic outcomes (p. e40). The components are supported by moderate evidence, making it likely they will positively impact student learning and outcomes (pp. e21-e22, e40).

Weaknesses:

A coherent conceptual framework is lacking (e.g., it is unclear how the Fidelity Matrix, Theory of Action, and Logic Model relate and connect to one another). (p. e41).

Sub

Reader's Score: 3

2. **(2) The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable.**

   Strengths:

   Each project goal is supported by objectives and outcomes (p. e42).

   Weaknesses:

   The project goals, objectives, and outcomes are not measurable as written (p. e42). For example, for Goal 2, Objective 2.2, the aim is to assess the impact of the intervention on student science learning, through eighth-grade math and science state test scores, but a numerical benchmark for improvement or proficiency is lacking, making it unclear how the applicant will determine if the intervention sufficiently increased student state test scores (p. e42). Some of the measures are misaligned with the objectives (e.g., Objective 2.2 will be measured in part by seventh-grade math and English language arts scores, but no explanation is made as to how those scores demonstrate an impact on student science learning) (p. e42).

   Reader's Score: 1

3. **(3) The extent to which the design of the proposed project is appropriate to, and will successfully address, the needs of the target population or other identified needs.**

   Strengths:

   The Logic Model makes a strong case for how the project design and intervention meet the needs of the target population, which are students enrolled in low-income, rural districts (p. e121). Many components of the Logic Model are supported by evidence, strengthening the likelihood that the needs of the target population will be met (e.g., improved science academic outcomes) (p. e121).

   Weaknesses:

   The Logic Model does not show how the intervention will impact English language arts scores, as suggested in Figure 3 in the narrative (p. e42, e121).

   Reader's Score: 4

Selection Criteria - Quality of the Project Evaluation

1. **The Secretary considers the quality of the evaluation to be conducted of the proposed project. In determining the quality of the evaluation, the Secretary considers the following factors:**

Reader's Score: 0

Sub

1. **(1) The extent to which the methods of evaluation will, if well implemented, produce evidence about the project's effectiveness that would meet the What Works Clearinghouse standards without reservations as described in the What Works Clearinghouse Handbook (as defined in 34 CFR 77.1(c)).**

   Strengths:

Sub

    Weaknesses:

    Reader's Score:

2. **(2) The extent to which the evaluation will provide guidance about effective strategies suitable for replication or testing in other settings.**

    Strengths:

    Weaknesses:

    Reader's Score:

3. **(3) The extent to which the evaluation plan clearly articulates the key project components, mediators, and outcomes, as well as a measurable threshold for acceptable implementation.**

    Strengths:

    Weaknesses:

    Reader's Score:

4. **(4) The extent to which the methods of evaluation will provide performance feedback and permit periodic assessment of progress toward achieving intended outcomes.**

    Strengths:

    Weaknesses:

    Reader's Score:

Priority Questions

Competitive Preference Priority - Competitive Preference Priority 1

1. **Competitive Preference Priority 1:**

   Promoting Equity in Student Access to Educational Resources and Opportunities: Implementers and Partners (up to 5 points)

   Under this priority, an applicant must demonstrate how the project will be implemented by or in partnership with one or more of the following entities:

    (a) Community colleges (as defined in the NIA)
    (b) Historically Black colleges and universities (as defined in the NIA)
    (c) Tribal Colleges and Universities (as defined in the NIA)
    (d) Minority-serving institutions (as defined in the NIA)

Strengths:

Both universities serving as implementation sites for the proposed project meet the criteria for minority-serving institutions as defined in the Notice Inviting Applications (p. e16). These organizations play key roles in the project since they are the lead implementers of the intervention (p. e24).

Weaknesses:

None noted.

Reader's Score: 5

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Technical Review Coversheet

Applicant: Sonoma State University (S411B230042)
Reader #2:   **********

		Points Possible	Points Scored
Questions			
Selection Criteria			
Significance			
1. Significance		15	0
Strategy to Scale			
1. Strategy to Scale		40	0
Quality of Project Design			
1. Project Design		15	0
Quality of the Project Evaluation			
1. Project Evaluation		30	27
	Sub Total	100	27
Priority Questions			
Competitive Preference Priority			
Competitive Preference Priority 1			
1. Promoting Equity		5	0
	Sub Total	5	0
	Total	105	27

Technical Review Form

Panel #3 - EIR Mid-phase - 3: 84.411B

Reader #2:   * * * * * * * * * *

Applicant: Sonoma State University (S411B230042)

Questions

Selection Criteria - Significance

1. **The Secretary considers the significance of the proposed project. In determining the significance of the proposed project, the Secretary considers the following factors:**

Reader's Score: **0**

    Sub

    1. **The extent to which the proposed project involves the development or demonstration of promising new strategies that build on, or are alternatives to, existing strategies.**

        Strengths:

        NA

        Weaknesses:

        NA

        Reader's Score: **0**

Selection Criteria - Strategy to Scale

1. **The Secretary considers the strategy to scale the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: **0**

    Sub

    1. **(1) The extent to which the applicant identifies a specific strategy or strategies that address a particular barrier or barriers that prevented the applicant, in the past, from reaching the level of scale that is proposed in the application.**

        Strengths:

        NA

        Weaknesses:

        NA

Sub

Reader's Score: 0

2. **(2) The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.**

   Strengths:

   NA

   Weaknesses:

   NA

   Reader's Score: 0

3. **(3) The applicant's capacity (e.g., in terms of qualified personnel, financial resources, or management capacity) to bring the proposed project to scale on a national or regional level (as defined in 34 CFR 77.1(c)) working directly, or through partners, during the grant period.**

   Strengths:

   NA

   Weaknesses:

   NA

   Reader's Score: 0

4. **(4) The mechanisms the applicant will use to broadly disseminate information on its project so as to support further development or replication.**

   Strengths:

   NA

   Weaknesses:

   NA

   Reader's Score: 0

5. **(5) The likely utility of the products (such as information, materials processes, or techniques) that will result from the proposed project, including the potential for their being used effectively in a variety of other settings.**

   Strengths:

   NA

   Weaknesses:

   NA

   Reader's Score: 0

Selection Criteria - Quality of Project Design

1. **The Secretary considers the quality of the design of the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: 0

    Sub

   1. **(1) The extent to which there is a conceptual framework underlying the proposed research or demonstration activities and the quality of that framework.**

    Strengths:

    NA

    Weaknesses:

    NA

    Reader's Score: 0

   2. **(2) The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable.**

    Strengths:

    NA

    Weaknesses:

    NA

    Reader's Score: 0

   3. **(3) The extent to which the design of the proposed project is appropriate to, and will successfully address, the needs of the target population or other identified needs.**

    Strengths:

    Weaknesses:

    Reader's Score:

Selection Criteria - Quality of the Project Evaluation

1. **The Secretary considers the quality of the evaluation to be conducted of the proposed project. In determining the quality of the evaluation, the Secretary considers the following factors:**

Reader's Score: 27

1. **(1) The extent to which the methods of evaluation will, if well implemented, produce evidence about the project's effectiveness that would meet the What Works Clearinghouse standards without reservations as described in the What Works Clearinghouse Handbook (as defined in 34 CFR 77.1(c)).**

   Strengths:

   The evaluation plan describes a Randomized Controlled Trial (RCT) to collect data for an impact analysis that has the potential to meet What Works Clearinghouse (WWC) without reservations if well implemented. Data for the impact study will be collected over two cohorts of schools with schools randomized into either a treatment group or a control group. Data from the two cohorts will be combined for the impact analysis (page e43). The application has identified an independent evaluator to conduct evaluation activities with the background and experience to complete the evaluation (page e35). A member of the evaluation team will lead the professional development efforts to train teachers (page e35). Members of the evaluation team will also be trained to support the teacher professional development (page e30) to provide expertise in professional learning design and facilitation. The application includes plans to obtain Institutional Review Board (IRB) approval for data collection (page e9). Members of the evaluation team will provide a formative evaluation for the pilot phase (page e34). The impact study will address research questions on the impact of project activities on students' science learning and teachers' competency in teaching science (page e41). The application provides descriptions of appropriate analytical methods to be used to evaluate performance measures for each of the research questions (page e43).

   Weaknesses:

   It is not clear if there will be a total of 80 schools in the impact study, 40 for Cohort 1 and 40 for Cohort 2 or if some of the schools in the control group for Cohort 1 might be randomized to participate in Cohort 2 (page e8). The application mentions that control group teachers will be offered the option to receive delayed treatment (page e44) and does not address if they have the potential to be randomized into Cohort 2. The instructional supplies table indicates that it is anticipated that some of the six pilot schools might continue into the implementation cohorts (page e171) which could create a bias since units are revised after the pilot program (page e152). The evaluation plan does not discuss analysis of the data collected during the pilot phase of the program. The application does not provide any details about the goals or evaluation of the equity cohort (page e152). The application does not provide details about the teacher competency survey (page e43). The application might be improved with the inclusion of the analytical models for the performance measures, including explanations of the coefficients for independent and other variables. The application might be improved with the details regarding development and validation of the proposed CT-TEC-Sci assessment instrument (page e27).

   Reader's Score: 12

2. **(2) The extent to which the evaluation will provide guidance about effective strategies suitable for replication or testing in other settings.**

   Strengths:

   The application indicates that final deidentified data, codebooks, and sample codes will be shared with the public (page e48). The evaluation will provide information on what works and how it works for high-need eighth-grade students from data collected on students with diverse backgrounds and schools (paged e48 to e49). Lowering the cost of implementation and providing virtual professional training (page e29) as well as the increased online availability of student and teacher supports at other sites (page e32) also have the potential to support replication at other sites. The teacher logs and implementation details from teacher interviews (page e49) also have the potential to support replication.

Sub

Weaknesses:

None noted.

Reader's Score: 5

3. **(3) The extent to which the evaluation plan clearly articulates the key project components, mediators, and outcomes, as well as a measurable threshold for acceptable implementation.**

Strengths:

The application includes details about an Implementation Fidelity Matrix (pages e136 to e138). The Grant Application Form includes details about the performance measures regarding teacher participation in professional development and the integration of project activities in the curriculum (pages e173 to e177). These measures have the potentail to provide data for a measurable threshold of implementation.

Weaknesses:

None noted.

Reader's Score: 5

4. **(4) The extent to which the methods of evaluation will provide performance feedback and permit periodic assessment of progress toward achieving intended outcomes.**

Strengths:

The Plan, Do, Study, Act process during the project development phase provides feedback through a formative evaluation to be conducted by the evaluator (page e34). Teacher logs will be collected every other month during the impact study to provide information about how they are implementing project activities, what works for students, and challenges they and their students experience (page e50). In addition, end-of-unit assessments completed by students after each of the three units will also provide implementation feedback (page e50). The evalution plan also includes an exploratory impact analysis to be conducted using data from Cohort 1 that also has the potential to provide assessment of progress (page e50).

Weaknesses:

None noted.

Reader's Score: 5

Priority Questions

Competitive Preference Priority - Competitive Preference Priority 1

1. **Competitive Preference Priority 1:**

Promoting Equity in Student Access to Educational Resources and Opportunities: Implementers and Partners (up to 5 points)

Under this priority, an applicant must demonstrate how the project will be implemented by or in partnership with one or more of the following entities:

   (a) Community colleges (as defined in the NIA)
   (b) Historically Black colleges and universities (as defined in the NIA)
   (c) Tribal Colleges and Universities (as defined in the NIA)
   (d) Minority-serving institutions (as defined in the NIA)

Strengths:

NA

Weaknesses:

NA

Reader's Score: **0**

Status: Submitted

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Technical Review Coversheet

Applicant: Sonoma State University (S411B230042)
Reader #3: **********

		Points Possible	Points Scored
Questions			
Selection Criteria			
Significance			
1. Significance		15	12
Strategy to Scale			
1. Strategy to Scale		40	34
Quality of Project Design			
1. Project Design		15	9
Quality of the Project Evaluation			
1. Project Evaluation		30	0
	Sub Total	100	55
Priority Questions			
Competitive Preference Priority			
Competitive Preference Priority 1			
1. Promoting Equity		5	5
	Sub Total	5	5
	Total	105	60

Technical Review Form

Reader #3:   **************

Applicant: Sonoma State University (S411B230042)

Questions

Selection Criteria - Significance

1. **The Secretary considers the significance of the proposed project. In determining the significance of the proposed project, the Secretary considers the following factors:**

Reader's Score: **12**

    Sub

    1. **The extent to which the proposed project involves the development or demonstration of promising new strategies that build on, or are alternatives to, existing strategies.**

    Strengths:

    The applicant clearly describes several promising new strategies for the proposed project, such as adding innovative Technology, Engineering, and Coding (TEC) elements to the curriculum, scaling the Networked Improvement Community (NIC) to include 8th grade teachers, incorporating innovative field experiences, and developing the Computational Thinking in Technology, Engineering, and Coding-embedded Science Education (CT-TEC-Sci) assessment instrument. (e19-e21, e23-e26)

    Weaknesses:

    It is not clear what the CT-TEC-Sci assessment is designed to measure that is different from the science unit assessments of the project curriculum and whether it is a better or more comprehensive measure of science achievement. It is not clear how the updated STEMACES project curriculum and TEC and STEM+C are linked and how they will be implemented in a coordinated and effective manner. (e25-e26)

    Reader's Score: **12**

Selection Criteria - Strategy to Scale

1. **The Secretary considers the strategy to scale the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: **34**

    Sub

    1. **(1) The extent to which the applicant identifies a specific strategy or strategies that address a particular barrier or barriers that prevented the applicant, in the past, from reaching the level of scale that is proposed in the application.**

Sub

Strengths:

The applicant thoroughly discusses three barriers and appropriate strategies to address them for the curriculum implementation and update, five barriers and strategies related to teacher professional learning and scaling the Networked Improvement Community (NIC), and two barriers to obtaining strong evidence of effectiveness of the project. (e27-e33)

A key strength is that the applicant recognizes the difficulties of meeting the science standards in different states with one curriculum, and the applicant proposed to address this barrier by analyzing commonalities and differences in science standards in the two states served by the project prior to implementation. (e28)

One of the key strategies to enhance scaling of the project is the use of teacher leaders for professional learning in a train-the-trainer approach for scaling and sustainability. (e30-e31, e38)

Weaknesses:

No weaknesses noted

Reader's Score: 10

2. **(2) The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.**

    Strengths:

    The applicant clearly explains its use of the Plan, Do, Study, Act (PDSA) management process model, outlines the financial and project management tools used to support the project, and thoroughly describes the roles and responsibilities of key project staff. (e34-e36)

    The applicant presents two project management plans, including an overall project plan with project activities and tasks on a trimester basis for each of the five years of the grant and a second more detailed management plan with monthly timelines, project activities, and milestones. (e36, e152)

    Weaknesses:

    The applicant does not clearly identify or adequately describe what the equity cohort is in the project narrative. (e36)

    In both of the presented management plans, the specific project activities are not all aligned or labeled with the person or organization responsible, and it is not clear how some of the PDSA elements fit into the implementation process.The notation and legend is very confusing for the management plan in the appendices. (e36, e152)

    Given that the project will be serving Spanish-speaking students in rural areas in California and Texas, the application does not adequately address the development, testing, and implementation of Spanish materials in the management plan. (e32, e36, e152)

    Reader's Score: 3

3. **(3) The applicant's capacity (e.g., in terms of qualified personnel, financial resources, or management capacity) to bring the proposed project to scale on a national or regional level (as defined in 34 CFR 77.1(c)) working directly, or through partners, during the grant period.**

Sub

Strengths:

A major strength that supports ongoing project management capacity and support is the continuity of staff, including the co-Principal Investigator from Sonoma State University (SSU) and one of the external evaluation leaders from WestEd. Both of these project personnel will continue in their roles and responsibilities in the proposed project. (e35)

The applicant provides the background, expertise, and relevant qualifications of the key project staff through resumes highlighting significant science education, technology, and evaluation experience. (e61-e85)

The applicant clearly presents letters of support and Memoranda of Understanding (MOUs) from some of the California and Texas school districts and schools that will be served by the project. (e93-e94, e97-e115)

The applicant clearly describes how it capitalized on the COVID pandemic and adjusted to enhance the capacity and utilization of the professional learning events and web-based app. These important and relevant updates will aid in efforts to bring the project scale on a national or regional level. (e37)

Weaknesses:

No weaknesses noted

Reader's Score: 10

4. **(4) The mechanisms the applicant will use to broadly disseminate information on its project so as to support further development or replication.**

   Strengths:

   The applicant clearly identifies local and state conferences that are geared toward teachers as avenues to disseminate project information, such as conferences organized by the California Association of Science Educators, the Science Teachers Association of Texas, and the National Rural Educators Association. (e39)

   The applicant highlights several dissemination mechanisms to share project implementation practices, lessons learned, and research outcomes, including conferences, peer-reviewed journals, websites, social media, and open education resources and tools. (e39)

   Weaknesses:

   The applicant discusses sharing the CT-TEC-Sci assessment tool, but it does not discuss the dissemination of the specific curriculum materials developed through the project. (e39)

   Reader's Score: 8

5. **(5) The likely utility of the products (such as information, materials processes, or techniques) that will result from the proposed project, including the potential for their being used effectively in a variety of other settings.**

   Strengths:

   The applicant clearly indicates the utility and accessibility of the LbyM curriculum and skill-building units as an open resource web app. As a freely available resources, the LbyM curriculum units can be used in a variety of other science education settings. (e20, e26)

   The applicant is clearly sensitive to the costs of student materials and how it may impact the utilization of the proposed project curriculum. The applicant presents cost-saving strategies to minimize prices and encourage

adoption of the updated curriculum, such as sharing the cost for kits, pairing students, working in teams, and using stations for larger groups of students. (e40)

Weaknesses:

The applicant does not explicitly discuss the use of the updated STEMACES project materials and how they specifically will be shared and utilized in a variety of other middle or high school settings. (e39-e40)

Reader's Score: 3

Selection Criteria - Quality of Project Design

1. **The Secretary considers the quality of the design of the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: 9

Sub

1. **(1) The extent to which there is a conceptual framework underlying the proposed research or demonstration activities and the quality of that framework.**

    Strengths:

    The applicant presents a detailed logic model that includes specific inputs, outputs, and short-, medium-, and long-term outcomes for the project. The activities and participation outputs of the logic model are aligned to the three components of the Theory of Action. The project logic model also includes background assumptions and external factors that may affect or influence the project outcomes, especially regarding rural and high needs students. (e121)

    The applicant adequately describes the three project components of its Theory of Action (teacher professional learning, revised curriculum, and supports for teachers and students), and provides several research-based evidence references for each of the three components. (e21-e22, e40-e41)

    Weaknesses:

    The applicant introduces a Theory of Action and provides a graphic for it, but it is not explained very well how the Theory of Action integrates all three components to produce improved student and teacher outcomes. (e40-e41)

    The applicant does not thoroughly explain or provide a rationale for incorporating TEC and the CT-TEC-Sci assesment and how they are all supposed to work together with the updated instructional units STEMACES curriculum.

    Reader's Score: 3

2. **(2) The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable.**

    Strengths:

    The applicant presents a comprehensive graphic that presents the two project goals and their associated objectives, outcomes, and performance measures for the project. (e42)

The applicant presents quantitative baselines and targets for the project performance measures, and they are mostly related to the training, attendance, and participation aspects of the project. (e186, e173-e177)

Weaknesses:

The applicant does not provide specific or measurable baseline data or targets for the student science learning objective 2.2 and its related math, science, English Language Arts (ELA), and Computational Thinking (CT) assessment scores as performance measures. There are no estimated levels of academic improvement from baseline to cohort 2 for these student achievement outcomes. (e42)

Reader's Score: 3

3. **(3) The extent to which the design of the proposed project is appropriate to, and will successfully address, the needs of the target population or other identified needs.**

Strengths:

Since a significant proportion of the students to be served by the project are Spanish-speaking, the applicant clearly proposes to work with on-site school translators to create Spanish-language versions of the three-unit curriculum guide and worksheets, as well as audio files of the student guides in Spanish. These resources will assist in meeting the language and translation needs of the target population. (e32)

The applicant clearly identifies four ways in which the proposed project meets the needs of the target population, including improved science outcomes for rural students, improved TEC and CT skills for students and teachers, increased connectivity and sustainability for local stakeholders and schools, and for developing the CT-TEC-Sci assessment. (e41)

Weaknesses:

It is difficult to determine how the proposed project is appropriate to and will meet the specific needs of the target population because the project narrative did not provide any information on the current academic gaps in science, math, and English Language Arts (ELA) in the target student population. (e41)

Reader's Score: 3

Selection Criteria - Quality of the Project Evaluation

1. **The Secretary considers the quality of the evaluation to be conducted of the proposed project. In determining the quality of the evaluation, the Secretary considers the following factors:**

Reader's Score: 0

1. **(1) The extent to which the methods of evaluation will, if well implemented, produce evidence about the project's effectiveness that would meet the What Works Clearinghouse standards without reservations as described in the What Works Clearinghouse Handbook (as defined in 34 CFR 77.1(c)).**

Sub

    Strengths:

    Weaknesses:

    Reader's Score:

2. **(2) The extent to which the evaluation will provide guidance about effective strategies suitable for replication or testing in other settings.**

    Strengths:

    Weaknesses:

    Reader's Score:

3. **(3) The extent to which the evaluation plan clearly articulates the key project components, mediators, and outcomes, as well as a measurable threshold for acceptable implementation.**

    Strengths:

    Weaknesses:

    Reader's Score:

4. **(4) The extent to which the methods of evaluation will provide performance feedback and permit periodic assessment of progress toward achieving intended outcomes.**

    Strengths:

    Weaknesses:

    Reader's Score:

Priority Questions

Competitive Preference Priority - Competitive Preference Priority 1

1. **Competitive Preference Priority 1:**

    Promoting Equity in Student Access to Educational Resources and Opportunities: Implementers and Partners (up to 5 points)

Under this priority, an applicant must demonstrate how the project will be implemented by or in partnership with one or more of the following entities:

  (a) **Community colleges (as defined in the NIA)**
  (b) **Historically Black colleges and universities (as defined in the NIA)**
  (c) **Tribal Colleges and Universities (as defined in the NIA)**
  (d) **Minority-serving institutions (as defined in the NIA)**

Strengths:

The applicant clearly indicates that it will be partnering with two Hispanic Serving Institutions in both of the target population states of California (Sonoma State University, SSU) and Texas (Angelo State University, ASU). Both partnerships are supported by letters of support in the appendices. (e24, e37-e38, e87-e91)

The applicant clearly describes the contribution of each of the universities, including college prep workshops from the TRIO programs at SSU as well as   teacher professional learning activities and resources at ASU. (e24, e37-e38)

Weaknesses:

No weaknesses noted

Reader's Score: 5

Status: Submitted
Last Updated: 08/12/2023 10:24 PM

Status: Submitted
Last Updated: 08/13/2023 01:44 PM

Technical Review Coversheet

Applicant: Sonoma State University (S411B230042)
Reader #4:   **********

		Points Possible	Points Scored
Questions			
Selection Criteria			
Significance			
1. Significance		15	0
Strategy to Scale			
1. Strategy to Scale		40	0
Quality of Project Design			
1. Project Design		15	0
Quality of the Project Evaluation			
1. Project Evaluation		30	26
	Sub Total	100	26
Priority Questions			
Competitive Preference Priority			
Competitive Preference Priority 1			
1. Promoting Equity		5	0
	Sub Total	5	0
	Total	105	26

Panel #3 - EIR Mid-phase - 3: 84.411B

Reader #4: **********

Applicant: Sonoma State University (S411B230042)

Questions

Selection Criteria - Significance

1. **The Secretary considers the significance of the proposed project. In determining the significance of the proposed project, the Secretary considers the following factors:**

Reader's Score: **0**

   Sub

   1. **The extent to which the proposed project involves the development or demonstration of promising new strategies that build on, or are alternatives to, existing strategies.**

    Strengths:

    N/A

    Weaknesses:

    N/A

    Reader's Score: **0**

Selection Criteria - Strategy to Scale

1. **The Secretary considers the strategy to scale the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: **0**

   Sub

   1. **(1) The extent to which the applicant identifies a specific strategy or strategies that address a particular barrier or barriers that prevented the applicant, in the past, from reaching the level of scale that is proposed in the application.**

    Strengths:

    N/A

    Weaknesses:

    N/A

Sub

Reader's Score: 0

2. **(2) The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.**

   Strengths:

   N/A

   Weaknesses:

   N/A

   Reader's Score: 0

3. **(3) The applicant's capacity (e.g., in terms of qualified personnel, financial resources, or management capacity) to bring the proposed project to scale on a national or regional level (as defined in 34 CFR 77.1(c)) working directly, or through partners, during the grant period.**

   Strengths:

   N/A

   Weaknesses:

   N/A

   Reader's Score: 0

4. **(4) The mechanisms the applicant will use to broadly disseminate information on its project so as to support further development or replication.**

   Strengths:

   N/A

   Weaknesses:

   N/A

   Reader's Score: 0

5. **(5) The likely utility of the products (such as information, materials processes, or techniques) that will result from the proposed project, including the potential for their being used effectively in a variety of other settings.**

   Strengths:

   N/A

   Weaknesses:

   N/A

   Reader's Score: 0

Selection Criteria - Quality of Project Design

1. **The Secretary considers the quality of the design of the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: **0**

     Sub

1. **(1) The extent to which there is a conceptual framework underlying the proposed research or demonstration activities and the quality of that framework.**

     Strengths:

     N/A

     Weaknesses:

     N/A

     Reader's Score: **0**

2. **(2) The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable.**

     Strengths:

     N/A

     Weaknesses:

     N/A

     Reader's Score: **0**

3. **(3) The extent to which the design of the proposed project is appropriate to, and will successfully address, the needs of the target population or other identified needs.**

     Strengths:

     N/A

     Weaknesses:

     N/A

     Reader's Score: **0**

Selection Criteria - Quality of the Project Evaluation

1. **The Secretary considers the quality of the evaluation to be conducted of the proposed project. In determining the quality of the evaluation, the Secretary considers the following factors:**

Reader's Score: 26

1. **(1) The extent to which the methods of evaluation will, if well implemented, produce evidence about the project's effectiveness that would meet the What Works Clearinghouse standards without reservations as described in the What Works Clearinghouse Handbook (as defined in 34 CFR 77.1(c)).**

   Strengths:

   The applicant provided a research design eligible for the highest What Works Clearinghouse (WWC) designation without reservations if fully implemented according to the standards (pg. e44). The applicant is planning a randomized control trial (RCT), cluster-level assignment at the school level (pg. e44). Randomizing at the school level will mitigate a threat to internal validity, such as contamination between teachers, as there will not be a mix of treatment and control teachers in the same school building. The applicant's power analysis was appropriate at .80, and based on this power, the acceptable minimum detectable effect size (MDES) was determined. Furthermore, based on this power and MDES, the applicant provided the sample size for the treatment and control group. All schools in the randomization process will have a non-zero probability of being in either the treatment or control group, a critical WWC requirement. The applicant will use an intent-to-treat analysis to address the WWC concern related to joiners.

   Weaknesses:

   Several important requirements must be met to receive the WWC without reservation, which is the highest WWC designation. The applicant did not explicitly discuss possible compositional changes based on attrition. Also, the applicant did not discuss confounding factors that may or may not be present in the intervention. Another concern is related to the primary outcome measure (pg. e45). The applicant is sampling schools from two states, and it was unclear if the same summative assessment would be used or different assessments would be used. This is a concern, as the applicant would need to address how scores will be scaled/equated to have the same meaning for different score points. Furthermore, the application might have been strengthened if the applicant provided these assessments' reliability metrics. Clarity regarding the number of randomized schools and power calculations is a final concern. The applicant discusses power and sample size in one section (pg. e45), and then includes yet another discussion related to random sampling on pgs. e170-e171. Three sampling groups could make up the impact analysis: Pilot Group, Cohort 1 Group, and Cohort 2 Group. In reading the applicant's discussion on (pg. e170-e171), it was unclear whether Cohort 1 Group could also be one of the schools to become Cohort 2, creating bias as they would have more exposure to the treatment. This application might be strengthened by demonstrating how the applicant will ensure that no unintended confound is introduced.

   Reader's Score: 11

2. **(2) The extent to which the evaluation will provide guidance about effective strategies suitable for replication or testing in other settings.**

   Strengths:

   The applicant sufficiently addressed this criterion. The applicant has several strategies, which are likely to allow others interested in the intervention and research to replicate or test for other settings (pg. e48). First, the applicant is pre-registering the study with a political and social research consortium. This is a best practice in the social sciences, where full transparency about all research and data collection aspects can be scrutinized. Secondly, there will be a cost-effectiveness analysis to determine the practicability of the intervention. Thirdly, there will be an implementation fidelity analysis. These will result in more than enough information about the intervention and data analyses to replicate in other settings (pg. e49).

Sub

Weaknesses:

There were no weaknesses noted.

Reader's Score: 5

3. **(3) The extent to which the evaluation plan clearly articulates the key project components, mediators, and outcomes, as well as a measurable threshold for acceptable implementation.**

Strengths:

The applicant clearly articulated the project's key components. The key components of this intervention are the professional development for teachers, the middle-school curriculum, and the additional resources being made available to the teachers (pg. e138). These key components align with the discussion in the narrative and the logic model. Regarding mediators, the applicant has an appropriate research question to address mediator variables (pg. e47). The applicant a-priori determined the anticipated mediators to the intervention as the teachers' competencies in science teaching. The applicant also discusses using state science assessments as the primary outcome. Given the outcome is from a state assessment, face validity is not a concern. Furthermore, the data collection procedures should be consistent because it is a state's summative assessment. Finally, the applicant provided an exceptional, measurable threshold implementation matrix, with a comprehensive rubric demonstrating what would be considered acceptable implementation (pg. e136).

Weaknesses:

There were no weaknesses noted.

Reader's Score: 5

4. **(4) The extent to which the methods of evaluation will provide performance feedback and permit periodic assessment of progress toward achieving intended outcomes.**

Strengths:

The applicant discussion related to this criterion was robust. There is a collection of relevant formative assessment data. Teacher logs will be completed every other month during the study, and teacher interviews or focus groups will be conducted twice a year (pg. e50). The applicant is also planning to conduct an exploratory impact analysis with a cohort of teachers before implementing the intervention. This exploratory study can be considered a pilot study to collect data before the actual field study, a best research practice. As noted by the applicant, the data collected will be promptly analyzed by the evaluation team to share the findings with the management team to make any revisions or adjustments to aspects of the intervention if necessary. Based on this data collection, timely feedback reporting with the management team is likely to provide performance feedback and permit periodic assessment of the progress related to the intervention.

Weaknesses:

There were no weaknesses noted.

Reader's Score: 5

Priority Questions

Competitive Preference Priority - Competitive Preference Priority 1

1. **Competitive Preference Priority 1:**

   Promoting Equity in Student Access to Educational Resources and Opportunities: Implementers

**and Partners
(up to 5 points)**

Under this priority, an applicant must demonstrate how the project will be implemented by or in partnership with one or more of the following entities:

> **(a) Community colleges (as defined in the NIA)**
> **(b) Historically Black colleges and universities (as defined in the NIA)**
> **(c) Tribal Colleges and Universities (as defined in the NIA)**
> **(d) Minority-serving institutions (as defined in the NIA)**

Strengths:

N/A

Weaknesses:

N/A

Reader's Score: 0

Status: Submitted

Last Updated: 08/13/2023 01:44 PM

Technical Review Coversheet

Applicant: Sonoma State University (S411B230042)
Reader #5: **********

	Points Possible	Points Scored
Questions		
Selection Criteria		
Significance		
1. Significance	15	15
Strategy to Scale		
1. Strategy to Scale	40	31
Quality of Project Design		
1. Project Design	15	7
Quality of the Project Evaluation		
1. Project Evaluation	30	0
Sub Total	100	53
Priority Questions		
Competitive Preference Priority		
Competitive Preference Priority 1		
1. Promoting Equity	5	5
Sub Total	5	5
Total	105	58

Technical Review Form

Panel #3 - EIR Mid-phase - 3: 84.411B

Reader #5:   **********

Applicant: Sonoma State University (S411B230042)

Questions

Selection Criteria - Significance

1. **The Secretary considers the significance of the proposed project. In determining the significance of the proposed project, the Secretary considers the following factors:**

Reader's Score: 15

   Sub

   1. **The extent to which the proposed project involves the development or demonstration of promising new strategies that build on, or are alternatives to, existing strategies.**

      Strengths:

      The application will build on a prior i3 grant which was a three-dimensional science learning curriculum with professional development and remote support (p. e21). The current project will focus on eighth grade students in rural areas, incorporating the same components with the addition of computational thinking (p. e25). The applicant makes a case that there are no validated middle school assessments for computational thinking in science. As an innovation, a new assessment will be developed that can measure computational thinking (p. e26).

      Weaknesses:

      There were no weaknesses found.

      Reader's Score: 15

Selection Criteria - Strategy to Scale

1. **The Secretary considers the strategy to scale the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: 31

   Sub

   1. **(1) The extent to which the applicant identifies a specific strategy or strategies that address a particular barrier or barriers that prevented the applicant, in the past, from reaching the level of scale that is proposed in the application.**

Sub

Strengths:

The application has a robust narrative description in which it identifies strategies to overcome barriers to scaling up. The applicant has identified several barriers to implementation: completion of all science projects in the pacing guide, different state standards in science, the cost of implementation, teacher time for professional development, and the need for technical support (p. e27). Strategies include shortening the curriculum, revising the curriculum to meet all state standards to facilitate its use nationally, using open educational resources to reduce the cost, converting professional development to virtual formats, and creating a call-in center for technical support (p. e31).

Weaknesses:

One of the strategies to recruit participating districts is the use of recruitment trips (p. e 32). As the states are large, and no details of the trips are provided, it is unlikely that this strategy will be an effective way to recruit participating schools.

Reader's Score: 9

2. **(2) The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.**

   Strengths:

   The applicant proposes an adequate management plan to achieve the grant objectives. The application contains a project timeline, with activities and dates by cohort (p. e152). Personnel responsibilities are described in the narrative (p. e35). The project team will use the "Plan, Do, Study, Act" process model to ensure improvement over the course of the project (p. e34).

   Weaknesses:

   Some of the timelines are unclear, as the application contains two project timelines which differ from each other. For example, the recruitment of the first cohort will end in March of 2025 (p. e36) per one project timeline or in April of 2025 (p. e152) according to the other. In addition, the timelines include an equity cohort (p. e152), but this group is never described.

   Reader's Score: 2

3. **(3) The applicant's capacity (e.g., in terms of qualified personnel, financial resources, or management capacity) to bring the proposed project to scale on a national or regional level (as defined in 34 CFR 77.1(c)) working directly, or through partners, during the grant period.**

   Strengths:

   The applicant has a high capacity for bringing the project to scale. The project director is well-qualified with experience in STEM, administration, and Education Innovation and Research (EIR) grants (p. e62). The prior experience of the project director with EIR grants will enhance the likelihood of bringing the grant to scale. The key personnel are well-qualified, with experience in educational technology and science education, as evidenced by resumes included in the application (pp. e62-73). Financial resources in terms of facilities and supplies are adequate to scale up the project (p. e33).

Sub

Weaknesses:

There were no weaknesses found.

Reader's Score: 10

4. **(4) The mechanisms the applicant will use to broadly disseminate information on its project so as to support further development or replication.**

Strengths:

The application contains a strong dissemination plan. The applicant will share findings at annual conferences (p. e39). The presentations will be conducted with appropriate audiences, such as science teacher conventions, and rural educator meetings (p. e39). The findings will also be posted on the project website and on the project's social media (p. e39).

Weaknesses:

It is not clear how effective the applicant will be in widely disseminated the results of the project. No data is provided about the usage or popularity of the project website or social media presence (p. e39).

Reader's Score: 7

5. **(5) The likely utility of the products (such as information, materials processes, or techniques) that will result from the proposed project, including the potential for their being used effectively in a variety of other settings.**

Strengths:

It is likely that project resources will be used in other settings. The applicant has provided additional suggestions for project findings, such as in high schools and college science classrooms (p. e39). The project will use open educational resources, which will lower the cost of adoption (p. e39). The applicant will also create a shopping list for potential adopters with cost-savings strategies (p. e40).

Weaknesses:

It is unclear what findings will be posted as open resources. The applicant states that it will post resources, but it appears that this is material from the prior study (p. e39). In addition, there are no methods to directly reach teachers. It is uncertain how educators who do not attend conferences will access project findings (p. e39).

Reader's Score: 3

Selection Criteria - Quality of Project Design

1. **The Secretary considers the quality of the design of the proposed project. In determining the quality of the design of the proposed project, the Secretary considers the following factors:**

Reader's Score: 7

1. **(1) The extent to which there is a conceptual framework underlying the proposed research or demonstration activities and the quality of that framework.**

   Strengths:

   The application contains several elements of a good conceptual framework. The application alludes to a theory of action that implements three components: STEM curriculum, professional development, and teacher supports. The applicant adds coding elements to the three components, emphasizing computational thinking (p. e19). The application contains a logic model with inputs, outputs, and outcomes (p. e121). For example, middle school curriculum revision will lead to increased teacher efficacy and independence as well as form a network of teachers (p. e121). In addition, there is a fidelity matrix that describes how inputs and outputs result in outcomes (p. e41). Finally, there is moderate evidence for the use of the activities proposed (p. e40).

   Weaknesses:

   The application lacks a coherent conceptual framework. The theory of action is introduced (p. e19), but it is not well-explained. It speaks of learning standards using the acronym TEC (Technology, Engineering, and Coding) but does not describe them or differentiate TEC from STEM (p. e19). It is unclear how TEC standards interact with STEM in the theory of action without additional details. In addition, the application narrative does not clearly link elements in the logic model, theory of action, and fidelity matrix (p. e40).

   Reader's Score: 3

2. **(2) The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable.**

   Strengths:

   The application minimally addresses this criterion. The goal of the project is to scale the model with fidelity and to evaluate its effectiveness (p. e15).

   Weaknesses:

    Application goals, objectives, and outcomes are not clearly measurable. Some of the measures are misaligned with the appropriate grade level. For example, eighth grade science learning is aligned with the performance measure in seventh grade math and reading (p. e42). In addition, there are implementation measures, but no baseline data or targets for science achievement (p. e42).

   Reader's Score: 1

3. **(3) The extent to which the design of the proposed project is appropriate to, and will successfully address, the needs of the target population or other identified needs.**

   Strengths:

   The project design may address science performance for high need students. The applicant defines high needs as students with at least 50% eligibility for free and reduced lunch (p. e15). The target is middle school science instruction in schools with high populations of Hispanic students (p. e15). Letters of support from partnering school districts are included in the application (pp. e93-115). The logic model shows evidence that the project may impact academic outcomes (p. e121).

Sub

Weaknesses:

The application does not clearly describe the targeted population. At times it seems that the population is 8th grade and 9th grade students (p. e15) and at others only eighth grade students (p. e164). The application also states that it will have a similar population as two prior programs, which range from fourth grade to high school (p. e22).

Reader's Score: 3

Selection Criteria - Quality of the Project Evaluation

1. **The Secretary considers the quality of the evaluation to be conducted of the proposed project. In determining the quality of the evaluation, the Secretary considers the following factors:**

Reader's Score: 0

Sub

1. **(1) The extent to which the methods of evaluation will, if well implemented, produce evidence about the project's effectiveness that would meet the What Works Clearinghouse standards without reservations as described in the What Works Clearinghouse Handbook (as defined in 34 CFR 77.1(c)).**

Strengths:

Weaknesses:

Reader's Score:

2. **(2) The extent to which the evaluation will provide guidance about effective strategies suitable for replication or testing in other settings.**

Strengths:

Weaknesses:

Reader's Score:

3. **(3) The extent to which the evaluation plan clearly articulates the key project components, mediators, and outcomes, as well as a measurable threshold for acceptable implementation.**

Strengths:

Sub

    Weaknesses:

    Reader's Score:

4. **(4) The extent to which the methods of evaluation will provide performance feedback and permit periodic assessment of progress toward achieving intended outcomes.**

    Strengths:

    Weaknesses:

    Reader's Score:

Priority Questions

Competitive Preference Priority - Competitive Preference Priority 1

1. **Competitive Preference Priority 1:**

Promoting Equity in Student Access to Educational Resources and Opportunities: Implementers and Partners (up to 5 points)

Under this priority, an applicant must demonstrate how the project will be implemented by or in partnership with one or more of the following entities:

    (a) Community colleges (as defined in the NIA)
    (b) Historically Black colleges and universities (as defined in the NIA)
    (c) Tribal Colleges and Universities (as defined in the NIA)
    (d) Minority-serving institutions (as defined in the NIA)

    Strengths:

The applicant meets this CPP. Two of the partner institutions are minority-serving institutions (p. e16). All of the key personnel are from these institutions and major activities are based from these institutions (p. e61). In addition, the application contains letters of support from both of these institutions (pp. e89-91).

    Weaknesses:

There were no weaknesses found.

    Reader's Score: **5**

Status: Submitted
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