

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

Status: Submitted

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Technical Review Coversheet

Applicant: National Math and Science Initiative (U411C180020)

Reader #1: *****

	Points Possible	Points Scored
Questions		
Selection Criteria		
Significance		
1. Significance	30	26
Quality of the Project Design and Management Plan		
1. Project Design/Management	50	46
Total	80	72

Technical Review Form

Panel #15 - EIR Early Phase Tier 1 (Content) - 15: 84.411C

Reader #1: *****

Applicant: National Math and Science Initiative (U411C180020)

Questions

Selection Criteria - Significance

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

(1) The national significance of the proposed project.

(2) 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.

(3) The extent to which the proposed project demonstrates a rationale (as defined in the NIA).

(4) The extent to which the proposed project represents an exceptional approach to the priority or priorities established for the competition.

Strengths:

- The proposed National Math and Science Initiative (NMSI) is significant as it is built on research and national statistics demonstrating the lack of access of rural students to rigorous advanced placement courses in rural high schools due to teacher shortages that put these students at a significant disadvantage in developing college readiness skills and aspirations to pursue STEM careers. The proposed initiative elaborates on an evidence-based College Readiness Program (CRP) and replicates it in after-school and summer youth programs in rural settings via an innovative blended delivery model to improve rural student enrollment and success in AP STEM with a particular focus on computer science.
- The proposed initiative involves development and demonstration of promising new strategies that build on and offer alternative innovative strategies to address Absolute Priority 1, Priority 3, and Invitational Priority 1 in after-school and summer programs targeting high school students. These research-based strategies include (a) deploying a blended online delivery model that offers high flexibility for tailored learning experiences through online supports and individualized pacing and just-right instructional supports (Appendix H5); (b) leveraging existing relationships with rural communities to support access to and adoption of this model to their particular context (c) building professional capacity of STEM teachers in rural areas to support CRP; and (d) reducing the program cost to participate in CRP.
- The rationale of the proposed NMSI in rural and tribal communities is informed by the evaluation study findings illustrating that CRP is effective in increasing the probability of students taking and earning qualifying scores on AP exams, increasing student achievement and college readiness (Research studies showing short- and long-term impact on students of CRP are discussed in Appendix G). The rationale is also built on the cited research evidence highlighting the potential of online and blended learning models especially if the delivered curriculum is of high quality and the delivery method is effective (Research studies that show the connection between the proposed NMSI and the attributes of high quality programs are shown in Appendix H5). The proposed project is also well-situated in the literature on effective teacher preparation in remote settings and offers comprehensive teacher professional support via ongoing professional development, mentoring, technical assistance, and curriculum exploration opportunities online.
- The proposed project represents an exceptional approach in addressing underserved high school students in rural and tribal communities via the design and large-scale field-testing of informal STEM curriculum and personalized activities aligned with the state's science and career readiness standards in afterschool hours and summer youth programs across the state. NMSI targets student motivation, engagement, and STEM achievement by integrating motivational strategies such as student competitions, badging, certificates, and a curriculum that incorporates wearable

technologies, robotics, digital storytelling, and maker spaces. The proposed field-test of alternative strategies to staff the youth programs may yield useful insights for youth programs in rural areas across the U.S.

Weaknesses:

- The literature indicates internship opportunities help to improve student aspirations to pursue education and jobs in STEM fields. The inclusion of a discussion on internships in the proposed after-school and summer youth programs would strengthen the proposal.

Reader's Score: 26

Selection Criteria - Quality of the Project Design and Management Plan

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

- (1) The extent to which the goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable.**
- (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.**
- (3) The extent to which performance feedback and continuous improvement are integral to the design of the proposed project.**
- (4) The mechanisms the applicant will use to broadly disseminate information on its project so as to support further development or replication.**

Strengths:

- The logic model (pp. e104) shows the data-driven afterschool/summer STEM program development with input from youth, project partners, and the design and program evaluation teams. The goals, objectives, and outcomes to be achieved by the proposed project are clearly specified and measurable. The proposed project design is built on a thorough analysis of the current barriers that rural students experience in accessing high-quality CRP and the innovative strategies that the initiative will use to address these barriers to learning (Appendix H3).
- The management plan is sustainable in getting varied stakeholders involved, coordinating activities between major partners, and achieving the objectives of the proposed project on time and within budget via clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.
- A continuous performance feedback/improvement is integral to the design of the project and curriculum development and implementation process. The data that will be collected and the frequency of meetings of state-level teams is likely to support information flow and timely feedback to improve implementation,
- A strength of the proposed project is the management team's plan to work with state organizations to shift computer science course classifications from elective to core subject and thereby eliminate a barrier to student access (e123). Research and experience show that, when computer science is classified as an elective, students tend to deprioritize computer science course for others that meet graduation requirements.
- The mechanisms the applicant will use to broadly disseminate information on the project to support further development or replication are adequate and the proposed plan to gather data and disseminate research-based insights gained from the varied youth program models and innovative staffing strategies that will be field-tested in the proposed initiative may be useful for youth programs in rural areas across the country.

Weaknesses:

- It is not clear if, when, and how schools will support the project activities. A detailed discussion would strengthen the management plan.

Reader's Score: 46

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Technical Review Coversheet

Applicant: National Math and Science Initiative (U411C180020)

Reader #2: *****

	Points Possible	Points Scored
Questions		
Selection Criteria		
Significance		
1. Significance	30	26
Quality of the Project Design and Management Plan		
1. Project Design/Management	50	43
Total	80	69

Technical Review Form

Panel #15 - EIR Early Phase Tier 1 (Content) - 15: 84.411C

Reader #2: *****

Applicant: National Math and Science Initiative (U411C180020)

Questions

Selection Criteria - Significance

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

- (1) The national significance of the proposed project.
- (2) 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.
- (3) The extent to which the proposed project demonstrates a rationale (as defined in the NIA).
- (4) The extent to which the proposed project represents an exceptional approach to the priority or priorities established for the competition.

Strengths:

Increasing Computer Science & STEM education access to rural areas is extremely important – this plan has made the case that rural schools have the least access to STEM teachers, even to go as far as calling them ‘STEM deserts.’

Focusing on high school education, the direct link to college and career is a strong model to get students into the STEM workforce. The proposal shows us that students are thinking about their future lives (page 4) at that point in the education.

A blended, online/in-person model will help deliver high-quality instruction to students in rural areas, where access to high-quality STEM/CS teachers is a challenge. Technology has the ability to conference in professionals from all around the world and can deliver high-quality STEM instruction. This addresses invitational priority 1, Personalized Learning

Advanced Placement Computer Science courses are a tested model for student success in college and career. It is a good model to work with to get students interested in STEM and is a standard, skill-based approach to learning.

Focusing on underprivileged, rural students is important to building a strong STEM career pipeline, and motivating students who might not otherwise be interested in STEM fields of work.

There is a great feedback model to inform changes in the program, as outlined on the top of page 11.

Weaknesses:

The magnitude of this project doesn't seem very large. The specifications of the project state small increases in a number of students taking AP Computer Science exams. It appears easy to increase the magnitude of this project.

Discussion of AP STEM and AP Computer Science occurs at the beginning of the rationale, but is not evident at the rationale's. A focus on both AP STEM courses and Computer Science (CS Principles & APCS A) would strengthen the project plan.

Selection Criteria - Quality of the Project Design and Management Plan

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

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

(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.

(3) The extent to which performance feedback and continuous improvement are integral to the design of the proposed project.

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

Strengths:

The partner curriculum that is outlined in the program from CRP & NMSI is strong, well researched, and will help this project attain its curricular goals.

There is a strong model for supporting online, distance, and blended learning for the students. They have thought about the issues related to distance-mentorship, equipment, and testing accommodations. This addresses Invitational Priority 1, personalized learning.

The logic model of the blended CRP program, as outlined in Figure 1 is extremely easy to understand, robust, and takes into account all stakeholders.

There is an understanding of the population this project is serving and its teacher shortage issues. The model is strong to mitigate these problems and increase STEM education in their schools.

The management plan is doable with the time and resources allocated to the program.

The model for selecting schools is consistent with the rationale of the program.

Weaknesses:

There is no evidence of how the teacher preparation will be funded. There is a cost associated with teachers taking online courses or credit-bearing courses, but it is not clear who will pay for this.

There isn't evidence of how the schools will allow for students to take these additional courses. It isn't clear if the structure of the school day will allow for this additional learning students will have as part of this project.

The percentage increases of students taking AP courses looks, on its surface, to be strong (page 12), but when you look at the number of students, it isn't that many.

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Technical Review Coversheet

Applicant: National Math and Science Initiative (U411C180020)

Reader #3: *****

	Points Possible	Points Scored
Questions		
Selection Criteria		
Significance		
1. Significance	30	28
Quality of the Project Design and Management Plan		
1. Project Design/Management	50	44
Total	80	72

Technical Review Form

Panel #15 - EIR Early Phase Tier 1 (Content) - 15: 84.411C

Reader #3: *****

Applicant: National Math and Science Initiative (U411C180020)

Questions

Selection Criteria - Significance

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

(1) The national significance of the proposed project.

(2) 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.

(3) The extent to which the proposed project demonstrates a rationale (as defined in the NIA).

(4) The extent to which the proposed project represents an exceptional approach to the priority or priorities established for the competition.

Strengths:

National significance is supported by the research presented p.2 to p.4: The national teacher shortage in rural areas has led to declining number of students prepared for college and STEM careers and this shortage impedes U.S. economic competitiveness. Some percentages added support this problem: 62% of rural school experiment STEM vacancies, only 19% of rural population hold a bachelor degree, less than half of the percent urban average, and yet STEM career fields require postsecondary education. The main objective of the proposal is to eliminate access as a barrier to STEM coursework and encourage more students to pursue AP STEM and earn qualifying scores for college entrance.

Promising new strategies: It is addressed on p. 5 and 6. Applicants have researched the 'blended learning' (a combination of online and in-person instruction) strategy that they intend to use and have found it an ideal solution to some of the barriers encountered in rural environment (table p. e114 gives a long list of barrier/unmet need and corresponding strategies that have been incorporated into the project design to reduce them). For example, blended learning is a solution to small class size with no instructor. The idea is to incorporate the blended learning strategy to proven content. National Math and Science Initiative (NMSI) is replicating a successful College Readiness Program (CRP) (p. e111) which targets 3-12 grades teacher-to-teacher instruction and support, with professional development, mentoring and regular feedback.

The blended delivery model aims to increase access to STEM education for students and build the capacity of STEM teachers in rural settings, at a reduced cost.

Mentorship and internship are touched upon p. e121: NMSI will offer online opportunities to engage in mentorship with STEM professionals and/or participate in internships.

The rationale: The program targets students in rural areas who have limited access to STEM education and so have fallen behind. The effectiveness of CRP has been evidenced in several research articles and suggests that CRP participation has a positive effect on students' achievement, and college and career readiness (p. 6-8 and p. e105).

The incorporated blended component contributes to the effectiveness of the delivery of the program design, content, and practices in three ways: teacher support, student support and school support (p. e120).

The logic model for Blended CRP (p. 8, 11 and e104) presents a connection between Inputs (online resources, and professional development), outputs (AP teacher trained, AP courses prioritized), outcomes (not very explicit in term of numbers) and impacts (pipeline of AP-ready student, improve college readiness and culture of achievement) as it relates to support to teachers, students, and schools.

IP. 1 is met (p. 3) as we know that online learning is tied to high pacing flexibility and personalized learning support

The exceptional approach is addressed on p. 10. The approach targets the high-need student population as defined in the

proposal: students with opportunity gaps in STEM educational outcomes or lacking components of a successful STEM system

The scaling up will benefit from its geographical location (rural and high need population). Individual Priority 1 is addressed as blended delivery offers high flexibility and is personalized to the need of each participant.

Student support on p. e121 addresses issues related to a possible lack of technology resources.

There is a strong partnership between 14 LEA in North Dakota, Florida Virtual Public School and North Dakota department of Public Instruction.

To increase sense of importance and priority and to encourage enrollment in AP CS courses (p. e123), NMSI will work with state organizations on shifting AP CS courses from elective to core content.

Weaknesses:

Not a lot is shared about the barrier of student computer access outside of the school environment relatively to blended learning instruction and how one on one support to teachers will be provided.

The demographic of schools (p. e109) doesn't bring a lot to the narrative. It would have been better to evidence high truancy/absence percentages, for example, to support the blended strategy effectiveness.

The proposal addresses specifically the native American populations but the schools chosen does not reflect it (a part one school with 25% and another with 12%)

Reader's Score: 28

Selection Criteria - Quality of the Project Design and Management Plan

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

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(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.

(3) The extent to which performance feedback and continuous improvement are integral to the design of the proposed project.

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

Strengths:

Table 1- p. 14 presents one goal, objective, measure, activities and milestones, as well as responsibilities and timeline. The outcomes are listed in more details on p. 12 for the three directions of the project: students, teachers and schools.

By the end of the grant period, NMSI will expand its footprint to 30 North Dakota high schools, serving approximately 20 percent of the state's rural high schools.

The outcome is measurable: Student enrollment in AP courses will increase by 80% the first year and to 140% after 3 years with the number of qualifying scores increasing by 70% to up to 125% for the same period of time (p. 12). Annual formal and informal surveys, site visits and mentor feedback will target the teachers' use of content and effective instructional strategies.

AP courses will be added to school programs.

Clearly defined responsibilities, timelines, and milestones: Each team member (CEO, CFO, COO, ED and PM) is experimented and has a precise role listed on p. 14-15

Table on p. 14 presents measures, and objectives aligned to the goal with quarterly scheduled activities and milestones.

Feedback and continuous improvement are well thought: Some of the activities listed in the management plan include: support and troubleshoot implementation at schools, collect feedback from students, teachers, administrators and staff,

finalize design of the evaluation plan, which, all, demonstrate a cycle of continuous improvement. Strategies used are listed on p. 17: data-driven decision-making to define targeted schools and students, approach, regular formal feedback, and support and informal feedback. KPIs are aligned to annual strategic priorities, which include and extend beyond the grant project's results (p. e126).

Dissemination and Replication: Proper dissemination of the success of the program is part of the long-term outcomes and will encourage other rural schools nationwide to adopt and/or replicate the blended CRP program. The program has the propensity to be scaled up to all rural schools nationwide which constitute 28 % of schools starting with schools in Alabama, New Mexico and Washington, which have a high rural population (p.13).

Weaknesses:

It is not clear how students will be supported before AP years to prepare them to enter 9th grade with the necessary background in math, ELA and science.

Also the internship/apprenticeship option is not clearly visited.

There is little or no mention of how they will get the buy-in of the schools and their support.

Reader's Score: 44

Status: Submitted

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