

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

Status: Submitted

Last Updated: 09/23/2013 04:48 PM

## Technical Review Coversheet

**Applicant:** Maricopa County Education Service Agency (U411C130116)

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

	Points Possible	Points Scored
<b>Questions</b>		
<b>Summary Statement</b>		
<b>Summary Statement</b>		
1. Summary Statement	0	0
<b>Selection Criteria</b>		
<b>Significance</b>		
1. Significance	35	34
<b>Quality of Project Design</b>		
1. Project Design	25	25
<b>Quality of the Management Plan</b>		
1. Management Plan	15	13
<b>Quality of Project Personnel</b>		
1. Personnel	10	10
<b>Quality of the Project Evaluation</b>		
1. Project Evaluation	15	0
<b>Total</b>	100	82

# Technical Review Form

Panel #6 - i3 Development - 6: 84.411C

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

Applicant: Maricopa County Education Service Agency (U411C130116)

## Questions

### Summary Statement - Summary Statement

#### 1. Summary Statement (Optional)

##### General:

Peer reviewer comments are linked to factors in each section and are identified by the numbers that precede the comment(s).

Reader's Score: 0

### Selection Criteria - Significance

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

(1) The extent to which the proposed project would implement a novel approach as compared with what has been previously attempted nationally.

(2) The potential contribution of the proposed project to the development and advancement of theory, knowledge, and practices in the field of study.

(3) The extent to which the proposed project will substantially improve on the outcomes achieved by other practices, such as through better student outcomes, lower cost, or accelerated results.

##### Strengths:

1. Page 2 The applicant suggests a novel program that seeks to encourage students to pursue Science, Technology, Engineering, and Math (STEM) careers by focusing on student STEM identity. The applicant proposes that students' desire to pursue scientific careers is dependent upon if they believe their identities are aligned with STEM fields. To achieve this, components that build STEM identity will be addressed. The proposed project will redesign courses based on the Next Generation Science Standards (NGSS) and examine other components in past curricular programs to build STEM identity. Recognizing that unqualified teachers, teachers without content knowledge in math and science negatively impacts student achievement; the proposed program includes professional development that addresses teachers' content knowledge.

2. Page 5 The applicant defines factors contributing to STEM identity development as access to role models, academic success, sense of institutional belonging, recognition, curricula relevance, and gender expectations. Previous studies have not examined STEM identity holistically and designed courses to include all factors. This will be a novel approach and advance knowledge in the field.

2. Page 4 The applicant discusses the concept of STEM identity and defines it as based on the perception of oneself based on experience, environmental feedback and recognition (page 3). This project provides opportunities to positively affect the development of STEM identity for middle school children. Middle school is a pivotal time for students and pathways are being chosen while identities are being forged. Working with students of this age is critical to ensure that choices are made to continue and dedicate oneself to further education and to pursue STEM fields of study. The applicant suggests that student STEM identity at age 14 is a good predictor of the likelihood that the student will persist in STEM coursework through college so working with middle school students is appropriate.

Page 4 The applicant suggests that the study will add to the knowledge base and provide insight into underrepresented populations (females and Hispanics) in STEM fields and how to support them through the STEM pipeline. There is a well known discrepancy between the sexes and a dearth of Hispanics in STEM fields and this would be a substantial contribution to the field.

3. Page 6 The applicant suggests that if multiple factors are incorporated to facilitate the development of STEM identity, it will increase student achievement (as measured by standardized tests). The applicant provides evidence of studies that show this positive effect.

Page 6 The applicant presents evidence that achievement gains will occur when teachers have expertise in Modeling Instruction. The applicant cites studies that show significant gains in achievement when teachers use Modeling Instruction. Teachers will participate in Modeling Workshops (page 11) where they will be supported in learning Modeling Curriculum. These workshops will take place via the Interactive Video Lab (IVL) and given for three weeks of summer professional development. This will strengthen instructional practices and should lead to student achievement growth.

Page 6 The applicant presents a process to develop student STEM identity and a professional development model to increase student achievement.

#### **Weaknesses:**

3. Page 14 To support objective 1.2(increase student engagement in STEM subject areas by 20% as measured by research validated student survey), the applicant proposes to present a STEM Parent Night with parents and students via IVL. However there is no discussion about what this session would cover. Parental involvement and support would be a positive factor in student success and would produce achievement gains and better student outcomes. A discussion on the elements of the STEM Parent Night would be helpful.

**Reader's Score: 34**

#### **Selection Criteria - Quality of Project Design**

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

**(1) The extent to which the proposed project addresses the absolute priority the applicant is seeking to meet.**

**(2) The clarity and coherence of the project goals, including the extent to which the proposed project articulates an explicit plan or actions to achieve its goals (e.g., a fully developed logic model of the proposed project).**

**(3) The clarity, completeness, and coherence of the project goals, and whether the application includes a description of project activities that constitute a complete plan for achieving those goals, including the identification of potential risks to project success and strategies to mitigate those risks.**

#### **Strengths:**

1.2. Page 6/7 The applicant presents a program designed to positively affect the development of student STEM identity, which will lead to increased achievement as measured by standardized test scores. This will be achieved by redesigning STEM course content to address student STEM identity. This project will also focus on strengthening instructional practices through the Integration through Modeling Instruction. The Integration Through Modeling Instruction

program has shown to produce significant gains in math and science. Recognizing that STEM teacher effectiveness is critical to increase student outcomes, the project has a dual focus – redesigning course content and strengthening teachers' effectiveness.

2. Page 7/8/9 The applicant has presented clear goals and objectives with action steps designed to reach the desired results.

Page 8/9 The applicant has presented a clear logic model outlining a plan of action to achieve its goals. The project focuses on two goals. The first goal empowers students by redesigning student experiences in STEM courses and providing opportunities for students to engage in meaningful STEM challenges by introducing role models, using research based curriculum and recognizing peer success. The second goal uses professional development to strengthen teachers' ability to participate in curricular planning, content knowledge and delivery.

3. Page 8/9/10 The applicant describes a detailed description of activities that constitute a complete plan for achieving the project goals. The applicant describes the Engineering STEM Identity (ESI) method of delivery that uses Interactive Video Lab (IVL) tablets and a Learning Management System (LMS). The IVL enables classes to interact and challenge one another. This method engages students and students are guided to produce solutions for challenges set by one another. After discussion and questioning, full scientific models will emerge and this will promote curricular relevance and academic success. This method encourages participation and provides for project-based problem solving as a group activity. This would allow for experimentation of hypotheses, testing educated conjectures and determining results in a group dynamic. Working together is a healthy setting for problem solving and prepares students for real world work.

3. Page 10 The applicant further describes how technology (the IVL) will facilitate communication and support the essential factors contributing to STEM identity development (page 4). It will allow cohorts to challenge one another and enable role models to inspire and interact with students. The role models will answer questions, relate their experiences with STEM, support content and act as design managers. Volunteers will be trained (page 11) by Maricopa County Education Service Agency (MCESA) and will visit classrooms and engage students in hands-on STEM experiences. The use of ILV's will also facilitate Peer Panels where classrooms interact on a monthly basis to share accomplishments and showcase projects.

Page 11 The applicant describes how professional development will be implemented to support teachers' content knowledge and method of delivery to improve instructional practices. Modeling Workshops and STEM Coaching will support teachers in learning Modeling curriculum. The workshops will take place via IVL and begin with a two-day kick off which will introduce teachers to each other and begin training on the IVL. This presentation will support teachers' learning using a new technological technique and familiarize teachers with other members of the team. The course continues for 3 weeks during the summer. Teachers will act as students and will be led through the curriculum and experience instruction from a student's perspective. This is an effective model and it will enhance instructional practices in teachers' classrooms as they incorporate the teaching methodology into their daily practices. Student outcomes should improve as teachers' instructional practices do.

Page 11 The redesigned STEM course content will focus on developing pedagogical content knowledge (pck) that is aligned with NGSS and the integration of math and science. The applicant describes supports for teachers in the form of STEM coaching that will be available throughout the year. STEM coaches will observe classrooms and continue discussions via ILV and onsite. This ensures continuous monitoring and support of the program and ensures that goals and objectives will be met.

Page 12 the applicant describes how teachers will be active participants in designing challenges that are consistent with the curriculum and standards. The involvement of stakeholders in the planning process is a positive factor and teachers will feel more invested in the project if they are an integral part of the curriculum designing process. The inclusion of teachers in redesigning the curriculum they are teaching will add to the success of the project and the achievement of the desired goal of allowing students to participate in meaningful STEM challenges and empower teachers to redesign course content.

Page 12 The applicant describes a strong support system of administrators and content experts to support teachers' efforts to redesign STEM curriculum. School Leader Cohorts consisting of administrators will support activities that will lead to the success of the program. Administrator groups will communicate via IVL's, the same technological pathways that teachers will use. They will be familiar with the same technology teachers are using and they will be able to support the program and teachers' efforts to redesign curriculum. Teachers will receive further support from Leading Challenge Cohorts who are STEM professionals and pedagogical experts, available to guide them in the redesign process and encourage inter-disciplinary collaboration.

Page 13 The applicant presents a detailed and thoughtful chart of possible issues and strategies to deal with those issues. It is commendable that the applicant describes activities to educate and include parents in the process.

**Weaknesses:**

No weaknesses noted.

**Reader's Score:** 25

**Selection Criteria - Quality of the Management Plan**

**1. In determining the quality of the management plan and personnel for the proposed project, the Secretary considers the following factors:**

**(1) The extent to which the management plan articulates key responsibilities and well-defined objectives, including the timelines and milestones for completion of major project activities, the metrics that will be used to assess progress on an ongoing basis, and annual performance targets the applicant will use to monitor whether the project is achieving its goals.**

**(2) The extent of the demonstrated commitment of any key partners or evidence of broad support from stakeholders whose participation is critical to the project's long-term success.**

**(3) The adequacy of procedures for ensuring feedback and continuous improvement in the operation of the proposed project.**

**Strengths:**

1. Pages 14/15/23 The applicant presents a comprehensive and detailed timeline with milestones. The metrics to assess progress are appropriate and detailed. As indicated in the chart on page 23, data will be collected at the beginning of the study and annually throughout the program duration on a variety of instruments to measure student achievement, teachers' STEM pedagogical knowledge, and Science Teaching Efficacy Beliefs. These are good indicators to determine if adequate progress is being achieved. The chart on pages 14 and 15 indicate personnel responsibilities with performance and date targets for completion.

2. Page 16 The applicant describes a set of 10 Local Educational Agencies (LEAs) and submits letters from each one affirming their agreement with the goals, objectives, and activities of the program. The applicant suggests that an alliance of private sector STEM Commissioners will be formed. This commission will review program data, accomplishments, and financial support as well as examine barriers to success. The first STEM Commissioner, LearningMate Solutions, has contributed a learning management system that allows multiple participants to work on the same problem simultaneously from different locations. This contribution is evidence of commitment from a key partner. Appendix G The applicant has secured letters of support from 10 districts outlining their commitment and the activities they will orchestrate for the program.

**Weaknesses:**

3. Page 17 The applicant reports that stakeholder groups (teachers, principals and STEM commissioners) will share feedback regarding scheduling. The applicant also reports that the internal advisory management team (IAT) will meet

quarterly to track progress. Appendix F contains the resumes of IAT members. However, a clear method of reporting feedback is not described and should be implemented to ensure the smooth transference of information.

**Reader's Score: 13**

#### **Selection Criteria - Quality of Project Personnel**

**1. In determining the quality and personnel for the proposed project, the Secretary considers the following factor:**

**(1) The adequacy of the project's staffing plan, particularly for the first year of the project, including the identification of the project director and, in the case of projects with unfilled key personnel positions at the beginning of the project, that the staffing plan identifies how critical work will proceed.**

##### **Strengths:**

1. Page 18-20 The applicant provides an impressive roster of key personnel with appropriate educational and experience backgrounds to manage and monitor the proposed program. The named [REDACTED], has the desired combination of theoretical background and practical teaching experience to coordinate activities for this project. She also worked on numerous engineering education grants, presented findings at national conferences and wrote for peer-reviewed journals. Until full time staff is hired, she will be supported by personnel who will fulfill the responsibilities of project staff and will enable the project to proceed with confidence. Each of the administrators exhibits a strong set of experience in collaborating on projects, understanding of STEM content and managing projects. Although there are several key positions that are unfilled (STEM Pedagogical Content Expert, STEM coach, IVL & Resource Specialist and a Data Coordinator), the applicant provides detailed job descriptions with qualifications for each and, as indicated, has provided temporary personnel well equipped to manage the program until full time personnel are hired.

##### **Weaknesses:**

No weaknesses noted.

**Reader's Score: 10**

#### **Selection Criteria - Quality of the Project Evaluation**

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

**(1) The clarity and importance of the key questions to be addressed by the project evaluation, and the appropriateness of the methods for how each question will be addressed.**

**(2) The extent to which the evaluation plan includes a clear and credible analysis plan, including a proposed sample size and minimum detectable effect size that aligns with the expected project impact, and an analytic approach for addressing the research questions.**

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

##### **Strengths:**

N/A

**Weaknesses:**

N/A

**Reader's Score:**     **0**

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**Status:**           Submitted

**Last Updated:**   09/23/2013 04:48 PM

Status: Submitted

Last Updated: 09/24/2013 11:11 AM

## Technical Review Coversheet

**Applicant:** Maricopa County Education Service Agency (U411C130116)

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

	Points Possible	Points Scored
<b>Questions</b>		
<b>Summary Statement</b>		
<b>Summary Statement</b>		
1. Summary Statement	0	
<b>Selection Criteria</b>		
<b>Significance</b>		
1. Significance	35	35
<b>Quality of Project Design</b>		
1. Project Design	25	25
<b>Quality of the Management Plan</b>		
1. Management Plan	15	13
<b>Quality of Project Personnel</b>		
1. Personnel	10	10
<b>Quality of the Project Evaluation</b>		
1. Project Evaluation	15	0
<b>Total</b>	100	83

# Technical Review Form

Panel #6 - i3 Development - 6: 84.411C

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

Applicant: Maricopa County Education Service Agency (U411C130116)

## Questions

### Summary Statement - Summary Statement

#### 1. Summary Statement (Optional)

General:

Reader's Score:

### Selection Criteria - Significance

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

(1) The extent to which the proposed project would implement a novel approach as compared with what has been previously attempted nationally.

(2) The potential contribution of the proposed project to the development and advancement of theory, knowledge, and practices in the field of study.

(3) The extent to which the proposed project will substantially improve on the outcomes achieved by other practices, such as through better student outcomes, lower cost, or accelerated results.

#### Strengths:

This excellent proposal does an exemplary job presenting the challenges that engineering and other technology based industries are faced with as they experience difficulty in recruiting and maintaining enough highly qualified, highly skilled workers for STEM careers. It provides both a call for research and presents a research based proposed plan that focuses on novel approaches to engaging and nurturing students at a critical time in their development, 6th through 8th grades, leading to a stronger Science, Technology, Engineering, and Mathematics (STEM) identity in participating students.

In addition to offering a project that will inform practices that will in effect assist middle school students persist in and identify with STEM subjects, the project will increase teachers' confidence and efficacy in implementing redesigned course content and instructional practices.

Identifying and basing the project on research on the development of math self concept, barriers to persisting in STEM courses, age a student becomes interested in pursuing a career in STEM, and other factors that impact students as they enter the STEM pipeline, provides a strong theoretical framework for the project goals for students. Using an approach that includes a variety of effective strategies that are supported by research will enable the project to focus keenly on one aspect of the student and assess its change over time due to participation in the project.

This proposed project, that will use a holistic approach to supporting student success by incorporating a variety of factors into its courses, is in contrast to current practice where only individual factors are taken into consideration in curriculum development. Learning from this project's approach will inform best practices and outcomes in the development of courses for other subject areas.

**Weaknesses:**

No weaknesses found.

**Reader's Score:** 35

**Selection Criteria - Quality of Project Design****1. In determining the quality of the proposed project design, the Secretary considers the following factors:**

**(1) The extent to which the proposed project addresses the absolute priority the applicant is seeking to meet.**

**(2) The clarity and coherence of the project goals, including the extent to which the proposed project articulates an explicit plan or actions to achieve its goals (e.g., a fully developed logic model of the proposed project).**

**(3) The clarity, completeness, and coherence of the project goals, and whether the application includes a description of project activities that constitute a complete plan for achieving those goals, including the identification of potential risks to project success and strategies to mitigate those risks.**

**Strengths:**

The project includes specified goals, detailed and measurable objectives, and specific strategies and outcomes that are tightly aligned (Table 1, page 7; section B2, page 8; section B3, page 9-12), and based on solid research. Rigorous documentation and evaluation data from this project will enable other districts to replicate the program and add to the knowledge base and best practices in the promotion of STEM education.

A logic model (Figure 2, page 9) includes inputs (resources) activities, outputs, short- and long-term outcomes. Activities and outputs are aligned to the two goals of the project that are to redesign the course content and redesign instructional practices.

The proposed plan takes into account both the teacher and the learner as partners in learning and the development of self-confidence. It provides professional development for teachers as they become confident planners of redesigned and challenge focused STEM curriculum and instruction that will lead to the self actualization of students as they move toward a stronger self identity in STEM courses. Access to professionals in the field and pedagogical experts will assist teachers and other educators as they work together and with students in 6th – 8th grades.

The proposed plan provides examples of how it will incorporate individual factors of the proposed theoretical framework (page 5) into its holistic approach of supporting student success in learning STEM content. For example, it takes into account both the teacher and the learner as partners in learning and the development of self. It provides professional development for teachers as they become confident planners of redesigned and challenge focused STEM curriculum and instruction that will lead to the self actualization of students as they move toward a stronger self identity in STEM courses. Access to professionals in the field and pedagogical experts will assist teachers and other educators as they work together and with students in 6th – 8th grades.

The project proposes using an informal peer review process through its implementation of Peer Panels (pages 9-10) with students that is commendable and will allow for interactions among many students who will engage in critical thinking and form critical friendships with other students in the class. Critical peer review can be a powerful way to help students develop self-confidence and strength as they are required to discuss their projects and solutions to problems faced and overcome. Friendships may form through these venues, much like the marching band community of students who seem to unify and become more confident after a collective struggle with learning new music or perfecting march steps and field formations.

Potential barriers are listed in Table 2 page 13 with detailed strategies and solutions. This shows a great deal of thought in anticipating potential problems and identifying strategies to ensure that they do not undermine the project.

**Weaknesses:**

No weaknesses found.

**Reader's Score: 25**

**Selection Criteria - Quality of the Management Plan**

**1. In determining the quality of the management plan and personnel for the proposed project, the Secretary considers the following factors:**

**(1) The extent to which the management plan articulates key responsibilities and well-defined objectives, including the timelines and milestones for completion of major project activities, the metrics that will be used to assess progress on an ongoing basis, and annual performance targets the applicant will use to monitor whether the project is achieving its goals.**

**(2) The extent of the demonstrated commitment of any key partners or evidence of broad support from stakeholders whose participation is critical to the project's long-term success.**

**(3) The adequacy of procedures for ensuring feedback and continuous improvement in the operation of the proposed project.**

**Strengths:**

The management plan is very well presented, highly detailed and sufficient to achieve the objectives on time and within the guidelines of the project. It includes all of the major components and activities, timelines by month and year, and major milestones/deliverables for the work. Responsibilities of personnel are identified in the narrative and project timeline on pages 14-15. The comprehensive table on pages 14 and 15 is clear, concise, shows aligned project objectives and activities, and persons responsible, timelines, metrics, and annual performance targets.

The commitment from each of the 10 participating LEAs is demonstrated through the "Alliance For Engineering STEM Identity" documents found in Appendix C. Each document, signed by the superintendent, states the goals for the project and lists what each of the partners will provide.

**Weaknesses:**

The management plan says that the project will be monitored and data will be used to inform project changes over time, however, details are lacking. For example, on page 17 it says that stakeholders will have quarterly meetings and share feedback, however, details about the method of communication and how feedback will be used to inform the project are not described fully. As shown on pages 17 and 18, MCESA has shown significant commitment to working with high needs school districts in its successful administration of two large Teacher Incentive Fund grants and other projects that focused on developing reliable assessments, professional development for teachers, and systematic and sustainable approaches to support instructional practices.

**Reader's Score: 13**

**Selection Criteria - Quality of Project Personnel**

**1. In determining the quality and personnel for the proposed project, the Secretary considers the following factor:**

**(1) The adequacy of the project's staffing plan, particularly for the first year of the project, including**

**the identification of the project director and, in the case of projects with unfilled key personnel positions at the beginning of the project, that the staffing plan identifies how critical work will proceed.**

**Strengths:**

MCESA professionals have high levels of expertise and experience and key personnel have been identified for key roles in the project. The roles and responsibilities of the project director, STEM Pedagogical Content Expert, STEM Coach, Interactive Video Lab media Specialist, and Data Coordinator are delineated, indicating a strong level of organization in operations. An internal advisory team will recruit and staff ESI and transition times between project startup, hiring and placement are addressed in the plan. All key personnel have qualifications and experience commensurate with expected roles and responsibilities. Senior leadership that includes superintendents (assistant and chief deputy) will assist in project implementation and ensure that project goals are met.

**Weaknesses:**

No weaknesses found.

**Reader's Score: 10**

**Selection Criteria - Quality of the Project Evaluation**

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

**(1) The clarity and importance of the key questions to be addressed by the project evaluation, and the appropriateness of the methods for how each question will be addressed.**

**(2) The extent to which the evaluation plan includes a clear and credible analysis plan, including a proposed sample size and minimum detectable effect size that aligns with the expected project impact, and an analytic approach for addressing the research questions.**

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

**Strengths:**

Not scored.

**Weaknesses:**

Not scored.

**Reader's Score: 0**

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**Status:** Submitted  
**Last Updated:** 09/24/2013 11:11 AM

Status: Submitted

Last Updated: 09/23/2013 10:21 PM

## Technical Review Coversheet

**Applicant:** Maricopa County Education Service Agency (U411C130116)

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

	Points Possible	Points Scored
<b>Questions</b>		
<b>Summary Statement</b>		
<b>Summary Statement</b>		
1. Summary Statement	0	
<b>Selection Criteria</b>		
<b>Significance</b>		
1. Significance	35	32
<b>Quality of Project Design</b>		
1. Project Design	25	25
<b>Quality of the Management Plan</b>		
1. Management Plan	15	12
<b>Quality of Project Personnel</b>		
1. Personnel	10	10
<b>Quality of the Project Evaluation</b>		
1. Project Evaluation	15	0
<b>Total</b>	100	79

# Technical Review Form

Panel #6 - i3 Development - 6: 84.411C

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

Applicant: Maricopa County Education Service Agency (U411C130116)

## Questions

### Summary Statement - Summary Statement

#### 1. Summary Statement (Optional)

##### General:

Reader's Score:

### Selection Criteria - Significance

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

(1) The extent to which the proposed project would implement a novel approach as compared with what has been previously attempted nationally.

(2) The potential contribution of the proposed project to the development and advancement of theory, knowledge, and practices in the field of study.

(3) The extent to which the proposed project will substantially improve on the outcomes achieved by other practices, such as through better student outcomes, lower cost, or accelerated results.

##### Strengths:

The proposal provides a convincing argument for the need of its targeted high-need population and for an approach that considers students' STEM (Science, Technology, Engineering, and Mathematics) identity. The use of academic self-concept as a pathway to explore STEM identity is innovative and offers a foundation from which to develop a framework for an identify theory specific to STEM education.

Contributing to the novel approach, the project promises to improve teachers' confidence in teaching rich STEM content and engages students at a critical time in the development of their academic identities. Furthermore, the innovative centerpiece of STEM identity is supported by related framework for the knowledge of teachers that integrates pedagogical content knowledge with self-regulation and self-efficacy (page 5). Throughout the proposal, these two frameworks are evident and serve as true foundations for cohesion and clarity of purpose.

The proposal includes a thorough review of literature, contributing to the ability of the reader to contextualize the project adequately within what is known about academic self-concept and its interaction with STEM.

Ultimately, the project can provide insight into students' STEM identities, which may lead to a strengthened understanding of best practices and interactions of student factors within the larger field of STEM education.

##### Weaknesses:

The description of STEM identity is novel, the measures provided regarding student outcomes are narrow in comparison to the broader identity targeted by the project. Using more creative measures might provide stronger insight into students'

identity and provide richer descriptions to contribute to the literature.

**Reader's Score: 32**

### **Selection Criteria - Quality of Project Design**

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

**(1) The extent to which the proposed project addresses the absolute priority the applicant is seeking to meet.**

**(2) The clarity and coherence of the project goals, including the extent to which the proposed project articulates an explicit plan or actions to achieve its goals (e.g., a fully developed logic model of the proposed project).**

**(3) The clarity, completeness, and coherence of the project goals, and whether the application includes a description of project activities that constitute a complete plan for achieving those goals, including the identification of potential risks to project success and strategies to mitigate those risks.**

#### **Strengths:**

Transforming STEM content by focusing on the interaction between STEM identity and content is an innovative approach to redesigning STEM curriculum. The project is clearly focused on Absolute Priority #3 and offers activities appropriately aligned with those goals.

The project uses its STEM identity and STEM Professional Growth frameworks to support a thoughtful logic model, indicating alignment with the two primary goals of the project (page 9). The result is a cohesive discussion of activities and approaches that appear to be well-chosen and aligned with those goals. Some detail is provided on those actions and outcomes, including sample modeling content (Appendix J).

A list of potential barriers is provided (page 13) that is matched with potential solutions and strategies. The solutions appear to be well fitted to respond to the barriers listed, and the list is a thorough consideration of risks.

Creating cohorts of teachers and administrators builds the ability of the project to remain sustainable and develop leadership.

#### **Weaknesses:**

None noted.

**Reader's Score: 25**

### **Selection Criteria - Quality of the Management Plan**

**1. In determining the quality of the management plan and personnel for the proposed project, the Secretary considers the following factors:**

**(1) The extent to which the management plan articulates key responsibilities and well-defined objectives, including the timelines and milestones for completion of major project activities, the metrics that will be used to assess progress on an ongoing basis, and annual performance targets the applicant will use to monitor whether the project is achieving its goals.**

**(2) The extent of the demonstrated commitment of any key partners or evidence of broad support from stakeholders whose participation is critical to the project's long-term success.**

**(3) The adequacy of procedures for ensuring feedback and continuous improvement in the operation of the proposed project.**

**Strengths:**

The proposal provides a thorough timeline (pages 14-15) that includes activities, dates, responsible parties, and metrics. This timeline also presents particular milestones and annual performance targets, providing the reader with a clear picture of the pacing of project activities and organization of the project.

Several roles are included, and each is well-defined. In addition, a professional development timeline is included (Appendix J) that contributes additional insight into how this particular component, so fundamental to the project's work, is to be conducted.

Partnering schools have already committed to the project as evidenced by included memoranda of understanding (MOU). The MOU provide thorough descriptions of expectations and roles, including start dates and evaluative responsibilities. An external evaluator is not yet named, but is a key piece of ongoing project feedback and communication. The proposal refers to the external evaluator and data coordinator providing feedback quarterly (page 17), which attends to the progress of the overall project. An additional level of feedback is discussed between STEM commissioners and educators to allow for refining of project implementation on a smaller scale (page 17).

**Weaknesses:**

Providing more information on the roles of the Internal Advisory Team would be helpful in determining how adequately this group will be able to complete fundamental work within the project, such as hiring of project staff and taking on the initial activities of the project. Understanding how the schools are represented in this group also assists in determining the potential for success of the feedback provided.

**Reader's Score: 12**

**Selection Criteria - Quality of Project Personnel**

**1. In determining the quality and personnel for the proposed project, the Secretary considers the following factor:**

**(1) The adequacy of the project's staffing plan, particularly for the first year of the project, including the identification of the project director and, in the case of projects with unfilled key personnel positions at the beginning of the project, that the staffing plan identifies how critical work will proceed.**

**Strengths:**

The project outlines several specific roles, each of which also has clearly defined responsibilities as shown in the timeline (pages 14-15) and in the job descriptions (pages 18-20). Descriptions provide background on identified persons or, where necessary, identify key qualifications either in the narrative or in the samples of job descriptions provided in the accompanying documents. Although each role is not yet filled by an identified individual, the project includes an Internal Advisory Team that will take on necessary roles until hiring has been completed (page 19). The individuals provided as potential Internal Advisory Team members demonstrate the expertise necessary to initiate the project and the work of hiring quality staff.

The hiring timeline is embedded in the overall project timeline (pages 14-15) and appears to include hiring at a time that allows initial activities of the project to begin.

**Weaknesses:**

None noted.

**Reader's Score:** 10

**Selection Criteria - Quality of the Project Evaluation**

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

(1) The clarity and importance of the key questions to be addressed by the project evaluation, and the appropriateness of the methods for how each question will be addressed.

(2) The extent to which the evaluation plan includes a clear and credible analysis plan, including a proposed sample size and minimum detectable effect size that aligns with the expected project impact, and an analytic approach for addressing the research questions.

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

**Strengths:**

N/A

**Weaknesses:**

N/A

**Reader's Score:** 0

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**Status:** Submitted

**Last Updated:** 09/23/2013 10:21 PM

Status: Submitted

Last Updated: 09/19/2013 04:24 PM

## Technical Review Coversheet

**Applicant:** Maricopa County Education Service Agency (U411C130116)

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

	Points Possible	Points Scored
<b>Questions</b>		
<b>Summary Statement</b>		
<b>Summary Statement</b>		
1. Summary Statement	0	0
<b>Selection Criteria</b>		
<b>Significance</b>		
1. Significance	35	0
<b>Quality of Project Design</b>		
1. Project Design	25	0
<b>Quality of the Management Plan</b>		
1. Management Plan	15	0
<b>Quality of Project Personnel</b>		
1. Personnel	10	0
<b>Quality of the Project Evaluation</b>		
1. Project Evaluation	15	13
<b>Total</b>	100	13

# Technical Review Form

Panel #6 - i3 Development - 6: 84.411C

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

Applicant: Maricopa County Education Service Agency (U411C130116)

## Questions

### Summary Statement - Summary Statement

#### 1. Summary Statement (Optional)

##### General:

Please note: reviewer comments for the evaluation section correspond numerically to the factors that relate to that section.

Reader's Score: 0

### Selection Criteria - Significance

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

(1) The extent to which the proposed project would implement a novel approach as compared with what has been previously attempted nationally.

(2) The potential contribution of the proposed project to the development and advancement of theory, knowledge, and practices in the field of study.

(3) The extent to which the proposed project will substantially improve on the outcomes achieved by other practices, such as through better student outcomes, lower cost, or accelerated results.

##### Strengths:

N/A

##### Weaknesses:

N/A

Reader's Score: 0

### Selection Criteria - Quality of Project Design

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

(1) The extent to which the proposed project addresses the absolute priority the applicant is seeking to meet.

(2) The clarity and coherence of the project goals, including the extent to which the proposed project articulates an explicit plan or actions to achieve its goals (e.g., a fully developed logic model of the proposed project).

(3) The clarity, completeness, and coherence of the project goals, and whether the application includes a description of project activities that constitute a complete plan for achieving those goals, including the identification of potential risks to project success and strategies to mitigate those risks.

**Strengths:**

N/A

**Weaknesses:**

N/A

**Reader's Score: 0**

**Selection Criteria - Quality of the Management Plan**

1. In determining the quality of the management plan and personnel for the proposed project, the Secretary considers the following factors:

(1) The extent to which the management plan articulates key responsibilities and well-defined objectives, including the timelines and milestones for completion of major project activities, the metrics that will be used to assess progress on an ongoing basis, and annual performance targets the applicant will use to monitor whether the project is achieving its goals.

(2) The extent of the demonstrated commitment of any key partners or evidence of broad support from stakeholders whose participation is critical to the project's long-term success.

(3) The adequacy of procedures for ensuring feedback and continuous improvement in the operation of the proposed project.

**Strengths:**

N/A

**Weaknesses:**

N/A

**Reader's Score: 0**

**Selection Criteria - Quality of Project Personnel**

1. In determining the quality and personnel for the proposed project, the Secretary considers the following factor:

(1) The adequacy of the project's staffing plan, particularly for the first year of the project, including the identification of the project director and, in the case of projects with unfilled key personnel positions at the beginning of the project, that the staffing plan identifies how critical work will proceed.

**Strengths:**

N/A

**Weaknesses:**

N/A

**Reader's Score: 0**

## Selection Criteria - Quality of the Project Evaluation

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

(1) The clarity and importance of the key questions to be addressed by the project evaluation, and the appropriateness of the methods for how each question will be addressed.

(2) The extent to which the evaluation plan includes a clear and credible analysis plan, including a proposed sample size and minimum detectable effect size that aligns with the expected project impact, and an analytic approach for addressing the research questions.

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

#### Strengths:

(1) The applicant's first two key questions relate to the extent of increased student achievement and engagement and increased teacher effectiveness and confidence in implementing the redesigned curriculum, as shown in Table 4 on p. 23. These questions directly relate to the applicant's proposed objectives, as shown. The applicant's table shows the measures to be used and thresholds, describes the measures and provides a timeline for data collection. Most of the data will be collected on a pre- and post-test basis at the beginning and end of the project, with most data also collected annually. This clearly demonstrates the applicant's understanding of the use of appropriate measures to respond to each question and the frequency and type of analysis to be used. The applicant's third evaluation question focuses on the assessment of program fidelity [see (3) below for discussion].

(2) On pp. 21-22, the applicant provides a detailed description of the assessment plan for both the student and teacher impact studies. For students, the applicant will use a quasi-experimental design (QED) with a matched comparison group and a t-test to identify differences between participants and the comparison group on a pre/post basis. The applicant explains how its proposed treatment group size exceeds the minimum treatment group size needed to have an 80% chance of detecting an effect size of 0.10. For teachers, the applicant identifies the instruments to be used, including inventories and observations, and indicates a 75% probability of detecting a moderate effect size with a sample size of 30 teachers (which it exceeds). The applicant intends to identify an equivalent comparison group of teachers selected on characteristics such as time spent teaching and grades taught. Pre/post t-tests will be used for the Basic Energy Concept Inventory for both participating and comparison group teachers to measure their knowledge of core content concepts as it relates to the effectiveness of the professional development that has been provided.

(3) The applicant provides a logic model on p. 9 showing the proposed relationship between program inputs or activities, outputs, and intended outcomes. The applicant has also provided measurable threshold to determine whether or not the intended outcomes have been met. For example, student achievement on state math and science assessments is expected to improve by 10%, and teacher pedagogical content knowledge is expected to improve by 34% or one standard deviation. The applicant's plan to assess fidelity of the program includes a review of the evaluator's observation notes taken during Professional Development and internal management and advisory team meetings (Table 4). These notes will be disseminated quarterly to the management team, which will help facilitate both program improvement and replication in other settings.

#### Weaknesses:

(2) Although the applicant intends to use a matched comparison group of students (p. 21), no information is provided on the variables to be used for the match or the source of the matching students, such as from different districts or within the same district as the participating students. Additionally, more information is needed about the comparison group of teachers to be selected, such as whether they are from the same or different districts and the rationale for this choice.

Reader's Score: 13

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Status: Submitted

Last Updated: 09/19/2013 04:24 PM



Status: Submitted

Last Updated: 09/23/2013 12:47 PM

## Technical Review Coversheet

**Applicant:** Maricopa County Education Service Agency (U411C130116)

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

	Points Possible	Points Scored
<b>Questions</b>		
<b>Summary Statement</b>		
<b>Summary Statement</b>		
1. Summary Statement	0	
<b>Selection Criteria</b>		
<b>Significance</b>		
1. Significance	35	0
<b>Quality of Project Design</b>		
1. Project Design	25	0
<b>Quality of the Management Plan</b>		
1. Management Plan	15	0
<b>Quality of Project Personnel</b>		
1. Personnel	10	0
<b>Quality of the Project Evaluation</b>		
1. Project Evaluation	15	13
<b>Total</b>	100	13

# Technical Review Form

Panel #6 - i3 Development - 6: 84.411C

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

Applicant: Maricopa County Education Service Agency (U411C130116)

## Questions

### Summary Statement - Summary Statement

#### 1. Summary Statement (Optional)

General:

Reader's Score:

### Selection Criteria - Significance

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

(1) The extent to which the proposed project would implement a novel approach as compared with what has been previously attempted nationally.

(2) The potential contribution of the proposed project to the development and advancement of theory, knowledge, and practices in the field of study.

(3) The extent to which the proposed project will substantially improve on the outcomes achieved by other practices, such as through better student outcomes, lower cost, or accelerated results.

Strengths:

n/a

Weaknesses:

n/a

Reader's Score: 0

### Selection Criteria - Quality of Project Design

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

(1) The extent to which the proposed project addresses the absolute priority the applicant is seeking to meet.

(2) The clarity and coherence of the project goals, including the extent to which the proposed project articulates an explicit plan or actions to achieve its goals (e.g., a fully developed logic model of the proposed project).

(3) The clarity, completeness, and coherence of the project goals, and whether the application includes a description of project activities that constitute a complete plan for achieving those goals, including the identification of potential risks to project success and strategies to mitigate those risks.

**Strengths:**

n/a

**Weaknesses:**

n/a

**Reader's Score: 0**

**Selection Criteria - Quality of the Management Plan**

1. In determining the quality of the management plan and personnel for the proposed project, the Secretary considers the following factors:

(1) The extent to which the management plan articulates key responsibilities and well-defined objectives, including the timelines and milestones for completion of major project activities, the metrics that will be used to assess progress on an ongoing basis, and annual performance targets the applicant will use to monitor whether the project is achieving its goals.

(2) The extent of the demonstrated commitment of any key partners or evidence of broad support from stakeholders whose participation is critical to the project's long-term success.

(3) The adequacy of procedures for ensuring feedback and continuous improvement in the operation of the proposed project.

**Strengths:**

n/a

**Weaknesses:**

n/a

**Reader's Score: 0**

**Selection Criteria - Quality of Project Personnel**

1. In determining the quality and personnel for the proposed project, the Secretary considers the following factor:

(1) The adequacy of the project's staffing plan, particularly for the first year of the project, including the identification of the project director and, in the case of projects with unfilled key personnel positions at the beginning of the project, that the staffing plan identifies how critical work will proceed.

**Strengths:**

n/a

**Weaknesses:**

n/a

**Reader's Score: 0**

## Selection Criteria - Quality of the Project Evaluation

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

(1) The clarity and importance of the key questions to be addressed by the project evaluation, and the appropriateness of the methods for how each question will be addressed.

(2) The extent to which the evaluation plan includes a clear and credible analysis plan, including a proposed sample size and minimum detectable effect size that aligns with the expected project impact, and an analytic approach for addressing the research questions.

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

### Strengths:

This proposal meets many of the evaluation requirements. Impact and implementation studies are both proposed with clear and appropriate key questions. For example, key questions are aligned with the proposed objectives, providing confidence that the questions will elicit the appropriate data to determine projected outcomes. The applicant clearly indicates the sample size and effect size along with a rationale justifying their alignment with expected project impact. Key questions are aligned with appropriate thresholds as well as data collection strategies, timeline, and analysis (pg. 23). The inclusion of baseline data collection and a threshold provides confidence that results generated will be sound and valid in measuring project impact. Rationale was also provided for both the evaluation approach and sample size (pg. 21), providing confidence in the ability of the project to address the key questions and determine project impact. The analysis approach is also strong. For example, analysis of pre and post data increases data reliability (pg. 22).

### Weaknesses:

There are couple areas needing clarity. On page 21, the applicant mentions that the treatment and control groups would be matched, but factors on which the groups would be matched are unclear. The variables related to the teacher treatment group are also unclear (pg. 22). Therefore, it is difficult to determine if the findings would be affected by variables other than the treatment variable which makes it difficult to determine the degree of impact related to the project. Additionally, the applicant discusses measuring student engagement of STEM subject areas by a student survey (pg. 9). While this is an adequate measurement tool and not a major weakness, it would strengthen the evaluation to include another measurement (i.e. taking additional STEM electives when possible, teacher observations, parent interviews, etc.) to triangulate data.

**Reader's Score:** 13

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**Status:** Submitted  
**Last Updated:** 09/23/2013 12:47 PM