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Introduction and Applicant Background

IDEA Public Schools’ mission is to close the opportunity gap between low-income, minority students and their peers by preparing students to successfully graduate college, which research has shown is the surest route out of poverty. Having a college degree improves Americans’ chances of surpassing their parents’ family income and wealth¹.

Since 2000, IDEA has grown from a single campus serving 150 students in the Rio Grande Valley to its current enrollment of 44,653 students across 79 schools in two states and is the fastest-growing network of tuition-free, Pre-K-12 public charter schools in the United States. Despite its rapid growth, IDEA has maintained—and even increased—its excellent student achievement results. **IDEA students have consistently outperformed the state and peer districts in each of its regions on the state STAAR exam in all content areas (Appendix I.1), IDEA students have achieved a 100% college acceptance rate each year for the past 12 years, and IDEA alumni are graduating college at rates over five times the national average than their peers (Appendix I.2).**

IDEA prioritizes recruiting and enrolling educationally disadvantaged students and students of color from specific neighborhoods that experience low college-going rates, low academic performance, and high poverty levels. IDEA’s current student population across all schools is **89.2% Hispanic, 5.5% African American, 88.6% economically disadvantaged, and 32.9% English-language learners. Additionally, 45.9% are considered at-risk for dropping out of school** due to multiple academic, social, and economic factors. By comparison, the Texas statewide student population is 52.4% Hispanic, 12.6% African American, 58.8% economically disadvantaged, 18.8% ELL, and 50.8% at-risk.

IDEA has been named **America’s Best Charter School Network** by the Eli and Edythe Broad Foundation, listed by The Washington Post among the **top 1% of America’s Most**

Challenging High Schools, and is nationally ranked on U.S. News & World Report’s **best high schools** lists (see **Appendix I.3** for IDEA’s accolades and sources for each). This, together with IDEA’s history of successfully managing large, multi-year Federal grant projects, positions the network well for success in this EIR initiative.

Absolute and Competitive Preference Priorities

ABSOLUTE PRIORITY 1: Demonstrates a Rationale

The logic model for this EIR project, to be known as *Mathways to STEM Success*, demonstrates the rationale for project design and success as indicated in the graphic below:

INPUTS	ACTIVITIES	GOALS
Deep engagement with highest-need communities (low-income, minority demographic)	Activity 1: Comprehensive Math Curriculum Redesign Y1: Planning & Pilot (Yr. 1 subjects, 10 schools) Y2: Full rollout (Yr. 1 subjects); Planning & Pilot (Yr. 2 subjects; 10 schools) Y3-5: Full rollout (all subjects; all schools)	Increase the number of college STEM majors
Ongoing PD and coaching	Activity 2: AP Computer Science Support <i>Providing Curriculum, Enhanced PD and District-level supports</i> Y1: Planning for RCT Y2-Y4: RCT Y5: Expansion decision	Reduce/eliminate the CS work gap
Performance management		Prepare students for courses and careers in STEM
Existing school supports	Activity 3: Computer Science Work-Study High School Y1: Planning Y2-Y4: Pilot Y5: Expansion decision	
Current partners		
Potential partners		

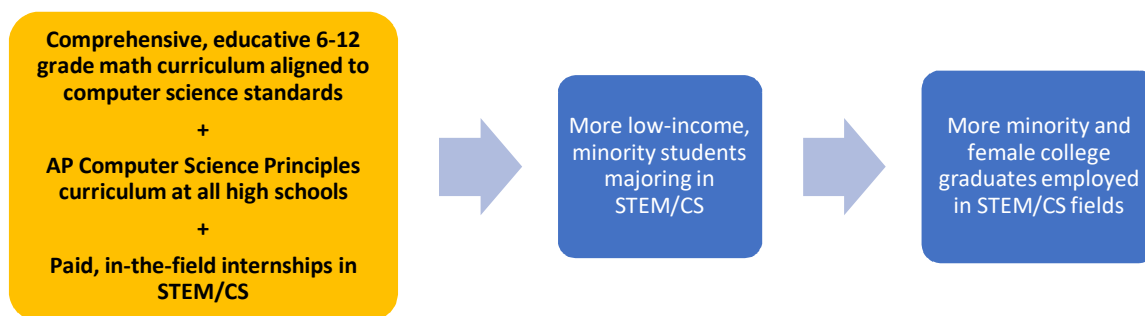
See **Appendix G** for the full logic model. Short-, mid-, and long-term outcomes are depicted on page 11. **Appendix I.4** provides references to evaluative studies that show project elements are based on high-quality research findings that are likely to improve student outcomes.

ABSOLUTE PRIORITY 3: Field-Initiated Innovations—STEM with a focus on Computer Science (CS)

The project resources, inputs, and activities outlined above and explained in more detail in Section B illustrate IDEA’s plan to **create, develop, pilot, refine, and replicate a three-part entrepreneurial, evidence-based, field-initiated innovation to improve student achievement**

and attainment for high-need students. Research-based components of the project design include **1) a comprehensive, standards-aligned, educative math curriculum for grades 6-12 that incorporates vertically-aligned computer science standards to increase computer science readiness; 2) increased access to AP Computer Science Principles** with curriculum and professional development support; and **3) a work-study high school pilot program** that includes opportunities for paid internships in STEM fields with an emphasis on CS.

The innovations in *Mathways to STEM Success*'s three-part solution will **expand access to and participation in rigorous math and computer science coursework for traditionally underrepresented students, preparing over 21,061 racial and ethnic minorities, women, students with disabilities, low-income individuals, and English-language Learners** for college, and pilot the impact of providing tangible workforce preparation and experience through paid STEM-related internships, all to promote increased post-secondary success in the STEM fields during the five-year project period and beyond.



Please see pages 10-11 for the timeline for project development and implementation and the number of schools impacted by project year. (See also **Appendix I.9.**)

A. Significance

(1) Contribution to increased knowledge of educational problems, issues, and strategies

Sharing knowledge from creating a comprehensive 6-12 grade educative math curriculum product, vertically aligned for computer science readiness

Schools require high-quality, curriculum-embedded professional learning that improves the abilities of their educators to implement the curriculum effectively. This educative piece for teachers is often missing from even the most well-known curriculum products, which are built on the assumption that an educator in a given content area has deep knowledge of that content. In reality, many educators—though degreed and certified—are *underqualified* for their job assignmentⁱⁱ. This can be attributed to a shortage of teacher candidates, an increase in out-of-field teaching assignments, or other causes, but the fact remains: schools and school districts serving students from predominantly low-income backgrounds often have access to fewer teacher applicants, less qualified applicants and applicants with less experience than school districts serving students from wealthier backgroundsⁱⁱⁱ. These districts **increasingly rely on novice teachers to meet demand for their high-quality school models, necessitating improvements to both curriculum *and* professional development and support.**

An educative curriculum should describe exemplary instructional practices in the teacher’s manual, situate teacher learning within the context of the lesson, link different knowledge areas within lessons in order to support teachers and students making connections, offer short scenarios or models of practice as examples, and address immediate needs for understanding as teachers plan for their lessons^{iv}. In short, it should build teacher capacity *and* bolster student performance. Research has shown that teachers using highly educative mathematics curriculum materials are more likely to work to identify the big ideas in a curriculum program while planning collaboratively and are more likely to maintain cognitive demand and elicit student thinking during lesson enactment.^v All materials should include resources that support teacher knowledge of the subject matter, help teachers anticipate what learners might say or do in response to activities, help teachers consider how to relate units throughout the year, make

visible the developers' pedagogical judgments, and promote a teacher's pedagogical design capacity for making adaptations for learners^{vi}.

As a contribution to increased knowledge in the field of mathematics teaching and learning, EIR funding will support IDEA in designing and creating a comprehensive, educative middle and high school grade math curriculum product that is aligned to state math standards, AP standards, vertical alignment progressions, ACT CCRS, computer science readiness strands; embodies IDEA's rigorous lesson planning and coaching structures; and provides daily lesson plans paired with a teacher and leader training pathway that models and reinforces pedagogical practices and builds teacher and leader content knowledge. This training pathway will feature full-day quarterly sessions with content experts, focused on giving teachers lesson internalization support and opportunities to stamp key pedagogical moves that are high-leverage aspects of the lessons.

Sharing knowledge from increasing access to AP Computer Science Principles

There are currently over 500,000 open computing jobs across the country, but only 35% of U. S. high schools offer computer science classes^{vii}, and only 8-10% of STEM graduates study computer science^{viii}. In 2015, only 3.3% of all Bachelor's degrees conferred were in Computer and Information Sciences. STEM is the future, but the present pipeline is insufficient to meet demand.

K-12 Computer Science course participation is the leading indicator of what happens in university. The College Board found that students who try AP Computer Science courses in high school are 6 times more likely to study Computer Science in college, and participation is 7 to 10 times higher for minority and female students, respectively. **IDEA seeks to study how its design of a computer science-integrated math curriculum impacts participation and**

performance in computer science in high school and in college. Sharing this knowledge will contribute significantly to the field, helping other secondary schools improve STEM preparation for underrepresented students nationwide.

By the end of the EIR funding period, all of IDEA’s high schools will offer a district-supported AP Computer Science Principles curriculum, with the goal that at least 33% of students will enroll. Third-party evaluation of this project component will produce evidence about the effectiveness of APCSS that will meet the *What Works Clearinghouse (WWC) Evidence Standards without reservations*. See Section D for evaluation details.

Sharing knowledge from expanding opportunities for student internships in STEM/CS

IDEA will further broaden its approach to solving access to STEM by developing an innovative pilot program that reimagines high school with opportunities for paid, meaningful internships in computer science and related fields.

IDEA will use a portion of EIR funding to study the impact of meaningful work-study programming and paid internships in STEM with a focus on Computer Science—in particular how such programming increases student interest and academic performance in STEM fields and their choice of college majors beyond that of students who do not participate in this intervention. EIR-funded evaluation of this program component will contribute to national knowledge in the field with the intention that it positively impact the way schools serving high-need, low-income students structure coursework offerings, develop corporate partnerships, and offer opportunities for real-world application of STEM learning.

Sharing new knowledge and lessons learned through educational networks

IDEA participates in several **national and regional educational networks** that educate and/or support a similar body of high-need students and will serve as excellent channels for

broad dissemination of project success, including: The Bill & Melinda Gates Lumicore cohort; Aspen and Pahara Education cohorts; United for College Success; the National Advisory Board of The Collective, Teach For America's Alumni of Color Association; the Building Excellent Schools Network; the Charter School Growth Fund; college and university partners, including 140+ colleges in the Coalition for College Access^{ix}; Education First; InsideTrack; Texas Boys & Girls Clubs; Communities in Schools San Antonio; Choose to Succeed; RGV Focus; Scaling Up Institute. In addition, IDEA will share takeaways with traditional school districts and has established relationships in its regions with their leadership to leverage shared learning experiences. IDEA will also share lessons learned with its in-district schools in certain high-need regions, including Midland, TX and Baton Rouge, LA.

IDEA will also disseminate information on project challenges and successes by participating in and presenting at **conferences and academic convenings** hosted by the Charter School Growth Fund, National Alliance for Public Charter Schools, South by Southwest EDU, Texas Charter School Association, Texas Conference for School Administrators, and others. Finally, IDEA's *Mathways to STEM Success* Project Director will network with other PDs throughout the funding period and will disseminate independent evaluation findings through the What Works Clearinghouse as well as the networks named here, as appropriate.

(2) Promising new strategies that build on existing strategies

This EIR proposal is based on the premise that the three well planned interventions will increase STEM college and career readiness.

Strengthening the math curriculum continuum. IDEA Public Schools implements Eureka Math at the Academy (elementary school) level, which has been successful in building teacher and leader content knowledge in math. At the College Preparatory (secondary school) level,

student performance data and feedback from leaders consistently indicated that IDEA’s growing teacher population needs more explicit guidance on internalizing and executing coherent, student-centered lessons with sound pedagogical practices that truly prepare *all* students for an AP course pathway. The middle school grades offer a Pre-Advanced Placement curriculum plus academic interventions. In grades 9-12, IDEA has been expanding its “AP for All” course offerings and supporting the growth of its network to new regions and states. Unlike results in most AP humanities courses, student performance in AP Calculus and Statistics have actually decreased as IDEA has struggled to support new campuses, new leaders, and new teachers throughout the network. In its needs assessment for this project, IDEA identified a gap in AP course preparation, which it must address even as the network expands. Therefore, IDEA seeks to build a rigorous mathematics curriculum as a model for districts nationwide. Improving performance in mathematics and embedding computer science components is vital to increasing college graduation rates and supporting students in STEM fields. (See **Appendix I.5** for a complete description of IDEA’s Math Curriculum Redesign and curriculum review process.)

Promising New Strategy 1: IDEA pioneers the path in the design and creation of a **comprehensive, educative middle and high school mathematics curriculum** product that is aligned to state standards, AP standards and vertical alignment progressions, and IDEA’s lesson planning and coaching structures, includes foundational concepts linked to success in CS courses (logic progressions, computational thinking, etc.), and **embeds teacher and leader content booster training pathways** to build teacher and leader content knowledge.

Expanding rigorous, college-preparatory high school STEM courses. The cornerstone of IDEA’s high school program is an ambitious AP for All strategy aimed at ensuring that students are prepared to go to and through college. AP courses not only provide opportunities for IDEA’s

students to earn valuable college credit (thus reducing their debt load), they also provide the best approximation of college-level rigor in a curriculum that is both challenging and accessible to high-need students. Students who take these courses are more prepared for the demands of college, more attractive applicants to Tier I and II institutions, more likely to earn a college degree. This is especially true for low-income students, who are significantly more likely to graduate from college than students who never take an AP course^x. IDEA will take this EIR-afforded opportunity to increase access to AP Computer Science Principles—a relatively new AP course, which has seen increasing student enrollment since it debuted in the 2016-17 school year.

Promising New Strategy 2: Move IDEA from 52 total AP Computer Science and 111 AP Computer Science Principles tests taken (in 2018) to 33% of all (23,800) high school students taking AP CSP by the end of the funding period by **making a district-endorsed AP CSP curriculum available at every IDEA high school and evaluating the impact of curriculum and district support.** Encouraging more students to enroll in AP CSP will mean **more underrepresented minority students have exposure and access to Computer Science as a college major and career choice.**

Internships and work-study opportunities. Currently, IDEA does not offer work-based internships of any kind.

Promising New Strategy 3: Pilot a new high school model that combines rigorous academic coursework with **opportunities for paid internships in STEM fields, with an emphasis on Computer Science.** Students at two IDEA pilot work-study high school programs will be able to deepen their experience and exploration of Computer Science as a viable post-secondary option. **Additionally, students will be able to use earnings from these paid internships to fund a portion of their college tuitions,** allowing them to

graduate with less education-related debt. School locations will be situated in areas that are tech industry hubs, like San Antonio and Austin, so students have access to corporations employing STEM majors.

B. Quality of the Project Design

Over the five-year project period, the Mathematics Curriculum Redesign component will be developed and implemented as shown in the table at right.

IDEA's Math Curriculum Design Team will create the first pieces of the comprehensive,

Project/ School Year	Subjects in Development - # of Schools Piloting	Subjects - # of Schools in Full Implementation
Year 1 2019-20	7th gr Pre-Algebra - 10 8th gr Algebra 1 - 8 12th gr AP Statistics - 3	None
Year 2 2020-21	6th gr Math - 10 9th gr Geometry - 8 10th gr Algebra 2 - 7 11th gr Pre-Calculus - 5 12th gr AP Calculus AB - 4	7th gr Pre-Algebra - 46 8th gr Algebra 1 - 38 12th gr AP Statistics - 14
Year 3 2021-22	No new subjects. Continue to evaluate, revise curriculum, and regionalize training.	6th gr Math - 68 7th gr Pre-Algebra - 59 8th gr Algebra 1 - 46 9th gr Geometry - 38 10th gr Algebra 2 - 21 11th gr Pre-Calculus - 22 12th gr AP Calculus AB - 18 12th gr AP Statistics - 18
Year 4 2022-23	No new subjects. Continue to evaluate, revise curriculum, and regionalize training.	6th gr Math - 82 7th gr Pre-Algebra - 68 8th gr Algebra 1 - 59 9th gr Geometry - 46 10th gr Algebra 2 - 38 11th gr Pre-Calculus - 26 12th gr AP Calculus AB - 21 12th gr AP Statistics - 21
Year 5 2023-24	No new subjects. Continue to evaluate, revise curriculum, and regionalize training.	6th gr Math - 82 7th gr Pre-Algebra/82 8th gr Algebra 1/68 9th gr Geometry/59 10th gr Algebra 2/38 11th gr Pre-Calculus/26 12th gr AP Calculus AB/22 12th gr AP Statistics/22

educative math curriculum and pilot it in the same school year. The first six-week units of study will be available at the beginning of the 2019-20 school year, and subsequent units will be written six weeks ahead of the timeline for implementation, ensuring IDEA's students can immediately benefit from this innovation beginning in Year 1 of the EIR funding period.

The Advanced Placement Computer Science Support component will implement one district-endorsed AP CSP curricula, randomly assigned—Project Lead The Way Computer Science^{xi} and control schools will select their own curriculum, such as University of Texas at Austin's UTeach CS Principles^{xii}. Rollout will take place as follows:

AP CSP Support	Year 1	Year 2	Year 3	Year 4	Year 5
Treatment Schools	--	13	15	15	Expansion decision
Control Schools	--	13	15	15	

Finally, the Work-Study High School component will be designed in project year 1 and will be implemented in San Antonio in year 2 and in Austin's Tech Corridor in project year 3.

(1) Clear, specific, and measurable project goals, objectives, and outcomes

IDEA's overarching goal is to close the opportunity gap between low-income, minority students and their peers by preparing students to successfully graduate college. Org-wide goals (pertaining to high school students) that all leaders, teachers, and staff commit to achieving include: 90% passing, 30% commended on state exam/end-of-course exam; average ACT score 21.35; 34% of graduates named AP Scholars (3 scores of 3 or higher); 100% accepted and 99% matriculate to a

college or university; and 37% of alumni graduating from college in 4 years/47% in 6 years. EIR funding will help IDEA achieve its overarching and org-wide goals by preparing students

Short-term outcomes (Years 1-2)	Mid-term Outcomes (Years 2-4)	Long-term Outcomes (Years 4+)
(A1) Improve student performance on mathematics assessments --District assessments --State assessments	(A1)(A2)(A3) Improve student performance on mathematics assessments --District assessments --State assessments --AP assessments --AP CSP --AP Calculus --AP Statistics	(A1)(A2)(A3) Improve student performance on mathematics assessments --District assessments --State assessments --AP assessments --AP CSP --AP Calculus --AP Statistics
(A2) Increase proportion of students enrolled in --AP CSP --Other AP Coursework	(A1)(A2) Increase proportion of students enrolled in --AP CSP --Other AP Coursework	(A1)(A2) Reach/maintain percentage of IDEA students enrolled in AP CSP at 50% following grant (A1)(A2) Increase retention of top-performing teachers
(A1) Improve teacher and leader perceptions of math curriculum	(A1)(A2) Increase retention of top-performing teachers (A3) Address CS workforce shortage --Increase number of students planning a STEM major --Increase number of students planning a career in STEM	(A2)(A3) Address CS workforce shortage --Increase number of students planning a STEM major --Increase number of students planning a career in STEM --Increase number of alumni employed in a STEM field
(A1)(A2) Improve teacher performance on annual reviews/ratings	(A2)(A3) Reduce the FAFSA gap calculation for graduating students	(A2)(A3) Reduce the FAFSA gap calculation for graduating students (A1)(A2)(A3) Improve collegiate outcomes --Maintain college acceptance rates --Improve college matriculation rates --Improve college matriculation rates to highly competitive IHEs --Improve college graduation rates

for high-demand careers in STEM with a focus on Computer Science. As noted in the Logic Model, achieving these stated outcomes will ensure achievement of *Mathways to STEM Success*

project goals. Please see **Section C, Evaluation Plan**, for specifics on evaluation methods to measure project outcomes and effectiveness.

(2) High-quality conceptual framework underlying the proposed research and activities

Educative curriculum. *Mathways to STEM Success* is built on the conceptual framework of an educative curriculum. The value of an educative curriculum is that even novice teachers who are working with high-needs, majority-minority, English-language Learner, and/or low-income students can improve student achievement and prepare students success in and graduation from college while also improving their own practice and student results.

Curriculum materials play a central role in teachers’ daily work and thus are a logical site for working toward reform^{xiii}, particularly when they are written to speak *to* teachers rather than *through* them^{xiv}. Teachers using highly educative mathematics curriculum materials are more likely to work to identify the big ideas in a curriculum program while planning collaboratively and are more likely to maintain cognitive demand and elicit student thinking during lesson enactment (Davis, et. al p 28). Furthermore, code.org’s Exploring Computing Education Pathways (supported by the National Science Foundation) suggests integrating computer science into mathematics, science, or other subjects (an integrated approach with basic exposure) is a possible way districts can build out a sequence of content and courses to support student learning. See **Appendix I.6** for the components of an educative curriculum.

Increasing Access to AP Computer Science Curriculum. IDEA’s secondary school model is built on a framework of “AP for All” because peer-reviewed research^{xv} by the Educational Testing Service, The College Board, the University of Texas and the U.S. Department of Education all show strong evidence that participation in AP strongly correlates with student achievement, college readiness, and college completion. Making a district-endorsed AP CSP

curriculum available to all secondary schools in IDEA’s growing network (rather than allowing each school to choose its own approach to teaching AP CSP) will advance understanding of how curriculum impacts college and STEM career readiness for underrepresented minority students.

Paid internships in STEM/CS. EIR funding will support IDEA in piloting an work-study high school that develops students’ professional, workplace (or “soft”) skills and provides them with in-the-field experiences in high-demand STEM/CS roles to deepen their understanding of how their college preparatory curriculum connects to college and career opportunities.

(3) Procedures for ensuring feedback and continuous improvement

At the district level, IDEA’s **Executive Team**—composed of the CEO/Co-founder, Superintendent/Co-founder, Chief Administrative Officer, Chief Advancement Officer, Chief College and Diversity Officer, Chief Financial Officer, Chief Human Assets Officer, Chief Program Officer, and Chief Operating Officer—meets weekly to systematically assess IDEA’s needs, set rigorous organizational goals (see **Appendix I.7**), and measure progress with a focus on improving student achievement and success in college. All employees have individual goals for their scope of work that “roll up to” and support achievement of IDEA’s organizational goals and metrics. Information is tracked to make real-time, data-driven decisions, identifying best practices or informing areas to course-correct. The weekly Executive Team meetings ensure oversight of this EIR project for the organization, alignment of the project to org-wide goals, and that the EIR project tasks are embedded into the existing daily operation and data monitoring activities of IDEA Public Schools. IDEA’s **College Success Team** (CST) monitors students’ AP scores and college credits, especially in relation to their impact on decreasing the need for student financial aid (to be further impacted by earnings from paid internships). The EIR Project Director will seek input from the CST on the interrelationships among and between student

internships, college matches and acceptances, financial aid packages, choice of STEM/CS college majors, and chosen career pathways and how these elements inform the college-preparatory conversations the CST has with students.

A **Project Advisory Team**, whose membership will represent internship partners, students, and parents (see letters of support from IDEA leaders and teachers and prospective project advisors, **Appendix B**), will meet quarterly to ensure all stakeholders have a voice in shaping project direction and success. In addition, the **EIR Project Management Team (PMT)**, composed of the Project Director, the Chief Program Officer, at least three members of the Academic Services Team (AST) Math Team, at least two teachers, and at least one school leader, will observe a regular schedule of communication and reporting as detailed in **Appendix I.8**.

C. Adequacy of the Resources and Management Plan

IDEA has nineteen years of experience launching new schools and rolling out curricula to teachers in its growing network and providing the professional development to enable effective implementation as measured by student achievement. Examples include partnering with the National Institute for Direct Instruction (NIFDI) for IDEAs PK-2 curriculum, the National Math + Science Initiative (NMSI) supporting AP coursework, and an Investing in Innovation (i3) grant that supported IDEA’s development of its New Teacher Institute with an evaluated training model showing success in closing gaps between novice and veteran teachers while also spurring additional partnerships with a local traditional public school district in the Rio Grande Valley of Texas. Please see pages 15-16 for qualifications of key *Mathways to STEM Success* project personnel and **Appendix B** for resumes and bios.

(1) High-quality project management will achieve project objectives on time and within budget; responsibilities, timelines, and milestones for accomplishing project tasks

The following table shows major milestones by year. Please see **Appendix I.9** for a detailed

project management plan with all activities, personnel responsible, and proposed timelines.

MAJOR PROJECT COMPONENTS/MILESTONES	
Year 1:	Project staffed for year 1 and pilot/treatment campuses finalized • Project has a plan for completion of curricular materials • Pilot math courses launched; begin data/feedback-based revisions • Planning for work-study high school complete, will open in 2020
Year 2:	Activities from year 1 repeat for next set of courses • AP CSP RTC begins • Plan for second work-study high school, to open in 2021
Year 3:	Staffing and curriculum activities repeat for next set of courses • Conduct holistic review of completed buildout of curricular materials
Year 4:	Project dissemination activities finalized • Project expands access to existing curricular materials as schools open and add courses in year 4 • Complete holistic review of network-wide implementation impact
Year 5:	Project concludes dissemination activities • Project expands access to existing curricular materials as schools open and add courses in year 5 • Complete holistic review of network-wide implementation impact • End of funding period and final reports

(2) Qualifications, relevant training, and experience, of key project personnel

A hallmark of IDEA’s leadership is its longevity and stability despite the rapid growth of the charter school network. The following highly qualified personnel will ensure project success:

Dolores Gonzalez, Chief Program Officer for IDEA Public Schools, will oversee and assume ultimate responsibility for all aspects of *Mathways to STEM Success*. As CPO, Dolores works directly with campus leadership teams as well as classroom teachers and co-teachers and provides curriculum, assessment, instructional resources, instructional coaching, and support for all students, with a focus on improving services to special populations. Dolores was recently recognized by Education Week (2017 Leaders to Learn From) for “Leadership in Preparing All Students for College.” She has served IDEA for 13 years, including 7 years in her current role.

Michael Franco is the Senior Vice President of Academics for IDEA Public Schools. He currently oversees the academic program for grades K-12, including curriculum development, teacher content training, and the implementation of IDEA’s Advanced Placement for All program across 79 Academy and College Preparatory schools in Texas and Louisiana. He previously served IDEA as Chief of Staff and as Vice President of Secondary Programs.

Prior to working at IDEA, and while he attended graduate school, Michael worked as an Education Pioneers fellow and as a Business Analyst for an education technology and consulting

firm in Austin, Texas. Michael began his teaching career with Teach For America where he taught AP World History at Roma High School in Roma, Texas for three years. He has served IDEA for 6 years, including 4 years in his college preparatory programmatic role.

The Math Curriculum Team includes **Will Kiker (Manager, Math Secondary Curriculum)**, **Julia Alvarez (Director of Math)**, and **Courtney Moulder (Math Curriculum Manager)**. **Ryan Smith, IDEA's Chief of Staff**, will oversee the work of the Computer Science curriculum team. Staff who will be key to implementing IDEA's new internship-focused high school program in Texas' two technology hub cities include **Rolando Posado, Executive Director, IDEA San Antonio**, and **Tricia Noyola, Executive Director, IDEA Austin**, both of whom report to **JoAnn Gama, IDEA Superintendent**. The Executive Directors have each nominated principals who will serve on the steering committee as IDEA launches these new school models. Finally, **Phillip Garza, Chief College and Diversity Officer**, sets the vision and strategy for everything IDEA does to send its diverse student body to and through college while consciously growing a diverse organization reflective of IDEA's communities.

The *Mathways to STEM Success* Project Director will report directly to the Senior VP for Academics and will be the linchpin that connects the key personnel named above, facilitating communication and action to achieve all project goals and aims. Please see **Appendix B** for resumes/bios of these team members, resumes for all members of IDEA's Executive Leadership Team (Chiefs) and their respective areas of accountability for the organization, resumes for grant management support staff and IDEA's internal Research & Analysis team members, and a table summarizing qualifications for curriculum content writers to be hired with EIR funding.

(3) Potential for continued support of the project after Federal funding ends, including demonstrated commitment of appropriate entities to such support

Financial support. The growth of IDEA’s charter school network and rigorous academic programming has historically been supported with funding from Charter School Program Replication and Expansion grant funds awarded from the U. S. Department of Education, private philanthropy, and careful internal planning and budgeting. EIR funding will build IDEA’s capacity to provide a rigorous, linked math and computer science curriculum, positioning IDEA to share lessons learned and codify the practices that the project evaluation finds to be successful and impactful regarding implementation. Partnerships with universities, corporations, and other entities named on page 7 will provide support to continue the internship program IDEA will establish with a portion of this EIR funding. Project leaders will also consider a model wherein companies employing student interns will pay a contracting fee to sustain the additional costs to operate the pilot program, including a full-time Intern Placement Specialist. IDEA will also continue to support *Mathways to STEM Success* after Federal funding ends through school-based, regional, and national budget decisions if the project evaluation concludes this program meets the proposed expectations for success.

Peer support. As it has done since inception, IDEA will host site visits by schools interested in IDEA’s educational and professional learning results and will share its academic results and lessons learned with partners, stakeholders, and others as appropriate through Learning Walks conducted in high-performing IDEA classrooms. As its student achievement results improve, IDEA will share best practices and lessons learned with other charter networks and traditional public schools serving a similar high-needs, low-income diverse student population. This sharing and seeking of feedback from like-minded peers and partners will also contribute to IDEA’s ability to sustain and support the program and to pursue continued improvement and program iteration through an EIR Mid-Phase grant project.

D. Quality of the Project Evaluation

(1) Evidence about the project's effectiveness will meet the WWC standards

The American Institutes for Research (AIR) will work with IDEA to conduct a rigorous evaluation of their *Mathways to STEM Success* EIR initiative. The evaluation will provide IDEA with timely and actionable formative feedback essential for ongoing monitoring and improvement of program implementation. In addition, the evaluation will conduct separate analyses of the effectiveness of each project component: the AP Computer Science Support (APCSS) program, the Mathematics Curriculum Redesign (MCR), and the Work-Study High School (WSHS). It will produce evidence about the effectiveness of APCSS that will meet the *What Works Clearinghouse (WWC) Evidence Standards without reservations*, and evidence about the effectiveness of MCR and WSHS that will meet the *What Works Clearinghouse Evidence Standards with reservations*. The evaluation also will provide guidance about effective strategies for future efforts to replicate and test the intervention in other settings, including new regions designated for IDEA expansion.

(2) Guidance about effective strategies suitable for replication or testing in other settings

AIR will conduct multiple methods formative and summative studies drawing on multiple data sources, including surveys, interviews, focus groups, documentation, and administrative data, to address the research questions (RQs). Taken together, the formative and summative studies will provide guidance and effective strategies suitable for replication or testing of these programmatic components in other settings (see sections 3 and 4 for more detail).

(3) The evaluation will provide valid and reliable performance data on outcomes

Research Questions	Data Sources
Formative Evaluation	
F1: To what extent is MSS being implemented with fidelity across schools?	Surveys, document analysis, student- and school-level extant data
F1A: To what extent are implementation challenges different for different components of MSS?	Surveys, interviews, document analysis, student- and school-level extant data

Research Questions	Data Sources
F1B: To what extent are implementation challenges related to school and region characteristics?	Surveys, interviews document analysis, student and school-level extant data
F2: How do students, teachers, and leadership experience the various components of MSS?	Surveys, interviews
F3: What resources and supports are necessary for successful implementation of MSS?	Interviews, student and school-level extant data
Summative Evaluation	
S1: What is the impact of APCSS on student standardized test scores (AP tests, ACT)?	Student- and school-level extant data
S2: What is the impact of MCR on student course enrollment patterns and standardized test scores (TX STARR, AP tests, ACT)?	Student- and school-level extant data
S3: What is the relationship between WSHS and student standardized test scores and course enrollment patterns?	Student- and school-level extant data

Formative Evaluation. AIR will conduct a formative evaluation using replicable and sustainable methods, enabling IDEA to use and adapt these methods to measure fidelity and to monitor implementation throughout and beyond the grant period. The formative evaluation will provide a rich description of the implementation of the three MSS components, inform interpretation of the summative evaluation’s impact estimates, and provide ongoing formative feedback and implementation guidance to the project team to support continuous improvement.

Data Sources and Analysis. To answer RQs F1 and F2, online *implementation surveys* will be administered to all school leaders, teachers, and IDEA support employees who participate in the three components of the MSS program to gauge perceptions of MSS implementation, challenges, strengths, and overall program utility. This survey will be administered annually in the spring of the first three program years (2020–2022). The survey will be developed by AIR and will include primarily fixed-response items with Likert-type response scales (e.g., agreement scales, frequency scales). Wherever possible, existing validated items will be used, and new items will be developed as needed. The structure of the response items will allow us to calculate fidelity of implementation scores based on a priori benchmarks that will be determined in partnership with IDEA during the initial planning phase of the project. Where existing validated items are not available, AIR will work with IDEA to create applicable implementation

constructs. AIR will establish face validity of the measures with input from IDEA and will pilot the survey in Year 1 and validate the survey using the Rasch model so that it is validated for full-scale implementation in Years 2 and 3.

To supplement the data collected through the survey and to address RQ F3, AIR will conduct 60-minute *interviews* with a sample of members of the IDEA central office staff, school leaders, and teachers. The interviews will provide additional information and context for addressing RQs F1 and F2. In the 2019–20 school year, AIR will select 10 teachers, five principals, and five IDEA staff to participate in interviews about MSS implementation. To ensure that a diversity of perspectives is captured, AIR will purposefully sample interviewees to provide representation across sites and implementation components. AIR will then follow up with the same interviewees in 2021–22 to examine changes in their responses over time. Interviews will allow for more detailed responses than a fixed-response survey and will enable us to probe stakeholder perceptions of implementation and program effectiveness. Specifically, the interviews will allow evaluators to collect rich data related to the challenges experienced during implementation, the resources needed to ensure successful implementation, and the experiences of teachers, principals, and program staff working on the MSS project.

AIR will work with IDEA to identify the documentation and materials best suited to inform AIR’s examination of MSS implementation. Using file sharing services such as SharePoint, AIR will collect documentation on the implementation of all MSS components for *systematic document analysis*. This analysis will speak to RQs F1A and F1B and will provide additional insight and context for RQs F2 and F3 as well. IDEA will provide AIR with written materials, documents, and other evidence related to the implementation of the MSS program, including curriculum documents, partnership agreements, and PD and internship participation logs.

In addition to findings from the document analysis and interviews, AIR will present descriptive analyses of the survey responses to IDEA. These findings will provide IDEA with timely feedback on implementation progress and will identify program strengths and challenges to enable ongoing refinement of the program model as implementation scales up. Further detail about the data analysis methods that AIR will employ are described in **Appendix I.9**.

Summative Evaluation Study. To answer RQs on the outcomes associated with and impacted by MSS, AIR will employ three designs because of logistical considerations affecting the implementation of each program component (APCSS, MCR, and WSHS).

(4) Key project components, mediators, outcomes, and a measurable threshold for acceptable implementation

Component 1: Advanced Placement Computer Science Support (RQ S1). IDEA's APCSS component is a testing of a computer science curriculum for Advanced Placement Computer Science (AP CS) courses, which will be provided through a partnership with Project Lead the Way (PLW). The expectation of this intervention is that it will improve student performance on the AP CS exam, as demonstrated in the logic model. To measure the impact of the APCSS component of the MSS program on earning a qualifying AP CS test score, beyond the impact of other MSS programs, AIR will conduct a ***randomized controlled trial (RCT)*** utilizing pair matching and designed to meet *WWC standards without reservations*. At least 26 schools will offer the AP CS course in the 2020–21 school year (the first year of the APCSS program). Among these schools, AIR will randomly assign half to receive the APCSS intervention (treatment: PLW curriculum) and half of the schools to not receive the APCSS intervention (control: no PLW curriculum) using pair randomization. Schools offering AP CS courses will be stratified into pairs based on participation in other MSS programs, school-level mathematics

achievement, and history of offering AP Computer Science coursework. During the 2021–22 school year, an additional four schools will be expected to be offering the AP CS course. AIR again will randomly assign half to receive the APCSS systematic supports and half to not. The impact of APCSS systematic supports will be measured by comparing the difference in the average AP test score as well as the rate of students’ achieving an AP CS qualifying test score between the treatment and comparison groups at the end of the school year.

The biggest risk to meeting *WWC standards without reservations* is high school-level or student-level attrition. Attrition at the school level is expected to be low and similar across conditions due to IDEA’s history of innovative approaches and initiatives. All schools have expressed interest both in providing the AP Computer Science course and in the additional systematic support component. However, AIR will monitor overall and differential school-level attrition throughout the course of the study. If there are high levels of attrition, baseline equivalence analyses will be conducted on the analytic sample. Because our primary outcome, earning a qualifying AP CS exam score, is not measurable before the start of the intervention, AIR will use the WWC guidance on baseline equivalence for studies that do not have pretest baseline measures (What Works Clearinghouse, 2016). Namely, AIR will measure students’ baseline equivalence on state standardized mathematics scores and eligibility for the federal school lunch program. In addition, AIR will measure baseline equivalence on teachers’ years of teaching experience. See **Appendix I.9** for more context on research parameters and model.

AIR also will monitor threats to validity due to spillover. AIR will work closely with IDEA to ensure that treatment and control schools remain in their assigned status. IDEA program staff will work with schools to preserve internal validity of the study. AIR will regularly check in with IDEA and school staff to check on school alignment to treatment assignment. AIR will

secondarily confirm this by requesting lists of IDEA schools from PLW.

AIR will request extant educational administrative data from IDEA, specifically AP CSP test score performance, standardized state assessments in math, and student- and school-level demographics. Data will be collected for school years prior to Year 1 and through Year 4 of the APCSS program (2017–18 through 2022–23). AIR will use multilevel modeling to account for the nesting of students within schools to estimate the effect of APCSS on student outcomes.

Approximately 163 students were enrolled in Computer Science courses in the 2017–18 school year when only nine schools offered an AP Computer Science course. It is expected that in 2020–21, the first year of the APCSS program implementation, 26 schools will offer an AP Computer Science course. Following this pattern, 471 students are expected to enroll in the course and 543 students in year 3. Given the number of schools and students participating in the treatment and comparison groups, a minimum detectable effect size is estimated 0.24.

Component 2: Mathematics Curriculum Redesign (RQ S2). IDEA will pilot the Mathematics Curricula Redesign (MCR) curriculum for Grades 6–12 in two phases and over three years. First, IDEA will purposefully pilot redesigned curricula for grades 7, 8, and one 12th grade AP course in 10 schools during Year 1. During Year 2, this redesigned curriculum will be rolled out to these same grades in the remainder of IDEA schools. Meanwhile, also during Year 2, the same 10 pilot schools will begin implementing the MCR redesigned curricula for grades 6, 9, 10, and 11. In Year 3, the MCR redesigned curricula will be rolled out to these same grades in the remainder of IDEA schools.

Because the pilot schools are not chosen at random, AIR will instead use a ***difference-in-difference (DiD)*** design to estimate the impact of MCR on student standardized test scores. Students in the same grades at other IDEA schools will serve as a comparison group during the

pilot years. Baseline equivalence will be examined in accordance with WWC standards, and the correlation between students' prior year mathematics standardized test scores and those from the first of the intervention year will be examined to determine whether they have a .6 correlation or greater. If these two criteria are met, this quasi-experiment should meet *WWC standards with reservations*. If this is not the case, AIR will explore matching students in the treatment schools to those in the control schools and implementing a matching design to establish equivalent treatment and control samples and examine outcomes controlling for baseline characteristics or other covariates in accordance with WWC recommendations.

For this analysis, AIR will use the same ***administrative data*** from IDEA that were collected as part of the analysis of the APCSS program component. The specific short-term outcomes included in the analysis are mathematics scores at grades 6, 7, and 8 from the Texas STAAR (state assessment), ACT test mathematics scores at grades 9, 10, and 11, and AP Calculus and Statistics test scores at grade 12. In addition, enrollment patterns in AP math courses will be examined. Data will be collected for two school years prior to the beginning of the program and following through Year 3 of the MSS program (2017–18 through 2021–22) for this specific analysis to exam pre-intervention performance relative to performance following the intervention.

AIR will use multilevel modeling to account for the nesting of students within schools and will control for student and school demographic characteristics in the DiD model in **Appendix I.9**. Given the number of schools and students participating in the treatment and comparison groups, a minimum detectable effect size is estimated 0.24.

Component 3: Work-Study High School (RQ S3). IDEA is also purposefully selecting two sites in which to launch the WSHS program in line with IDEA's expansion plan. IDEA will redesign two high schools to provide a comprehensive work-study experience for students in the

computer science industry. The first school will open in Year 2 of the MSS program (2020-21) and the second school will open in Year 3 of the MSS program (2021-22). Students will have an opportunity to participate in paid internships with partnering organizations throughout their high school enrollment. AIR will measure the impact of WSHS by conducting a *quasi-experimental matching design*. This approach capitalizes on the limited number of sites participating in the WSHS component of MSS because there are ample comparison students in other IDEA schools that can be statistically matched to students at WSHS schools. The comparison group will consist of students within similar schools chosen through a 5-1 school level propensity score matching (Rubin, 1997). To construct the comparison group, WSHS schools will be matched to five other IDEA schools with certain demographic features, including location, urbanicity, demographic makeup, and size, as well as on preintervention demographic and achievement. AIR will then match students within these schools to students in the WSHS schools. All variables used in the match will be tested across treatment and comparison groups to ensure baseline equivalence in accordance with WWC standards. A matched comparison group with baseline equivalence will allow this component of the study to meet *WWC standards with reservations*.

For this analysis, AIR will use the same *administrative data* from IDEA that was collected as part of the analysis of APCSS and MCR. The specific short-term outcomes that will be included in the analysis include AP test scores, ACT scores, and AP course enrollment patterns. Data will be collected for two school years prior to the beginning of the program and following through Year 4 of the MSS program (2017–18 through 2021–22) for this specific analysis to capture pre-intervention measures and outcomes throughout the program. Given the number of schools and students participating in the treatment and comparison groups, a minimum detectable effect size is estimated 0.61.