

**Advancing STEAM Education in San Diego Unified School District
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COMPETITIVE PREFERENCE PRIORITY 1: NEED FOR ASSISTANCE

The San Diego Unified School District (SDUSD) requests MSAP funding to implement *Advancing STEAM Education in the San Diego Unified School District*. This program will develop a network of four elementary STEAM sites. Three sites, Franklin, Jefferson, and Washington Elementary Schools will be new magnet schools, and we will significantly revise the existing magnet program at Valencia Park Elementary.

(a) The Costs of fully implementing the magnet schools project as proposed

Advancing STEAM Education is projected to serve 1,771 students and 74 teachers each year. Funding will make possible the following critical components of the project design: District-level support and project management; marketing and recruitment; STEAM materials and equipment; professional development; and family and community engagement. All components are necessary to implement *Advancing STEAM Education*.

Project management activities, necessary to coordination and oversight of the project, include a Project Manager, a Teaching and Learning Specialist, and a Science and Technology Specialist. A Science and Technology Specialist in the MSAP office will provide added science, technology and engineering support, an area of intense need for elementary teachers. A Teaching and Learning Specialist will sustain the network of professional learning relationships among the sites, SDUSD, and University and community partners (See letters of Support in Appendix A). District departments such as translation and Office of Language Acquisition will provide vital support.

Marketing and recruitment activities are necessary for MSAP sites to meet their diversity goals. The creation of marketing plans, research for targeted marketing, and the development of

logos and other branding visuals, fliers, marketing materials such as brochures and informational folders, as well as the expertise to create these materials are beyond the capacity of school sites.

STEAM materials and equipment are necessary as classrooms lack the curricular supports and materials necessary to implement the program. SDUSD currently uses Full Option Science Systems (FOSS) Kits, a research-based curriculum developed by the Lawrence Hall of Science, UC Berkeley, for elementary science instruction. While the FOSS kits are available to teachers, refurbishment of the materials is based on scarce site funds, and professional development to support an inquiry approach and the understanding of science process is not.

As the district does not yet offer elementary level engineering, there are no materials or resources to support implementation. Each site will also use MSAP funds to update/replace arts and mathematics materials and to upgrade library holdings with nonfiction informational texts to support STEAM instruction and meet CCSS standards. MSAP funds will be used to purchase both conventional and digital texts focused on STEAM topics. Differing technologies are necessary for robotics work, teaching of technology, and science and arts integration. Initial training for the i21 technology was heavily weighted towards basic operations. This project requires integrating technology into instruction in meaningful ways.

Implementing STEAM in the elementary grades requires effective, sustained professional development from a range of professionals with deep disciplinary competencies. Not only will teachers need to build competency in the individual disciplines contained in STEAM instruction, but cross-disciplinary inquiry based instruction will be the goal.

Site Support through two STEAM Resource Teachers (STEAM-RTs) will offer teachers direct access to a wide range of instructional and content support necessary to become effective STEAM teachers. STEAM-RTs will enable the infusion of STEAM content into the daily

instructional life of the school necessary to improve instruction and increase achievement.

Our partnership through the University of San Diego will bring added STEAM content and process support as well as pedagogical support through the Teaching Innovative Studio (TIS) process, a classroom based, action research process. Partnership with USD will also allow teachers access to master's level online STEAM courses, and content materials, information and expertise from the courses will be infused into the TIS process.

Funding will support the expansion and STEAM integration into family and community activities. Their engagement is a critical component for recruitment, student success, and family commitment.

(b) The resources available to the applicant to carry out the project if funds under the program were not provided

Without the resources of MSAP funding, SDUSD will have limited (though dedicated) resources to implement *Advancing STEAM Education*. Despite historic budget cuts (see next section), personnel and departments within SDUSD are dedicated to supporting these magnets as proposed.

The College and Career Technology (CCTE) department has pledged support from grants funding their programs, inclusive of funding for engineering professional development, bus transportation for students and families to engineering events, and transportation for secondary students in STEM-related Career Paths to visit the MSAP sites to mentor students and support Robotics clubs. Through CCTE, teachers and students will have access to guest speakers from STEM industries, high school students heavily involved in STEM-related studies to serve as mentors, and have access to STEM competitions to motivate and engage. The science, math, Visual and Performing Arts department, the Office of Language Acquisition, and Instructional

Materials departments have helped plan the project by identifying curricular and content-specific community supports, and they will become partners in staff development efforts.

The i21 Interactive Classroom Initiative is a district-wide phased-in plan to supply technology in the classroom. I21 is supported by Proposition S, a bond measure that will provide over \$25 million per year through 2014 for educational technology and some professional development.

The parent Outreach and Engagement Department and Translations Department (many of the students in these schools are English Language Learners) will help MSAP sites by developing engagement strategies that are theme-based and that sustain open communication with families. The District's Enrollment Options office handles the district's Choice application process and will supporting the marketing of MSAP sites by highlighting them in the district's yearly enrollment options catalogue.

Through the Strategic Design Initiative, funded by Title 1, SDUSD is collaborating with The Leadership and Learning Center to revise district mathematics and English Language Arts units to meet the demands of the Common Core State Standards (CCSS). School sites across the District send teacher representatives to participate in the process.

SDUSD provides for the Magnet office daily operations by funding classified support through a .20 Administrative Aide, bilingual (\$14,468.56 annually) and a .20 Secretary II, bilingual (\$8,671.85 annually). Custodial is supplied through the district as well.

MSAP school site budgets include two funding categories, Categorical Funds and Site Discretionary Funds. Categorical Funds include funds from Title I and other federal and state programs, which are used for services that contribute directly to student academic achievement and support the Single Plan for Student Achievement such as instructional materials,

professional development and parent involvement. Site Discretionary Funds are based on enrollment and school type, and usage is determined by the school community. Programs and services that can be funded with this allocation include school counselors, content support such as VAPA teachers, supplies, and class-size reduction teachers. All STEAM MSAP sites have pledged to use their Categorical Funds and Site Discretionary Funds to support the design, implementation, and sustaining of the STEAM program.

(c) The extent to which the costs of the project exceed the applicant's resources

Without MSAP funding, SDUSD will not be able to implement *Advancing STEAM Education* as designed. Draconian budget reductions have severely challenged the district to provide basic supports to our 223 educational facilities and 6,500 teachers who serve 133,182 students. In his February 1, 2013, report on the path to a balanced budget, SDUSD's Superintendent Bill Kowba outlined details of SDUSD's continuing fiscal crisis:

"State funding reductions, which began in 2007, continue to cut San Diego Unified's budget and impact student learning. Since 2007, California has seen historic reductions in school funding. For the San Diego Unified School District, this means a reduction of more than 25 percent in school funding while the enrollment has remained stable. That's a reduction of more than \$500 million. Over the past several years, the district has spent down reserves, made permanent operational cuts, and used one-time funding solutions to balance budgets during the state's financial crisis. These budget balancing strategies of previous years still leave a 2013/14 budget deficit of \$84 million."

To address the projected \$84 million budget deficit, SDUSD School Board directed staff to prepare a balanced 2013-14 budget using a combination of strategies, including continued furlough days and attrition. The Board has made every effort to minimize the impact of state budget cuts on students. Massive teacher layoffs have been avoided, and steps to shield classroom teachers when possible will continue. However, while the district student population has remained stable since 2007, the number of teachers has decreased 10.6% as vacated positions remain empty, allowing for an increase in class size of four students per class. Added increases

are expected for the 2013 school year. The emphasis on attrition not only means new vacancies will not be filled, but existing staffing needs will not be addressed.

The chart below identifies significant areas of reduction that affect our ability to implement this project without MSAP support.

Changes in SDUSD Budget				
Department	Adjusted budget		Change	
Funding source	2005	2013	Change in funding	Percent change
Literacy				
Restricted	\$2,151,159	\$323,710	\$(1,827,449)	-85%
Unrestricted	906,537	34,211	(872,326)	-96%
Literacy total	3,057,696	357,920	(2,699,776)	-88%
Math				
Restricted	\$4,059,317	\$316,970	\$(3,742,347)	-92%
Unrestricted	548,494	34,465	(514,029)	-94%
Math total	4,607,811	351,434	(4,256,377)	-92%
Science				
Restricted	\$3,811,581	\$107,427	(3,704,154)	-97%
Unrestricted	376,400	34,211	(342,189)	-91%
Science total	4,187,981	141,638	(4,046,343)	-97%
Social studies/history				
Restricted	\$422,935	\$107,427	(315,508)	-75%
Unrestricted	299,951	34,211	(265,740)	-89%
Social studies/ history total	722,886	141,638	(581,248)	-80%
Visual & Performing Arts (VAPA)				
Restricted	\$35,190	\$763,356	728,166	2069%
Unrestricted	2,450,225	3,253,977	803,752	33%
VAPA total	2,485,415	4,017,333	1,531,918	62%
Grand total	\$15,061,789	\$5,009, 963	\$(10,051,826)	-67%

Fiscal imperatives continue to impact negatively SDUSD’s staff development efforts. All centrally funded site-based support for content, materials or technology in the way of Resource Teachers or coaches has been eliminated. The current Instructional Services staffing to support 133,182 students and 6,500 teachers is as follows:

Department	Staffing
Science	Single Program Manager, no resource teachers

Math	Single Program Manager, two resource teachers
Literacy/ELA	Single Program Manager, two resource teachers
VAPA	Single Director, five resource teachers – one each in dance, general music, instrumental music, theater and visual art
Social Studies/History	Single Program Manager
CCTE	Staff of 8, single engineering resource teacher
Instructional Materials Center	Single resource teacher
Integrated technology	Single Interim Director, seven resource teachers

As an example of the change caused by budget cuts, in 2005, the Science Department had eight Resource Teachers, (four elementary, two middle school and two high school), two program managers, and three stock clerks charged with refurbishing and coordinating the rotation of the Full Option Science Systems (FOSS) kits. Budget cuts (97% reduction) have essentially dismantled this department. The department now consists of one Program Manager and no resource teachers to serve the entire school district. The mathematics department is in similar straits. A budget reduction of 92% has gutted the department, leaving one Program Manager and two Resource Teachers serving the entire district. Such conditions mean that the one manager is already overtaxed in terms of time and effort to support schools.

In addition to the core instructional issues outlined above, SDUSD faces several rising costs that must be absorbed and that pose additional budgetary challenges:

Increases in utility costs. The prices of utilities and gasoline have increased steadily over the past five years (gasoline prices alone have risen 10% in the past year. SDUSD expects utility costs to increase an additional 2% each year in utilities alone.

Labor costs. SDUSD uses a step-progression schedule that provides salary increases to each classification of employee each year they are employed. Salary costs are projected to increase 2.6% annually for certified and classified staff.

Costs of employee benefits. The cost of providing health benefits to district employees are expected to increase by up to 9% annually.

Special Education costs. The cost of providing services for children with disabilities as mandated by the federal government increases with rising labor and transportation costs. Federal funds, however, do not cover 100% of costs. SDUSD must cover costs from the District's general fund, with projected costs of \$156 million in 2013-14 and \$168 million in 2014-15.

Proposition 30 was passed by the voters of California in November 2012, theoretically enabling the state to begin to refund the more than \$450 million cut from SDUSD, as part of the \$10 billion underfunding resulting from Prop. 98. Despite Proposition 30's passage, funding for education will not increase enough to offset reductions in its first year, with unknown projections for the following years. As a result, SDUSD will not have adequate funding in 2013-14 to maintain current class sizes and staffing levels, or create a balanced budget without continued cost-cutting measures. A \$48 million shortfall is projected for the 2013 school year.

(d) The difficulty of effectively carrying out the approved plan and the project for which assistance is sought, including consideration of how the design of the magnet schools project impacts the ability to carry out the approved plan

The four sites selected are schools in corrective action, and are losing parent and community confidence as evidenced by declining enrollment. Three sites, Franklin, Jefferson, and Valencia Park, are in their first year of Program Improvement, offering an opportunity to immediately impact areas of instructional need.

Difficulty in implementation also stems from the increasing poverty and lack of English proficiency at the schools. At Franklin and Jefferson elementary schools, 100% of the population is eligible for free and reduced-price lunch. Poverty only minimally decreases at Valencia Park (85%) and Washington (80%). This level of poverty means that students often lack access to school supplies, high-level learning materials, and technology at home. Many students also lack English skills sufficient for rapid acquisition of STEM content and texts in

English (informational texts often pose challenges for English Language Learners).

These factors have led many parents to seek other education options for their children, including other district schools, charter schools, or private schools. As a result, minority group isolation has increased for Hispanic students at three of the schools (Franklin, Jefferson, and Washington) and for African American students at Valencia Park. Compared to the district enrollment average of 46.4% Hispanic students, Franklin's 58.4 %, Jefferson's 70.5%, and Washington's 64.7% indicate already high levels of minority group isolation. Among Washington Elementary's enrollment, 31% of students are African American, with is nearly triple the district average of 11.4%.

The District's Science Advisory Blue Ribbon Committee and the Math Task Force subcommittee found that many elementary teachers lack the depth of scientific and mathematic content and process knowledge necessary to increase student competencies in STEM. Through multi-faced professional development, this project will improve teacher STEAM content/process knowledge, strengthen pedagogical skills, and create inquiry-based classrooms.

Advancing STEAM Education is designed to address these instructional issues and raise STEAM achievement in the four schools. Success in the classroom will respond to the community's demand for improved performance, leading to an increased enrollment and reduced minority group isolation. All four sites are located on major transportation corridors or in downtown San Diego.

**COMPETITIVE PREFERENCE PRIORITY 4: PROMOTING SCIENCE, TECHNOLOGY, ENGINEERING,
AND MATHEMATICS (STEM) EDUCATION**

(a) Providing students with increased access to rigorous and engaging coursework in STEM

A goal of SDUSD is to create an education continuum for the district's magnet schools with the addition of STEAM magnet programs at the four elementary schools selected for this grant. The plan is to leverage existing SDUSD STEM focused initiatives and resources with the MSAP grant to help students significantly increase their proficiency in STEM topics. The elementary MSAP schools will provide students with a sound foundation should they choose to progress through the STEM magnet school curriculum that is currently available.

SDUSD is drawing on the findings of its Science Advisory Blue Ribbon Task Force (BRTF), the Math Task Force Subcommittee Recommendations, and the work of our Strategic Design initiative to develop a network of elementary schools offering Science, Technology, Engineering, Arts and Mathematics (STEAM) education to students. Out of concern for continued student achievement in science, the BRTF set priorities for support. Among these was an emphasis on the importance of focusing on science at the elementary level to build a strong foundation, with Program Improvement schools as first priority.

Within this context, a primary focus of the design of the curriculum for the magnet schools participating in this grant is on STEM areas of study. All of the sites selected with the exception of Washington have just recently entered Program Improvement (PI) status (Washington is in PI Year 4). Mathematics and Science scores show evidence of pockets of instruction that mirror the rest of the district, yet the overall picture requires improvement. Focusing on STEM instruction addresses this area of need and creates true strength throughout each school.

To provide students with increased access to rigorous and engaging STEM coursework,

SDUSC will use the MSAP grant to leverage existing resources, such as the Full Option Science Systems (FOSS) kits for science instruction and the district's Integrated 21st Century (i21) Initiative that is providing technology equipment to enhance instruction.

The FOSS kits are research-based curriculum developed by the Lawrence Hall of Science, University of California Berkeley, for elementary science instruction. These kits were designed based on the belief that science learning should be active, fueled by our human capacity to think. Scientific process is embedded, as the kits provide experiences that call on students to explore their natural world by observing objects and events, thinking about how they relate to what is known, testing ideas in logical ways, and generating explanations that integrate the new information into the established order. In this way, content and process are combined as students learn to think critically to actively construct ideas through their own inquiries, investigations, and analyses. Teachers have requested additional materials and tools to support the FOSS instruction. While the FOSS kits offer opportunity to meet the three dimensions of the science framework (Scientific and Engineering practices, crosscutting concepts, and disciplinary core ideas), added curriculum will be necessary to prepare students for continuing STEM course work beyond K-5 and to establish true STEM competencies. The MSAP teachers will develop this more rigorous curriculum, designed to meet Common Core and Next Generation Science Standards, with support from the STEAM Resource Teachers.

With the Integrated 21st Century (i21) Initiative, SDUSD has provided classrooms with a range of technology tools to enhance STEM education and support varied learning needs. The goal of the Interactive Classroom is an engaging and personalized learning environment designed to optimize teaching and learning through the interconnected use of mobile computing, audio, visual and formative assessment technologies across the curriculum. Most classrooms now have

a presentation station consisting of a Promethean Board, projector, document camera, and teacher laptop. Students have access to laptops – either 1-1 or through rolling carts of classroom sets. The planned purchase of personal tablets for use by students will further increase their access to a great variety of STEM learning materials and digital texts.

As an example, tablets will allow for the integration of technology as students learn to use photography to document steps in the inquiry process and observations in their natural world for the purpose of creating digital science journals and presentations of scientific concepts. To further promote STEM education, SDUSD will use the MSAP grant to deepen student engagement with the formation of STEM-related clubs and the introduction of more in-depth STEM-related activities. The district's College, Career and Technical Education (CCTE) Resource Teachers will help facilitate this process. Through CCTE, teachers and students will have access to: guest speakers from STEM industries; high school students heavily involved in STEM-related studies to serve as mentors; and competitions to motivate and excite. For example, the CCTE will support Lego Robotics clubs by recruiting high school students involved in STEM-related pathways to be mentors for the robotics teams. CCTE will coordinate joint field trips to robotics competitions for students and families, and will support the MSAP by covering costs not allowable through the grant, such as transportation to STEM events.

Mathematics clubs, science clubs, tech clubs, and other STEM-related opportunities based on student interests will be developed. Beyond providing more engaging outlets for STEM education, all of these extended learning opportunities will increase interaction of families and students from diverse backgrounds and cultures – a key goal of the magnet program. To provide access to more rigorous and all-encompassing coursework, students will incorporate lab-based, technology-supported, and project-based learning activities that focus on fundamental STEM

concepts. Across content areas, students will work collaboratively to solve problems by using scientific, mathematical and/or design processes in interconnected ways. Students will increasingly use technology as part of their ongoing instruction, providing access to a greater variety of learning materials and learning methods. Lessons will be constructed across subject disciplines to help reinforce STEM concepts and increase engagement.

As an example, fifth graders involved in an exploration of water in science might design and build devices to support necessary measurements, and then draw on a range of mathematical processes to work with the resulting data. They will keep digital science journals, incorporating the arts as they use photography to document research findings and their observations of the natural world. Other STEM-based initiatives to increase access to rigorous and engaging coursework for the magnet schools will include:

- The JASON Project: Education Through Exploration offers a digital platform that connects students with scientists and researchers in real- and near-real time, virtually and physically, to provide mentored, authentic and enriching science learning experiences. The JASON Project offers teachers added professional development designed to increase expertise in implementing inquiry-based science experiences in the classroom. It offers students and families interactive web-casts, which connect them with STEM role models to put a human face on science, technology, engineering and math.
- For Science, additional instructional materials will be procured to supplement the district's Full Option Science System (FOSS) curriculum. Sites will purchase lab equipment such as microscopes and glassware and models from EnviroScope to be shared across grade levels.
- ST Mind Math + Music: Incorporates innovative visual instructional approaches to teach students math concepts with integrated music. Music has a mathematical architecture, and as

young students learn music they also learn the concepts of counting and fractions and recognize patterns and symmetries. ST Mind Math + Music also has a self-paced learning opportunity for students, consisting of on-line innovative games which lead students through multi-step problem solving.

- The Mindstorms and We Do Lego Robotics materials offer students opportunities to design, build and program small-scale robots. The materials are flexible and adaptable to the needs of a range of student populations. They allow for hands-on problem based exploration in collaborative learning environments. All MSAP STEM sites will use We Do robotics in grades K-2, and Mindstorms Lego robotics in grades 3-5 inside engineering and technology units taught during the instructional day, as well as in Robotics clubs that meet after school and robotics teams formed to participate in competitions.

Additionally, MSAP funds will be used to replenish diminished classroom libraries, and to purchase texts that explore STEM-related topics, concepts, and careers. SDUSD's Instructional Materials department is teaming with the MSAP project to identify supportive digital resources for similar texts. Classroom libraries will be upgraded with nonfiction texts to engage, spark curiosity, and support conceptual learning. These texts will be a mix of leveled instructional books to support the teaching of nonfiction reading and trade books on STEM topics to make rigorous and engaging material available to all students.

(b) Increasing the opportunities for high-quality preparation of, or professional development for, teachers or other educators of STEM subjects

The SDUSD plans to implement a multi-tiered plan to provide high-quality professional development in STEM subjects for teachers and educators. This will start at the school level, where two STEAM Resource Teachers (STEAM-RT) will be available at each location to assist with curriculum development and technology training. At the district level, two MSAP STEAM

Specialists will be tasked to provide additional support and professional development across the magnet schools. Beyond the district, the University of San Diego, (USD), will be a partner and provide STEAM coursework for magnet school teachers to help build their proficiency in science, technology, engineering and math topics.

The professional development plan for the magnet program includes teacher-to-teacher professional development and peer support that targets content knowledge and pedagogical practice; assistance in implementing Common Core State Standards (CCSS); creation and use of STEM-based materials and resources aligned to CCSS and state standards; district-level support for practice and inquiry; and access to site-based support through the STEAM Resource Teachers, who will provide job-embedded professional development and support for each site's Professional Learning Communities (PLCs).

Starting at the school level, opportunities for high quality preparation in STEM subjects will begin within the Professional Learning Communities that have been established at the four selected schools. The PLCs are set-up so teachers can work collaboratively to share best practices for achieving better results for their students. Currently, teachers at each site meet weekly in grade-level teams to monitor student progress towards proficiency. During the PLC's, teachers focus on the analysis of student performance data and work to problem solve, link data to instruction, determine instructional gaps, plan for next steps and revise curriculum accordingly. Teachers will bring student STEM work to analyze as part of this process.

The MSAP grant will support PLC's through a partnership with the University of San Diego (USD). University faculty will partner with teachers at each site, using the Teaching Innovation Studio (TIS) design process to lead teachers in action research. Action research involves educators in the process of identifying questions that they want to explore in their own

classrooms to improve their practice and achieve student success. Through the action research process, teachers will see the impact of their decisions on student STEM learning.

Because Mathematics has been the discipline with the lowest achievement levels and the smallest gains in the district, SDUSD convened a Math Task Force Subcommittee to assist the District in bringing renewed attention to instruction in mathematics. Recommendations, released March 2011, emphasized increasing teacher content knowledge (particularly in the elementary grades) and pedagogy through sustained professional development. As with the BRTF report, the Math Task Force emphasized support from content experts, lesson study, teacher collaboration, and curriculum writing. To address these needs the MSAP professional development plan offers teachers a scaffolded support in moving from strengthening expertise within each STEM component to integrating the disciplines, thereby creating true STEM learning environments. Though the central project design for curriculum and professional development will be common to all four sites, the MSAP plan includes diverse delivery methods and sustained support to enable teachers to strengthen their overall STEM content, pedagogy and process knowledge.

A critical feature of this MSAP grant is having adequate, specialized support for teachers. With grant funds, two full-time STEAM Resource Teachers will be hired at each school. These STEAM-RT's will allow for ongoing and embedded professional development complete with workshops, coaching, and the infusion of STEM topics into conversations about teaching and learning in PLC sessions. They will support curriculum writing, demonstrate teaching in STEM subjects, and provide guidance in the purchase of materials. An example of how the STEAM-RT's will help is in the use of FOSS kits for Science instruction. Although the kits are available to teachers, professional development to support an inquiry approach and the understanding of science process has not been. Currently, teachers use the kits to the best of their ability but more

direct teaching models often prevail. The STEAM-RT's will fill this professional development gap so that maximum benefit can be obtained in science instruction with the use of the FOSS kit. Another role of the STEAM-RT's will be to strengthen each teacher's awareness of the possibilities technology brings to teaching and learning. An initial emphasis will be on increasing teacher's comfort level with the equipment, and work towards meaningful integration of technology with ongoing instruction. Teachers received initial training when the i21 technology was purchased, but the training was weighted towards the basic operation of the equipment. Integrating the technology into instruction in thoughtful, real world ways was not explored in depth because of time and funding limits. The STEAM-RT's will help teachers learn how to truly incorporate these tools into their lessons and make a step change in STEM education. Beyond each school, the MSAP grant will fund two positions at the district level for STEAM Specialists – a STEAM Teaching and Learning Specialist and a STEAM Science and Technology Specialist. The STEAM Teaching and Learning Specialist will organize cross-site professional development in STEM subjects since lateral sharing is seen as a necessary component of developing professional capacity (Fullan 2006). This Specialist will help build the professional relationships and networking necessary to sustain content area learning beyond the close of the grant. Methods will include organizing cross-site visits highlighting best practices; leading cross-site professional development; and the integration of support from the district, USD and community partnerships.

The STEAM Science and Technology Specialist will have specific science, engineering and technology expertise and will support sites with this content. She will work in concert with the district's College, Career and Technical Education (CCTE) department and Math and Science program managers to collaborate and build extended networks for STEM support.

An example of collaboration with CCTE is the plan for STEM-related internships as part of a teacher's professional development. CCTE has built partnerships with over 800 San Diego area businesses – many of which are in STEM industries. CCTE will help place educators in internships with these companies, thus offering teachers valuable insight into the demands of STEM-related jobs. The MSAP grant will help fund these 1-2 week internships.

In addition to SDUSD resources, the grant will enable outside partnerships with the University of San Diego (USD) and STE[+a]M Connect that will increase the opportunities for high-quality professional development for all teachers. STE[+a]M Connect is a San Diego based collaborative that brings together organizations working in support of STEM programs by offering partners learning opportunities, and shared resources. The partnership with USD will offer teachers access to workshops, presentations, and networking, along with specialized STEM coursework. USD is in the final phase of developing an on-line STEAM masters program. Through the partnership, USD will help teachers build STEM content knowledge in three ways: 1) Teachers may access full Master's level STEAM courses with partial compensation from a MSAP stipend; 2) USD will run separate sections of the STEAM courses for MSAP teachers to engage with content collaboratively; and 3) modules will be created out of the STEAM courses and infused into ongoing on-site professional development. USD will also engage teachers in the Teaching Innovation Studio (TIS) – an on-site, collaborative, classroom-focused, inquiry-driven research process to enhance professional learning in STEM topics.

This multi-tiered approach to STEM professional development that includes: in-school support of PLC's and STEAM-RT's, layered with help from the STEAM Specialists and content departments; lateral sharing with the other MSAP STEAM schools; community networking through STEA[+a]M Connect; and the availability of USD STEAM coursework, will achieve the

goal of increasing the opportunities for high-quality professional development for teachers of STEM subjects at the magnet schools.

(A) PLAN OF OPERATION

The San Diego Unified School District (SDUSD) is proposing to develop four elementary STEAM magnet schools through *Advancing STEAM Education in the San Diego Unified School District*. Three of the sites, Franklin, Jefferson, and Washington Elementary Schools, will be new magnet schools, and we will significantly revise the existing magnet at Valencia Park Elementary. All four schools are Program Improvement sites, meaning they have not met specific state targets for two or more years. While the SDUSD is creating a coordinated network of STEAM magnet schools with this grant, each site will shape and enrich the work to meet the unique demands of their families, student population, and rich history.

Franklin Elementary (K-5), currently serving 245 students (100% of whom are eligible for free and reduced-price lunch), will create 73 seats, bringing enrollment to 318 students by the end of the project. This school is in its first year of Program Improvement. Reducing minority group isolation of Hispanic children (58.4 % compared to district average of 46.4%) is the target of this magnet program. While the school is diligently working to develop a rigorous academic program capable of bringing students back to Franklin, currently, only 36% of the resident population attends Franklin. Franklin is framed by four major transportation arteries in a very central portion of San Diego, which offers easy access to interested families. Science is already a passion on campus with 62.2% of 5th graders scoring proficient or above. A partnership with Ocean Discovery allows 3rd -5th graders additional science instruction outside the classroom. The Franklin staff had begun work with an Artist in Residence program, and teachers are requesting

added support in arts integration, particularly as they look forward to a fully integrated STEAM curriculum.

Jefferson Elementary IB STEAM Magnet School currently serves 334 children in grades K-5, all of whom are eligible for free and reduced-price lunch. Hispanic enrollment is 70.5%, while the district average is 46.4%. Student enrollment includes 55% English Language Learners. An additional 85 seats will be created to bring enrollment to 419. Four years ago, Jefferson began an International Baccalaureate (IB) Primary Years program. Although now fully authorized, they have had minimal funding to support their efforts. This means curricular units are not fully developed, and the reflection cycle has not been systematically observed. Only 53.3% of 5th graders scored proficient or better in science in 2012, down 9.9% from the previous year. At the third-grade level, 24.4% of students scored proficient or better in English language arts, and 43.5% scored proficient or better in math. Currently, 47% of the resident population opts out of Franklin, with many families choosing charter schools and other IB schools. The staff and greater community are looking to reinvigorate their IB program, adding academic strength by revising units to meet the demands of a STEAM curriculum. With the support of the MSAP grant, Jefferson will develop a space for collaborative learning experiences that immerse students in real world problems addressed by the STEAM content areas.

Valencia Park Elementary School serves 520 K-5 students, with 85.1% eligible for free and reduced-price lunch. The African-American population (31.4%) exceeds the district average by 20.1 percentage points. Currently, 62% of families living within the boundaries of Valencia Park “choice out” of the school. The school will create 93 seats, reaching an enrollment of 613 by the end of the grant period. Originally a University lab school with a "fundamental" program, Valencia Park was revised into a performing arts magnet in 1986-87. While the performing arts

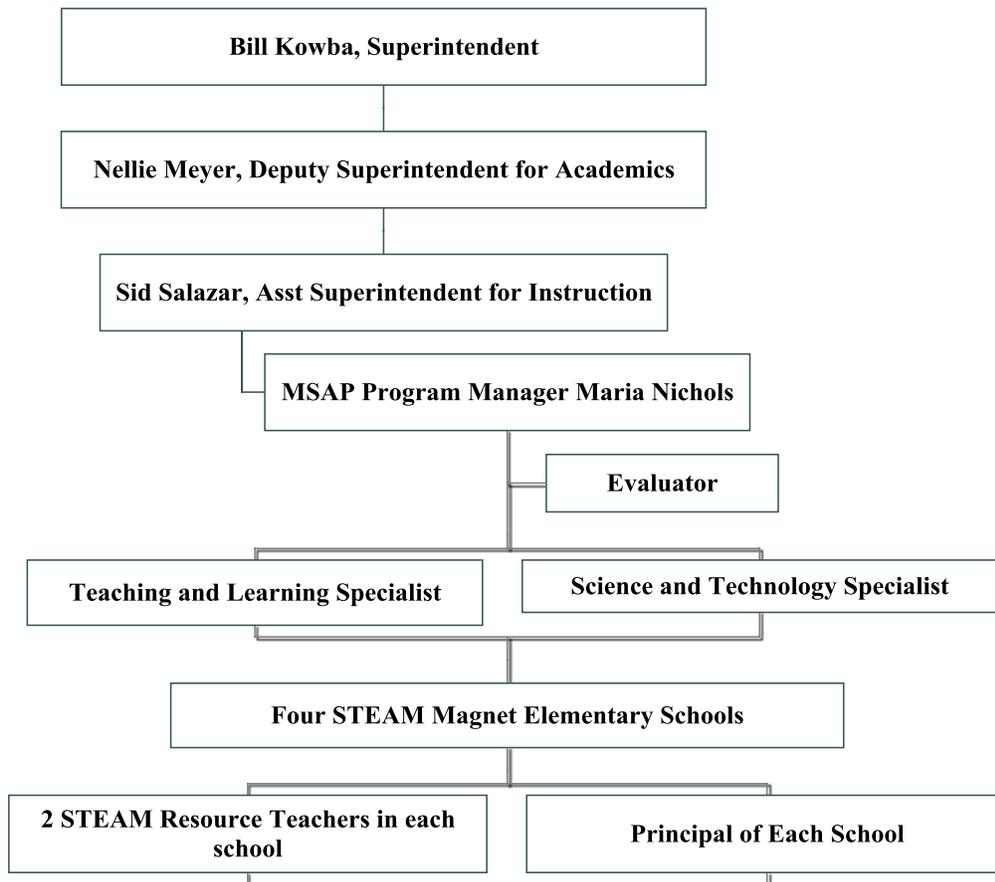
theme was initially quite favorable, gradual teacher turnover since the site's first years as an arts magnet (36 years ago) means many classroom teachers never had the necessary level of staff development, and the integration of arts is no longer prevalent in classrooms. Gradually, attendance began to decline with resident population as well as magnet population. Recognizing that Valencia Park feeds into STEM middle and high schools, the staff determined that the STEAM theme would meet both of their goals while offering their students the necessary foundation for success in a STEM-related K-12 pathway. The STEAM theme will tap academic strengths and address weaknesses, drawing families now opting out as well as families beyond the boundaries interested in the STEAM/STEM articulation pattern.

Washington Elementary, located in the heart of Little Italy in downtown San Diego, serves 334 students in K-5, with 80% of students eligible for free and reduced-price lunch and 57.8% non-resident. The school will create 87 seats, creating a total enrollment of 421 by the end of the grant period. Washington has a rich history of educating the children of Italian immigrants whose families came to work in the tuna fishing industry. Currently, many students attending Washington come from outside the school's boundaries as parents working downtown take advantage of the geographical ease of access. The resident population chooses out of Washington, opting instead for charter schools with specialized programs, including a museum school and an IB school. This has left Washington with increasing Hispanic isolation, with the current Hispanic student population at 64.7%, compared to the district average of 46.4%. The staff of Washington realizes the power of a diverse learning community and has taken decisive steps to draw families back. With so many downtown museums and surrounded by the richness of the Italian culture, the Arts and languages have become a focus. However, arts programs remain isolated opportunities as opposed to richly integrated learning throughout the

day. Washington feeds into Roosevelt IB STREAM magnet, so STEAM will interest families looking for the foundational abilities necessary to succeed at Roosevelt. Student’s rich involvement with the Little Italy community will shift as they begin to work inside inquiry experiences and project-based unit design. The surrounding community will offer opportunity to investigate and solve real world problems, applying scientific processes such as data collection and analysis, incorporating math into the analysis, and designing solutions drawing in engineering process and aesthetic design.

(i) Effectiveness of its management plan to ensure proper and efficient administration

SDUSD has created a plan to ensure effective management of *Advancing STEAM Education in the San Diego Unified School District* at both the district and school levels. The management structure is depicted below.



At the district-level, a MSAP Program Manager will oversee and coordinate all MSAP activities, provide fiscal and programmatic oversight, coordinate the Advisory Committee, work closely with the external evaluator to monitor progress and attainment of objectives (and annual benchmarks), work with SDUSD staff and the marketing contractor on recruitment and application processes, facilitate partnerships, and build capacity of MSAP schools to ensure sustainability. She will also be responsible for all fiscal and programmatic compliance and reporting. The MSAP Program Manager will establish and maintain effective communication and procedures to assure that the MSAP project remains integrated with SDUSD planning and educational operations.

To manage the project effectively, the Program Manager will meet every two weeks with Site Leadership Teams to guide the process towards meeting objectives and goals. She will meet monthly with the project evaluator to review data and recommendations concerning the status of each school. The Program Manager will conduct regular meetings with MSAP staff, participating schools, and the Advisory Committee. At the conclusion of each year, she will prepare and present to the San Diego Board of Education a report that will summarize and discuss all salient points about the program.

To support the management, SDUSD will create a Magnet Advisory Committee. This committee will consist of STEAM-content leadership from the District's Instructional Services Support department and site and parent leadership from the MSAP STEAM schools. The Advisory committee will meet quarterly throughout the project to review progress, recommend necessary adjustments, advise with recruitment, and help expand community support.

Fiscal accountability and oversight are also part of the management plan. The district's finance office and grants accounting personnel are familiar with federal grant fiscal management

and reporting procedures. The Program Manager and the district's finance staff will meet regularly with each school to review procedures, expenditures, and item justifications.

Two full-time credentialed specialists with specific experience and training in STEAM will be hired at the district level to support the schools and provide direct assistance to the principals, the two STEAM Resource Teachers (STEAM-RTs) at each site, and classroom teachers.

A STEAM Teaching and Learning Specialist (TLS) (1.0 FTE) will assist school sites with the coordination of long-term, systemic professional development and curriculum design. The TLS's primary focus will be on 1) developing the lateral networks that allow sites to learn and grow from each other's successes and connect sites to district expertise for the purpose of developing the enduring learning relationships necessary for sustainability; 2) coordinate and monitor the MSAP-supported partnership with the School of Leadership and Education Sciences (SOLES) at the University of San Diego who will work on two levels: improving STEAM content expertise among teachers through its newly developed STEAM instruction master's program and its Teaching Innovation Studio (TIS), a site-based collaborative, classroom-focused, inquiry-driven research process that will enhance ongoing Professional Learning Communities. This position will also 3) support STEAM Resource Teachers with the development of STEAM curriculum aligned to Common Core State Standards; 4) work with the STEAM Science and Technology Specialist to ensure professional development and curriculum design include integrated technology; and 5) coordinate cross-site professional development for the STEAM Resource Teachers, and 6) coordinate classroom observations for MSAP teachers highlighting effective pedagogy.

A STEAM Science and Technology Specialist (1.0 FTE) will strengthen use of educational technology in teaching and learning. An initial emphasis will be on building

awareness of the potential uses of equipment and software and increasing teacher's comfort level with the technology in order to work towards meaningful integration with ongoing instruction. The Science and Technology Specialist will 1) collaborate with teachers to support use of technology in delivering curricula through a variety of instructional methods; 2) work with teachers to integrate the use of hardware, software and Internet resources to support student learning and to meet state and ISTE national standards for subject-area and technology-learning objectives; 3) conduct technology-related professional development in coordination with the STEAM Teaching and Learning Specialist, including the teaching of technology; 4) work with SDUSD's College, Career and Technical Education (CCTE) Resource Teacher to plan engineering professional development and support site robotics teams and clubs; 5) assist MSAP schools with identifying and purchasing needed equipment and supplies; 6) guide the design of MSAP school web sites linked to teacher-created class/subject pages for recruitment; 7) develop online curriculum, magnet newsletters, and resources for students, parents, teachers and the community; 8) Provide MSAP schools ongoing technical assistance including network web and file servers, hardware/software purchases, setup and trouble-shooting; 9) Organize and collect data and documentation related to technology integration.

The magnet school principals are responsible for providing effective instructional leadership and are accountable for the school's operation. Their major responsibilities include the educational program, managing professional and classified staff, student development, facility maintenance and management, fiscal management activities, and developing effective community relations.

MSAP funds will be used to place two STEAM Resource Teachers (1.0 FTE each) at each school. Site-based Steam Resource Teachers (STEAM-RTs) will have proven expertise in

STEAM content and experience with staff development. The STEAM RTs will serve as Site Coordinators, overseeing daily operations, assisting with the purchase of materials, monitoring of site budget, development of marketing materials; monitoring implementation and collecting formative and summative data, and coordinating and hosting site tours and community/family events such as Science Night, Math Night, or Art Shows. These STEAM-RTs will also work directly with classroom teachers providing professional development in STEAM content and processes and demonstrating and coaching teachers in effective STEAM-based instructional practices that emphasize content process skills. They will also support with curriculum writing at each grade level, articulation of curriculum across grade levels; and remain involved in the TIS process, adding valuable content and process knowledge to the conversations.

(ii) The effectiveness of its plan to attain specific outcomes that—(A) Will accomplish the purposes of the program; (B) Are attainable within the project period; (C) Are measurable and quantifiable; (D) For multi-year projects, can be used to determine the project’s progress in meeting its intended outcomes

The goal of *Advancing STEAM Education in the San Diego Unified School District* is to develop a coordinated network of sustainable elementary STEAM sites that offers a compelling academic choice to students so that enrollment shifts reduce or eliminate minority group isolation of Hispanic children at three schools and African-American children at one school while advancing student academic achievement. Vehicles to achieve these overarching goals include intensive site support through personnel, intensive professional development targeting STEAM content and integration and effective instruction, and the transition to project-based and inquiry-based learning across disciplines.

Towards this end, SDUSD has identified four attainable, measurable and quantifiable objectives for the MSAP schools that directly address this goal as well as the six MSAP

purposes. To ensure a quality plan of operation for *Advancing STEAM Education*, we have established the following objectives and performance measures.

<u>Objective and Performance Measures</u>
<p>Objective 1: <i>Advancing STEAM Education in the San Diego Unified School District</i> will promote voluntary desegregation in its public schools by reducing minority group isolation in four elementary STEAM sites with substantial portions of minority students (MSAP purpose 1).</p>
<p><i>Performance Measure 1.1:</i> Each year, the applicant pool for admission into the four sites will increase by at least 10% among targeted recruitment groups for each site.</p> <p><i>Performance Measure 1.2:</i> Each school will reach at least 90% of its enrollment targets each year, reducing minority group isolation of Hispanic students in three schools and of African-American students in one school. (GPRA PM A)</p> <p><i>Performance Measure 1.3:</i> Each year, feeder schools will not show increased isolation of Hispanic or African-American students.</p>
<p>Objective 2: <i>Advancing STEAM Education in the San Diego Unified School District</i> will increase academic achievement among all students in participating STEAM schools. (MSAP Purposes 2 & 6)</p>
<p><i>Performance Measure 2.1:</i> The percentage of students from major racial and ethnic groups in magnet schools who score proficient or above on CST or Smarter Balance State assessments in English/language arts and in mathematics will meet state targets each year. (GPRA PM B & PM C)</p> <p><i>Performance Measure 2.2:</i> The percentage of students from major racial and ethnic groups in participating schools who score proficient or above on State assessments of science in 5th grade will meet the state target each year.</p> <p><i>Performance Measure 2.3:</i> The percentage of students in 3rd and 4th grade from major racial and ethnic groups in magnet schools scoring proficient or above on SDUSD end-of-course science exams will increase by 10%.</p> <p><i>Performance Measure 2.4:</i> The percentage of students from major racial and ethnic groups scoring proficient or above on MSAP-created science process rubrics measuring science understanding and conceptual knowledge will increase by at least 10% each year.</p> <p><i>Performance Measure 2.5:</i> Each year of the project, the percentage of students in grades 3 and 5 at each participating site scoring proficient or above on MSAP-site created engineering/technology rubrics will increase at least 10% each year.</p> <p><i>Performance Measure 2.6:</i> Each year of the project, the percentage of students in grades 2 and 4 at each participating site scoring proficient or above on MSAP-site created artistic design process rubrics will increase by at least 10%.</p>
<p>Objective 3: <i>Advancing STEAM Education in the San Diego Unified School District</i> will advance systemic reforms at each MSAP site, improving the quality of STEAM-based instruction and integration strategies in each classroom (MSAP Purposes 2, 3, 4, & 6)</p>
<p><i>Performance Measure 3.1:</i> At least 90% of teachers at each site will integrate professional development on cultural competency and integration strategies into curriculum and lesson plans</p> <p><i>Performance Measure 3.2:</i> AT least 95% of participating teachers will apply the TIS Professional development on instructional cycle into their lesson design.</p> <p><i>Performance Measure 3.3:</i> At least 95% Teacher STEAM content knowledge and confidence in teaching STEAM subjects will increase each year of the grant as documented by pre/post-tests, surveys, and lesson plans.</p> <p><i>Performance Measure 3.4:</i> Attitudes toward STEAM and interest in STEAM-related careers will increase/improve by at least 20% among children at each site.</p>
<p>Objective 4: <i>Advancing STEAM Education in the San Diego Unified School District</i> will increase parental and community engagement and satisfaction regarding the four STEAM schools. (All MSAP</p>

Purposes)
<i>Performance Measure 4.1:</i> Attendance of parents at school STEAM events will increase each year of the grant by 10% percent.
<i>Performance Measure 4.2:</i> Volunteerism and mentoring by parents and community members will increase each year of the grant period by 15%.
<i>Performance Measure 4.3:</i> Attendance of parents at student-parent-teacher conferences will be 100% by the end of Year 3.
<i>Performance Measure 4.4:</i> Parent satisfaction with each school will increase by 15% each year.

(iii) The effectiveness of its plan for utilizing its resources and personnel to achieve the objectives of the project, including how well it utilizes key personnel to complete tasks and achieve the objectives of the project

Critical features of *Advancing STEAM Education in the San Diego Unified School*

District include recruitment and selection of students; marketing; access to integrated STEAM curriculum, career readiness strategies and learning supports; development of engaging STEAM curriculum and lesson design; professional development; and strategies to increase parental and community engagement.

In Year 1, the four MSAP sites will be listed in the Enrollment Options catalogue as STEAM magnets, and the first applicants for the 2014 school year will be processed. The MSAP office team, Magnet Advisory Board, school sites, parents, University partners, and community members will be heavily involved in conversations that will create the vision and mission statement, and refine the implementation plan. Diversity goals will be discussed, and recruitment and marketing efforts planned. STEAM content and inquiry-based Professional development with CTE Resource Teachers, STEAM RTs, MSAP Specialists, and USD will begin. Site-level teams will be strengthened, and cross-site networking will begin. Year one technology and materials will be ordered, and usage embedded into professional development.

In Year 2, data from Year 1 reporting will support reflection and help to refine all processes. Magnet applicants from the 2014 Open Enrollment process will begin their first year.

Sites will take on the look of STEAM environments. Classrooms, multi-purpose rooms, libraries and professional development rooms will be filling with necessary technology, lab equipment and learning tools. Marketing efforts will increase, based on data showing results of the previous year's efforts. Professional development opportunities will increase with new grade levels of teachers joining the Teaching Innovation Studio process. Curriculum design will begin to incorporate engineering and the teaching of technology, and professional networking among sites and project partners will strengthen. STEAM clubs and robotics teams will form, with expanded family and community activities to strengthen the learning environment.

In Year 3, the accumulation of data from Years 1 and 2 will allow continued reflection and refinement. Marketing efforts will be maximized based on recruitment data. Professional Development will focus on strengthening networking among the sites, and with district content areas, STE[+a]M Connect, USD and other community entities for sustainability purposes. The curricular emphasis will shift towards integration of content for the creation of true STEAM learning environments. Clubs and other extended opportunities will be incorporated into the community culture, ensuring students and families extended opportunities to interact and pursue developing academic interests.

A detailed Timeline of Activities is in Appendix B.

Overview of Strategies to Attain Objective 1: Advancing STEAM Education in the San Diego Unified School District will promote voluntary desegregation in its public schools by reducing minority group isolation in four elementary STEAM sites with substantial portions of minority students (MSAP purpose 1).

The MSAP Program Manager and school personnel (with support from a contracted marketing specialist) will conduct student recruitment activities, including development of

marketing plans, creation of school websites and marketing materials; advertising; articulation with feeder schools; and development of additional community partnerships to support magnet program growth. All marketing materials will be updated annually as needed, and student recruitment activities will continue throughout the project. In addition, the Program Manager and The MSAP Systems Analyst will access the necessary district data bases to extract and analyze enrollment trends so that recruitment efforts can be tailored to each school's needs.

Overview of Strategies to Attain Objective 2: Advancing STEAM Education in the San Diego Unified School District will increase academic achievement among all students in participating STEAM schools.

Access to engaging, rigorous STEAM curriculum and activities is essential to advancing academic achievement, closing achievement gaps, and recruiting students to the school. Across all content areas, students will be asked to work collaboratively to solve problems by engaging in scientific, mathematical and/or design processes in interconnected ways. For example, fifth graders involved in an exploration of water in science might design technical devices to support necessary measurements, and then draw on a range of mathematical processes to work with the resulting data. Their findings may be interpreted through the lens of social and political issues surrounding water use, and their resulting understandings shared through a variety of written and visual forms, both traditional and digital.

Added instructional materials to support STEAM instruction will include:

- Engineering is Elementary: The Engineering is Elementary® (EiE) project fosters engineering and technological literacy among children. EiE has created a research-based, standards-driven, and classroom-tested curriculum that integrates engineering and technology concepts and skills with elementary science topics. EiE lessons not only promote K-12 science,

technology, engineering, and mathematics (STEM) learning, but also connect with literacy and social studies.

- The Mindstorms and We Do Lego Robotics materials offer students opportunities to design, build and program small-scale robots. The materials are flexible and adaptable to the needs of a range of student populations. They allow for hands-on problem based exploration in collaborative learning environments. All MSAP STEAM sites will use Lego robotics as inside engineering and technology units taught during the instructional day, as well as in Robotics clubs that meet after school and robotics teams formed to participate in competitions.
- The JASON Project: Education Through Exploration offers a digital platform that connects students with scientists and researchers in real- and near-real time, virtually and physically, to provide mentored, authentic and enriching science learning experiences. The JASON Project offers teachers added professional development designed to increase expertise in implementing inquiry-based science experiences in the classroom. It offers students and families interactive webcasts, which connect them with STEM role models to put a human face on science, technology, engineering and math. Additional instructional resources are available to supplement the district's Full Option Science System (FOSS) curriculum. Sites will purchase science lab equipment such as microscopes and glassware and models from EnviroScope to be shared across grade levels in support.
- ST Mind Math + Music: Innovative visual instructional approach teaches students math concepts with integrated music. Music has a mathematical architecture, and as young students learn music they are also learning to recognize patterns and symmetries, and experiencing and hearing the concepts of counting and fractions. ST Mind Math + Music is an additional self-

paced learning opportunity for students, consisting of on-line innovative games which lead students through multi-step problem solving.

- Artful Thinking: An arts-infused curriculum in which the arts are used as entry points for students to develop deeper thinking and learning skills. Intended for classroom teachers across all grade levels, the program focuses on viewing and interpreting art, rather than making art. Artful Thinking has two goals: To help teachers create rich connections between works of art and topics they are teaching; and to use the power of art as a force for developing students' thinking dispositions.

Each school will also develop and implement (expand) learning support programs for students. These support programs may include but are not limited to Response to Intervention (RtI) strategies and supports, online programs such as ST Math+Music, and GATE program strategies. These activities will be the responsibility of the STEAM Resource Teachers and school site staff with support from the STEAM Specialists.

Overview of Strategies to Attain Objective 3: Accelerating STEAM Achievement in the San Diego Unified School District will advance systemic reforms at each MSAP site, improving the quality of STEAM-based instruction and integration strategies in each classroom (MSAP Purposes 2, 3, 4, & 6).

A core function of MSAP funding will be to provide intensive professional development regarding STEAM content and integration activities as well as effective pedagogical practices. All academic efforts will be driven by the demands of Common Core State Standards, Smarter Balance performance assessments, and knowledge of best practice inclusive of the building of dialogic learning communities that capitalize on increasing diversity to harness the power of varied perspective. The STEAM sites will be developed with a network of support including:

- Teacher access to higher level STEAM coursework through USD’s online STEAM master’s courses.
- University support for significant pedagogical reform focused on building integrated classrooms where students learn with and from each other
- Academic support for teachers from school-based STEAM RTs and district-based personnel, and collaboration with STEA[+a]M Connect
- District-level staff with content expertise (science, math, VAPA, CCTE, and Instructional Materials)
- Community partnerships developed with the support of CCTE to create externships that enable a teacher to intern for one or two weeks in a STEAM-related business.

Professional development activities include teacher-created individual development plans; using these plans to identify professional development priorities for each school; coordinating and conducting the professional development identified; training on technology use and integration into the curriculum; inquiry-based and project-based instruction; literacy within the STEAM content areas; and cultural proficiency and/or race human relations strategies. Professional Development will be the responsibility of the STEAM RT with support from the district-level Teaching and Learning Specialist and the Program Manager.

Professional development will occur on-site, across sites, and through developing partnerships and collaborations. On site professional development will engage University support for significant pedagogical reform through the Teaching Innovation Studio (TIS) process, focused on building integrated classrooms where students learn with and from each other. In addition, each site will have access to content knowledge and process development

support from STEAM RTs. STEAM specialists will also provide added professional development and educational technology support.

Across sites, we will implement professional development to build capacity and expertise. STEAM specialists and University partners will facilitate cross-site collaboration and professional development for STEAM RTs who will in turn help facilitate teacher-to-teacher collaboration. The STEAM RTs and the district specialists will coordinate cross-site visitation and observation opportunities for classroom teachers. The STEAM RTs will focus on strengthening teacher's content and process knowledge and all STEAM-related unit design. The consistent, embedded staff development and extended staff development opportunities will develop a level of content and process knowledge, instructional methodology, and the peer support networks needed to sustain the STEAM magnets beyond the close of the grant.

Additionally, USD's Teaching Innovation Studio process will support teachers with the development of inquiry methodology so critical to STEAM learning. Through the infusion of the inquiry process in lesson design, teachers will learn to support student inquiry by:

- Posing real-world problems/questions to students.
- Supporting students in a process of conducting original research and analyzing data.
- Working collaboratively to re-design and improve potential solutions.
- Communicating solutions in multiple ways to peers and the larger community

Added professional development supports will include: *Quality Teaching for English Learners* (QTEL) by WestEd, a professional development initiative that improves the capacity of teachers to support the linguistic, conceptual, and academic development of adolescent English learners, both immigrant and U.S.-born. An understanding of sociocultural theory and instructional scaffolding is built into all QTEL professional development, along with customized attention to

reading, English language arts, mathematics, science, social studies, and English as a second language (ESL). QTEL's professional development offerings include sustained work with districts and schools as well as open enrollment institutes.

Training for teachers of English Language Learners (ELL) and Gifted and Talented Education (GATE). SDUSD requires teachers to be certified to teach ELL and GATE students. SDUSD provides courses in which these teachers learn to differentiate instruction through strategies such as lesson modification cooperative grouping, and bridging.

SDUSD's English Language Arts, Mathematics and Science curriculum is in the process of being revised to rise to the demands of Common Core State Standards through the district's Rigorous Design Process. As MSAP's STEAM teachers strengthen their disciplinary content and disciplinary process knowledge with the support of the STEAM RTs, STEAM Specialists and University and District partnerships, they will build upon the work of the Rigorous Design process. At first, their work will be strengthening the content and process work within each discipline, gradually shifting to integrating the disciplines to create an integrated STEAM curriculum.

Overview of Strategies to Attain Objective 4: *Advancing STEAM Education in the San Diego Unified School District* will increase parental and community engagement and satisfaction regarding the four STEAM schools. (All MSAP Purposes)

Ultimately, parental and student satisfaction will determine the success (and level of success) for the STEAM magnet initiative. Each school will seek to increase levels of parental engagement, by increasing their voice in guiding the STEAM implementation through service on the school's implementation team. STEAM-related family events at each site will offer families an engaging STEAM-specific learning task, such as building a rocket or designing a poster about

engineering or using digital tools to access translation software. Field trips, community-sponsored STEAM-related festivals, and projects designed to include parents will be available, as will numerous opportunities to volunteer and mentor. These events are meant to increase a parent's engagement not only with the school, but also in family-centered learning tasks. We will incorporate family focus groups, including parents whose children who attend private, charter, or other public schools, to ascertain strategies to interest them in returning to their community public school.

Student satisfaction is inherent to the design of *Advancing STEAM Education*. What children know, how they learn, and what interests them are fundamental questions that each school will continually address as they implement the project at the classroom and individual teacher to student level. All curricula and support curricula, which are research-based and standards-based, have been selected because of their success at engaging students in STEAM content, a necessary ingredient to shaping long-term interest and achievement. GEMS clubs are designed to help girls feel confident about their STEM competencies and to support and celebrate their achievement. Each school will also have an informal means for students to provide feedback and suggestions about programs and activities. Such strategies will help increase student satisfaction with their STEAM magnet elementary school.

(iv) How it will ensure equal access and treatment for eligible project participants who have been traditionally underrepresented in courses or activities offered as part of the magnet school, e.g. women and girls in mathematics, science, or technology courses, and disabled students

A 2011 report released by the national Science Foundation entitled *Women, Minorities, and Persons with Disabilities in Science and Engineering* presented research showing that women, persons with disabilities, and three racial/ethnic groups – African Americans, Hispanics, and American Indians—are considered underrepresented in science and engineering. A 2013

report from the National Research Council entitled *Monitoring Progress Toward Successful K-12 Stem Education: A Nation Advancing?* described three goals for U.S. K-12 education in the STEM disciplines. The first of these goals fully focuses on broadening the participation of women and minorities in those fields. *Advancing STEAM Education in the San Diego Unified School District* will tap district resources and launch new strategies to recruit underrepresented student groups into the four STEAM elementary schools. In particular, strategies will include GEMS clubs, access to LEGO robotics during school, and access to a personal role models and mentors (same gender and ethnicity). The districts ADA/504 Department will fully support the needs of students with disabilities to ensure participation opportunities.

Research has shown that women and ethnic minorities lose interest and self-confidence in science and math subjects for reasons having more to do with misconceptions and stereotypes than with science or math ability (Eccles, 2007). Additionally, research shows that early socialization and achievement experiences of females and ethnic minorities can have a substantial impact, positive or negative, on students' decisions to pursue and persist in careers in science and math throughout the STEM pipeline. (Valla & Williams, 2012. *Journal of Women and Minorities in Science and Engineering*). The effects of stereotype threat on performance can be reversed by simply exposing the at-risk population to positive STEM-relevant role models, or by conveyed messages of positive ability to students in the classroom (Dweck, 2007; McIntyre et al, 1995).

Many girls come to elementary school with little or no experience with “tinkering.” They may never have built anything with Legos™ or other materials. Girls may also have received spoken and unspoken messages about STEM- related activities indicating that math, science, and similar fields are not for girls, or are “too hard” for girls. These gender differences often have

their root in elementary years as well, where traditional instructional methods and gender stereotypes keep girls from active involvement in STEM-related instruction. In support of all underrepresented groups in STEAM-related work and learning, SDUSD's STEAM magnets will provide early, positive STEAM experiences which instill and maintain interest and self-confidence combined with a "Who's Who in STEAM" curricular component, a focus on successful individuals representing a range of race, ethnicity, and gender in STEAM endeavors.

When working with SDUSD's College and Career Technical Education department to recruit secondary school and business industry mentors and speakers, every effort will be made to recruit from both genders and a range of ethnicity so that all students and families are provided with positive models that push back at stereotypes.

To recruit more girls into STEAM-related disciplines, SDUSD will use Girls Excelling in Math and Science (GEMS), a framework for math and science clubs for girls based on the concept of a growth mindset (Dweck, 2006). GEMS clubs are designed to offer elementary-aged girls first experiences with using tools, mixing chemicals, tinkering and building, wearing safety gear, and other experiences that are foundational to the development of STEM-related competencies. GEMS club leaders will work towards developing passion for STEAM in girls by highlighting female achievement in STEM, exposing girls to successful role models, and developing a belief in self. GEMS club activities such as Girls Science Saturday, will be used to recruit girls to the STEAM sites.

Each site will schedule GEMS clubs and mixed-gender clubs in ways that allow all opportunities to participate. Clubs may meet before or after school, or during the school day as part of weekly project-based work. Classroom teachers, STEAM RT's, middle and high school STEM pathway mentors and community volunteers will operate, monitor and support the clubs.

(v) The effectiveness of its plan to recruit students from different social, economic, ethnic, and racial backgrounds into the magnet schools

SDUSD has earned high marks from the Brookings Institution as having one of the best school-choice systems. For the past two years, the district has ranked in the top 10 for school choice among the 100 largest school systems in the United States. SDUSD offers a variety of excellent choices to families who wish to explore academic options. Enrollment choices are available to all students, including English Learners, Gifted and Talented Education (GATE) and Special Education students. SDUSD's Enrollment Options department's Choice process will be used for MSAP recruitment and admissions activities. Activities to provide equitable access to high quality education, including equitable selection of students through the SDUSD magnet school student selection process; and assurances of access for students and teachers with special needs.

The SDUSD School Choice application process is a weighted lottery. Parents apply for up to three school choices in priority order. The applications are randomized and ranked using computer generated random numbers. Once random numbers are assigned, applications are sorted by two priorities: 1) students requesting transfer from Program Improvement schools to non-Program Improvement schools, and 2) high school cluster. High School clusters are formed based on overall academic achievement using California State Testing data, and socio-economic levels based on Free and Reduced-Price Meals data. A student's high school cluster is determined by the address of residence regardless of grade level. Each magnet school has a cluster priority system, allowing it to give priority to students from areas of the district most apt to bring socio-economic diversity to the site.

Enrollment is offered to students in order using assigned random numbers within the weighted categories, then by assigned random number in the non-weighted categories. Parents

are sent a letter and schools are provided a list of students to enroll by a cut-off date. Student ethnicity, academic achievement, income level and gender are not provided to the schools, and are not factored in the selection.

Once students are enrolled in magnet schools, the SDUSD Magnet Office monitors student placement in course of study to ensure equity and access by race/ethnicity, gender, and resident/non-resident status. All elementary principals ensure that classrooms are racial/ethnically diverse and gender balanced compared to the school's overall population by working with teams of grade level teachers to construct each classroom. Classroom enrollment data is collected at the district level to ensure adherence to this policy.

Recruitment for MSAP schools begins with offering families desirable choices. Surveys sponsored by the district and the city of San Diego in 2006 and 2009 found STEM and the arts to be the most sought after academic programs. The addition of the Arts to a traditional STEM program will not only have a wide appeal to a diverse range of families, but will add critical thinking and representational abilities to students' developing competencies.

SDUSD will work diligently to recruit students from different social, economic, ethnic, and racial backgrounds into the MSAP STEAM schools through a strong emphasis on marketing inclusive of sharing the successes and opportunities offered through STEAM instruction. A combination of targeted marketing and the weighted lottery process will support sites in drawing the diverse population needed to reduce minority group isolation (Hispanic at three sites, and African American at the fourth). This will be accomplished without increasing isolation at feeder schools by following the district's magnet enrollment practices and offering an innovative program that attract students from across the district.

Parent access to information is the most critical variable in achieving diversity in and across magnet schools (U.S. Department of Education, 2004). Every district family receives an Enrollment Options Catalog by October 1 of each school year. This catalog describes all district school options, provides extensive information about district magnet programs including the STEAM magnet articulation patterns, and includes the option to apply online in English or Spanish. The catalog and application are also available at all school sites and on the district web site. Catalogs are available in English, Spanish, Tagalog, Somali, and Vietnamese.

Recruitment of applicants within the district or district charter schools is supported by SDUSD's Zangle Student Information System, which allows the MSAP office to access addresses of students who reside within the boundaries of an MSAP site but attend other district sites or charter schools. Too, Zangle provides lists of addresses of students in clusters to be targeted for recruitment. Recruitment materials such as fliers can be mass-mailed through the inter-district mailroom. The MSAP office times these mailings to coincide with the Nov. 1 opening of the Choice window.

For added support, particularly with reaching private or home school families not in the Zangle system, the MSAP project will provide marketing services to project schools through a contract with an external marketing organization. The marketing organization will plan, organize, and support MSAP communications activities, work with focus groups to tailor recruitment efforts for each school; prepare and disseminate public information material (print and digital/multimedia); and develop and proactively place stories with the media. The marketing organization's staff will work with MSAP schools to determine communications needs, provide support for communications efforts, and ensure that communications activities are effective and meet objectives. Marketing efforts will include the development of traditional tools

such as flyers and brochures, social networking tools such as websites and school blogs, contributions to community forums, participation in local and national competitions; enrollment fairs and district-wide open house activities; and community partnerships. Recruitment materials will be placed in places families frequent, such as pediatrician and dentist offices, preschools, places of worship, restaurants, and family fun centers. Advertisements will be placed in a range of publications such as San Diego Family magazine, the San Diego Reader, or Raceplace San Diego to ensure reaching a broad audience.

Family and community outreach and educational events such as Science Night, Math Night, Star Gazing, or Art Shows will draw interested families to the site to see the process and result of a STEAM education. Through MSAP funds, the sites will work to communicate the STEAM theme, ensuring that STEAM processes and projects are on display. The STEAM Resource Teachers will offer weekly tours for interested families, and the schools will participate in articulation fairs with the STEM middle schools and high schools. These events, which include student demonstrations of learning, are an opportunity for families to experience the progression of skills and ability that develop when students develop foundational STEM competencies in the elementary years. The events include guest speakers from STEAM-related business to highlight career opportunities. These events are well advertised and draw families from across the district and beyond.

Students from the MSAP sites will participate in community events, offering demonstrations of robotics, presentations of STEAM projects, art shows, and other means of showcasing the process and the result of STEAM education. These community events will allow sites to reach families attending private schools, or families who are home schooling.

The MSAP office will provide information to parents and the school communities in a variety of formats, including the Magnet website and Connect-Ed mass communication tools; and newspaper articles and advertisements. SDUSD's Community Relations, Communications, Parent Involvement and Translation Departments will provide advice and guidance to support the MSAP office and MSAP schools in their marketing and recruitment activities. The translation department translates all parent communication into the needed languages in a timely manner to ensure access to information for all families.

Recognizing that word-of-mouth process from satisfied families is often the best recruiting tool, relationships with parents and the community will be a key focus for the MSAP project. These relationships are cultivated on-site by a caring, capable staff and the added outreach efforts of the STEAM Resource Teachers and MSAP Office. The MSAP office will support sites in collecting and analyzing enrollment data each semester to ensure continued progress towards recruitment goals. Sites will be supported with determining targeting recruitment based on findings from enrollment data analysis.

(B) QUALITY OF PERSONNEL

(i) The project director is qualified to manage the project

The current full-time Project Manager, Maria Nichols, has been an educator in SDUSD for 26 years. Her experience includes classroom teacher, Master Teacher, Elementary Professional Development Center Demonstration Teacher, and Literacy Coach. She became a Magnet Theme Coach at a MSAP grant school site in 2008, and joined the Magnet Schools Assistance Program project District team in 2009. Ms. Nichols holds an Administrative Credential, a master's degree in Curriculum Design from San Diego State University, and was National Board Certified in 2005 and re-certified in 2010. Additionally, she has a Language Development Specialist Credential, a Literacy Coach Certification and has served as a literacy consultant to school districts across the U.S. Ms. Nichols received the Distinguished Elementary Educator Award from the San Diego chapter of Phi Delta Kappa in 2002.

Ms. Nichols is highly experienced with magnet schools, with over 8 years of experience as a Site Magnet Resource Teacher, Magnet Department Resource Teacher, and MSAP Project Manager. Ms. Nichols is currently the SDUSD Manager of Magnet Schools and has gained a national reputation for her work in classroom-based literacy and the development of dialogic learning environments. She is the author of several professional texts and articles documenting the importance of, and process towards this goal for teachers.

Ms. Nichols has been responsible for the oversight, management and reporting, and academic growth of MSAP schools for the last four years, and is the Project Manager for the current MSAP grant. She is responsible for assisting project schools in recruiting and marketing magnet programs, curriculum design, instructional technology and developing inquiry-based learning strategies.

The emphasis of Ms. Nichols work has been the design and implementation of dialogic learning environments, which strengthen learning and teach students the potential of varied perspectives when thinking and talking collaboratively. She has brought this emphasis to the District's MSAP schools, furthering their integration goal through staff development. Ms. Nichols has published four professional texts intended to support classroom teachers in developing dialogic learning environments: *Teaching Literacy in First Grade* (Guilford, 2005), *Comprehension Through Conversation* (Heinemann, 2006 with a forward by Richard Allington), *Talking About Text* (Shell, 2008), and *Expanding Comprehension with Multigenre Text Sets* (Scholastic 2009), as well as numerous articles.

Ms. Nichols' work as a literacy coach and staff developer includes six years experience with STEM Magnet schools. In this role, she led the design of the overall professional development program to support the sites in transforming into an integrated STEM learning environment; worked with teachers to design integrated curriculum with inquiry based instruction; and supported teachers in developing richly dialogic classrooms that offer diverse groups of students opportunities to learn with and from each other. She also was responsible for the purchasing of appropriate STEM-related texts and materials for classroom and lab teachers.

(ii) Other key personnel are qualified to manage the project

MSAP Office Personnel – Two full-time credentialed specialists with specific experience and training in STEAM will be hired to support the schools and provide direct assistance to the site administrators, site STEAM Resource Teachers (STEAM RT) and classroom teachers. These two positions will be a MSAP STEAM Science and Technology Specialist (1.0 FTE) who will strengthen science content knowledge and awareness of the possibilities that technology brings to teaching and learning, and a MSAP STEAM Teaching and

Learning Specialist (1.0 FTE) who will assist school sites with the coordination of professional development and curriculum design.

The MSAP STEAM Science and Technology Specialist will strengthen awareness of the possibilities technology brings to teaching and learning. An initial emphasis will be on building awareness of the potential uses of equipment and software and increasing teacher's comfort level with the technology in order to work towards meaningful integration with ongoing instruction. This Specialist will have extensive background in the understanding of integrated technology, the teaching of technology, and integrated instruction. Knowledge of hardware, software, supportive curricular materials, digital tools and apps, and their applications for teaching and learning is necessary. The ability to support the ordering of technology and provide professional development for teachers that develops comfort with the tools and their application is needed. Valid teaching credentials (master's degree preferred) with a minimum of five years of successful classroom instruction are required. Additionally, the Science and Technology Specialist will work to build teacher's science content knowledge and process knowledge through professional development specific to District curriculum and MSAP purchased curriculum support, such as Engineering is Elementary.

Ms. Sarah Trueblood-Luke will serve as the STEAM Science and Technology Specialist. Ms. Trueblood-Luke has 11 years of experience that includes teaching elementary and middle school science, English, and teaching engineering lab at a STEM magnet. She is a MSAP Technology specialist, a middle school STEAM Magnet resource teacher and IB coordinator. She holds a Bachelor of Art's degree in English from Indiana University and a Masters degree in Math, Science and Technology from the University of San Diego. Ms. Trueblood's professional development experience included designing and leading district i21 technology training over the

last four years, ensuring district teachers understand and are able to implement technology embedded instruction. She drew from her background in elementary science instruction to develop and support the science and engineering lab and lead the robotic team at Johnson STEM elementary, a previously MSAP supported elementary site in SDUSD.

The MSAP STEAM Teaching and Learning Specialist's primary focus will be on developing the networks that allow sites to learn and grow from each other's successes and connect sites to district expertise for the purpose of developing the enduring learning relationships necessary for sustainability. Though not yet identified, the ideal candidate for this position will have an extensive background in large-scale professional development design, curriculum design, integrated instruction, the ability to network and coordinate efforts of various sites and departments, and the ability to form and support professional learning relationships with diverse groups of colleagues. Knowledge of best practices that transcend all disciplines will be necessary, as will experience in diverse schools with an emphasis on instructional practices that develop integrated learning environments. Valid teaching credentials (master's degree preferred) with a minimum of five years of successful classroom instruction will be required.

The job description for the STEAM Specialist position is presented in Appendix C.

A Systems Analyst will be shared with the Enrollment Options department (.15 FTE). Mr. Alan Perlman has worked in information technology and database management for over 25 years, with vast experience in extracting and interpreting information from a wide variety of data sources. His work with the MSAP Office includes data extraction and analysis as assigned from diverse data sources (Student Information System, Zangle, School Choice Application database, District facilities, State of California); creation of MS Access databases and MS Excel worksheets as needed for data analysis; and the creation of Create SQL queries.

School Site Personnel – The magnet school principals are responsible for providing effective instructional leadership and are accountable for the school’s operation. Their major responsibilities include the educational program, managing professional and classified staff, student development, facility maintenance and management, fiscal management activities, and developing effective community relations.

Each MSAP STEAM site has an administrator with extensive educational experience and a proven track record in leadership of academic reform in diverse learning environments.

Franklin Elementary: Led by Mr. Akoni Derige, a native Hawaiian, who has a deep passion for integrated learning environments. He holds a Master of Education degree in Cross-Cultural teaching from National University, as well as a Master of Education degree in Educational Leadership from the University of San Diego. His 16 years as an educator and in leadership includes experiences as a Peer Coach/Staff Developer, Project Resource Teacher, Beginning Teacher Support Provider, Dean of Students, and Vice Principal, all in inner-city schools with high numbers of lower socio-economic and ethnically diverse students. His work as a Reading Recovery Teacher has developed an intense focus on struggling students, with a wide repertoire of supportive strategies.

Jefferson Elementary: Mr. Francisco Morga, an administrator in SDUSD since 2003 was chosen by a committee of teachers and parents in 2009 to lead Jefferson Elementary. Mr. Morga is responsible for Jefferson’s first steps towards becoming an International Baccalaureate (IB) site, working with the community and staff to launch the IB efforts. Through his leadership, Jefferson plans to add the academic depth of STEAM curriculum to become the district’s only IB STEAM elementary in an effort to draw a more diverse population and prepare students for Roosevelt IB STEAM Middle Magnet School. Mr. Morga, who is bilingual, has a long history of

working with diverse groups. He holds Masters of Education in bilingual and cross-cultural instruction from National University, served on the SDUSD Latino Advisory Committee in 2010 and 2011, is an Ethical Leaders Trainer for SDUSD, supporting district leadership with the facilitation of conversations focused on making ethical leadership decisions for our schools, our staff and our district.

Valencia Park: Ms. Lori Moore was selected by community, staff and district leadership to lead due to her previous successes in inner city, ethnically diverse schools. Ms. Moore's experience includes analyzing school achievement data to identify areas of need, coaching teachers in the implementation of effective teaching strategies, designing and leading professional development and facilitating grade level planning. She has planned, organized, and implemented school-wide Focused English Language Development (FELD) to support English language learners. Ms. Morre's background in counseling, with a Master's degree in counseling from National University, and her background in business guides her as she works to support families in their developing understanding of academic pathways and career awareness.

Washington Elementary: Is led by Ms. Janie Wardlow, who has been in education for 36 years, with 23 years of leadership experience. As an administrator, her focus is on systematic reform; such as providing meaningful research-based professional development, increasing teacher content knowledge in mathematics, science and language acquisition, creating teacher collaboration teams to identify student needs using data, and creating assessments to measure their growth and achievement. She has extensive expertise in community involvement and the formation of community partnerships that draw diverse families into the learning community.

On-site MSAP STEAM Resource Teachers: Two credentialed teachers with proven expertise in STEAM content and experience with staff development will be hired at each site as on-site

Steam Resource Teachers (STEAM-RT). District leadership for Science, Technology, Engineering, Art, and Mathematics will be asked to identify potential candidates with content and process expertise, and experience with content specific professional development. Preferred candidates will be well networked in their respective field, have knowledge of instructional strategies that support diverse populations, and knowledge of materials and curricular supports. Each individual selected for the MSAP STEAM-RT position will be expected to have a valid teaching credential, a bachelor's degree (master's degree preferred), and at least five years of successful experience, preferably in a magnet school environment. The job description for this position is presented in Appendix D.

MSAP Marketing Services: The MSAP project will provide marketing services to project schools through a contract with an external marketing organization with proven experience working with schools to develop messaging that incorporates educational mission, vision, and the STEAM emphasis. The marketing organization will plan, organize, and support MSAP communications activities, prepare and disseminate public information material (print and digital/multimedia); manage and respond to requests from the media; develop and proactively place stories with the media; and develop school marketing/recruitment materials. Their staff will work with the schools to determine communications needs, support communications efforts, and ensure that communications activities are targeted, effective and meet objectives.

The Project Evaluator: The external project evaluator, Ms. Patricia Trandal, is highly experienced in the MSAP program, with 23 years of experience working in and directing magnet programs. During her 30-year career with SDUSD she served the district as the Director of the School Choice Office, Director of Integration Programs, MSAP Project Director (for nine years), as an integration monitor for district schools, a district resource teacher and a magnet school

resource teacher. She has worked extensively with schools to develop magnet school designs and curriculum and holds Masters of Arts degrees in Multicultural Education and in School Administration from Pepperdine University. Since her retirement from the district in 2003, Ms. Trandal has worked on research and evaluation projects with the Western Region Equity Center Network and the American Institute for Research, and has served as a consultant to SDUSD on monitoring schools as they worked through the process of desegregation.

As the external Project Evaluator, Ms. Trandal will monitor the magnet program evaluation plan; develop appropriate measurement instruments and rubrics; conduct evaluation visits to each MSAP school three times each year; collect and analyze data; make timely reports to the Project Manager and MSAP school site staff; make recommendations for program changes; and prepare process and summative evaluation reports.

Resumes for all key personnel are presented in Appendix C.

(iii) Teachers who will provide instruction in participating magnet schools are qualified to implement the special curriculum of the magnet schools

The teachers in the participating magnet schools will be highly qualified to implement the STEAM curriculum. All California teachers must have a college degree and be credentialed by the State of California. Preliminary California Teaching credentials are earned after a fifth year of education courses and student teaching. A Professional Teaching credential requires additional course work and three years of successful teaching experience. Opportunities to interview to teach in an elementary magnet school are open to all credentialed teachers who are NCLB Highly Qualified and have expertise or interest in the grade level and the magnet theme.

Each site designs a race/human relations plan which is developed and supported by the district Race/Human Relations and Guidance Department. All teachers participate in approximately six hours per year of race/human relations training and/or Cultural Proficiency

professional development, which may include such topics as multicultural education, conflict management and alternative teaching strategies, including culturally relevant teaching practices.

Professional development is one of the critical components of this project, as it is understood that improving STEAM education will require on-going academic growth for instructional staff and school leaders. Professional development will be on-site and across site, drawing from the expertise of the STEAM-RTs, the STEAM Specialists, the District's content department's leadership, College and Career Technical Education, and the staff of the University of San Diego (USD). Teachers will be involved in collaborative learning efforts and curriculum design in Professional Learning Communities (PLCs) with grade-level teams, in small groups with the Teaching Innovative Studio (TIS) process (a teacher research process that will enhance the PLCs), and in cross-site teams. The PLC and TIS support will include strategies for supporting English language learners and students with diverse needs and learning styles.

Teachers will be supported in strengthening STEAM content knowledge in small grade-level teams and in larger on-site and cross-site content-specific workshops. These workshops will enhance the use of district curriculum such as the Full Option Science Systems (FOSS) kits and district mathematics units, as well as provide training on new curricular supports purchased through the grant such as Engineering is Elementary, Lego robotics, ST Math+Music, and Artists in Residence programs. Teachers will have the opportunity for individualized assistance through coaching, and on-line learning through the USD partnership. USD will help teachers build STEAM content knowledge in three ways: 1) Teachers may access full Master's level STEAM courses with partial compensation from a MSAP stipend; 2) USD will run separate sections of the STEAM courses for MSAP teachers to engage with content collaboratively; and 3) modules will be created out of the STEAM courses and infused into ongoing on-site professional

development, drawing on the STEAM knowledge, expertise and resources used to develop the courses. The overall professional development plan is outlined in the table below.

Year 1	Content:	Engineering and technology will be a new area of learning for teachers. Materials will be ordered, and teachers will have ample opportunity for hands-on exploration and professional development under the guidance of CTE Resource Teachers, on-site STEAM RT's, and MSAP STEAM Specialists. Grade levels will focus on aspects of science, math and arts instruction dependent on need. Content specific consultants will support these efforts. Information on USD STEAM course options will be shared and opportunities to attend content specific and pedagogical conferences will be offered to broaden each teacher's sense of what is possible.
	Pedagogy:	Action research will be introduced to the teachers' existing PLCs. They will explore dialogic learning environments, developing an understanding of their potential. Emphasis will be on instructional design that supports inquiry and discussion.
	Developing Professional Networks:	Site-level teams will be strengthened, and the MSAP STEAM Specialist will begin developing cross-site networking. District level content experts are introduced, taking part in professional development. STE[+a]M Connect, a local business and educational collaborative offering networking, workshops, and materials support along with CTE's STEAM Externships – one or two week opportunities for teachers to observe and study in a STEAM-related business – will be introduced and interested teachers enrolled for the summer.
Year 2	Content:	Emphasis on transforming professional knowledge into instructional outcomes will include curriculum design support that enables more inquiry-based learning, and begins to incorporate the teaching of Engineering and Technology. CTE Resource Teachers, on-site STEAM RT's, and MSAP STEAM Specialists will collaborate, offering multiple layers of support as teachers take on this new content and continue to strengthen other STEAM specific instruction. Content integration will begin, with supportive insights from teachers who experienced the STEAM Externships. As teachers take advantage of STE[+a]M Connect and USD STEAM courses, learning from these venues will be incorporated into the TIS process, curriculum design, and family outreach events.
	Pedagogy:	Exploration of dialogic learning environments through the TIS process will expand, with an emphasis on introducing varied perspectives into lesson design.

	Developing Professional Networks:	Multi-layered networking – cross-grade, cross-site, and site-District – will be encouraged to ensure the formation of professional relationships that will sustain future professional efforts. Professional development opportunities such as conferences, access to STE[+a]M Connect, and Externships will continue.
Year 3	Content:	The curricular emphasis will shift towards integration of content for the creation of true STEAM learning environments and on developing inquiry based learning throughout the day in all content areas.
	Pedagogy:	The TIS process will focus on strategies to deepen dialogue and begin to harness the energy of varied perspectives.
	Developing Professional Networks:	Teachers will begin taking ownership of their learning opportunities, reaching out for support when needed. The STEAM Teaching and Learning Specialist will ensure networks are in place to extend the learning and professional relationships into the years beyond the grant.

(iv) The applicant, as part of its nondiscriminatory employment practices, will ensure that its personnel are selected for employment without regard to race, religion, color, national origin, sex, age, or disability

San Diego Unified School District is an equal opportunity employer and complies with all applicable federal and state laws requiring nondiscrimination in employment in addition to district policies. The Board of Education has adopted a nondiscrimination program that encourages active recruitment and retention of minorities, women and persons with disabilities.

As part of its nondiscriminatory employment practices SDUSD will ensure that its personnel are selected without regard to race, religion, color, national origin, sex, age, or disability. The District implements effective measures to promote and ensure the provisions of Section 427 of the GEPA. The San Diego Board of Education has adopted an Equal Opportunity in Employment policy (Board Policy 0100) that explicitly prohibits discrimination based on race, religion, creed, color, marital status, veteran status, sex, sexual orientation, national or ethnic origin, age, or disability. This policy further declares, “It is also the policy of the district in employment and promotion to seek equal opportunity and nondiscrimination for all eligible candidates within major organizational units, major occupational groups (management, teacher, classified) and major classification (salary) levels. To achieve this, the district shall pursue an

aggressive policy of identification, encouragement and counseling of all eligible candidates with potential for leadership.”

The SDUSD Board of Education also has established policies that provide further commitment to nondiscrimination on the basis of handicap. This policy (Board Policy 0110) expands on the Board’s Equal Opportunity in Employment policy to specify that “no qualified person with a disability shall, on the basis of disability, be subjected to discrimination in recruitment or employment under any program or activity receiving federal financial assistance. Obligation to comply with this policy is not obviated or alleviated by state or local law, or by the terms of any collective bargaining agreement.” The District’s 504 coordinator actively supports teacher’s special needs to ensure full participation in all employment-related events. The Board of Education also has established specific policies and procedures (Board Policy 0120) that govern the implementation of federal and state laws that mandate nondiscrimination on the basis of sex (i.e., Title IX at the federal level and the California Sex Equity in Education law). All district policies will be honored during the hiring of personnel for all MSAP project positions.

(3) To determine personnel qualifications, the Secretary considers experience and training in fields related to the objectives of the project, including the key personnel’s knowledge of and experience in curriculum development and desegregation strategies.

Ms. Maria Nichols, the Project Manager, has extensive experience with magnet schools, large-scale educational reform, and education of diverse student populations. She is highly experienced in curriculum development, multicultural education, recruitment/marketing, finances and administration. Her work as a consultant with districts across the United States and in Canada has offered opportunity to work a greater range of socio-economic and ethnic diversity. Ms. Nichols has provided management and academic leadership to the District’s magnet programs with an emphasis on developing magnet themes, developing curriculum to meet

standards and integrate magnet themes, recruitment strategies and supporting district enrollment procedures. She works with numerous leadership teams in support of District processes and initiatives, inclusive of added efforts to promote integrated learning environments and access for all students beyond Magnet schools, such as the Interdivisional Curriculum Committee.

Ms. Nichols has published widely and worked nationally supporting districts and teachers with the development of dialogic learning environments. She will be working side by side with USD staff and teachers in the TIS process to support the development of learning environments where students from varied backgrounds work interactively.

Ms. Patricia Trandal, the Project Evaluator, has 30 years of experience working in and directing magnet programs, and has managed three successful MSAP grants for SDUSD. She has extensive expertise monitoring schools as they work through the process of desegregation. Her role in recommending improvements through the formative and summative evaluation of the project will further enhance the expertise that the district brings to the MSAP Project.

As part of the district integration strategy, all staff and students participate annually in a district-developed Race/Human Relations and/or Cultural Proficiency programs. Staff members participate in approximately six hours of workshop activities related to Race/Human Relations.

(C) PROJECT DESIGN

The San Diego Unified School District (SDUSD) has successfully implemented STEM magnet school programs in the past for middle and high school students in the district. An overarching goal in the design of this magnet school project is to bolster those previous investments by adding STEM magnet options at the elementary school level. In this way, students will have a continuum of STEM education opportunities and be better prepared to thrive as they matriculate

to middle school and beyond. All four elementary schools chosen for the project have issues with minority isolation and all four have been designated as needing Program Improvement.

Recognizing the needs at these schools, SDUSD is already committing funds from the i21 Technology program to provide equipment and software to augment lessons. The proposed Program Manager and Evaluator for this grant have significant experience with implementing and monitoring MSAP programs, thus providing a level of institutional knowledge that will help this project get off the ground quickly and succeed. With these available resources, now is the perfect time to intervene and leverage district resources with the MSAP grant to address the needs identified at the schools and set them on a new course as STEAM magnets.

(i) Promote desegregation, including how each proposed magnet school program will increase interaction among students of different social, economic, ethnic, and racial backgrounds

In the effort to increase interaction among students of different social, economic, ethnic, and racial backgrounds, the SDUSD is planning to significantly restructure Valencia Park Magnet to reduce African American isolation, and create three new magnet programs at Franklin Elementary, Jefferson Elementary, and Washington Elementary to reduce Hispanic isolation. All four sites will become STEAM magnets. Recruitment efforts focused on bringing students from different backgrounds to the MSAP STEAM sites will be targeted and varied. Marketing materials highlighting the advantages and features of the STEAM programs at each site will be distributed to parents, both electronically and through traditional mail. Information will also be dispersed at pediatrician and dentist offices, day care and preschool facilities, and other places families tend to congregate. Recruitment fairs, and content events, shows and competitions will be used to disseminate information as well to attract a diverse pool of applicants for the schools.

Leadership at all four MSAP sites will thoughtfully and purposefully place students in classrooms ensuring each class is balanced by race, ethnicity, gender, and ability, so that all can take full advantage of the richness diversity brings to a learning environment. Students with special learning needs are placed in the least restrictive environment possible as a matter of district policy. A detailed study of the outcome of this process in SDUSD found that students made much more progress in a school year when placed in a balanced classroom surrounded by peers with higher scores on achievement tests (Betts, Zau, & Rice, 2003).

As diversity is built, effort will be made to ensure truly integrated learning environments are developed. The range of experiences brought to school by culturally, linguistically, and ethnically diverse students offer a powerful resource that enables all to learn more (Cole, 2008). Dr. Heather Lattimer, EdD, Chair of School of Leadership and Education Sciences (SOLES) at the University of San Diego (USD) has published research on the critical role that student interaction plays in developing empathy and perspective consciousness (Lattimer, 2009). Lattimer's analysis revealed four primary classroom conditions that support students in rethinking their views of controversial topics and understanding perspectives that are different from their own. Those conditions are: (1) Presentation of a range of evidence through classroom learning experiences, (2) Opportunity for reflection and re-thinking, (3) A safe classroom environment that supports respectful dialogue, and (4) The critical role of peer-to-peer dialogue. Through the partnership with SOLES, teachers will engage in the Teaching Innovation Studio (TIS), an on-site collaborative, classroom-focused, inquiry-driven research process that will enhance teaching methods. Emphasis will be placed on increasing interaction among students of different backgrounds through the development of dialogic learning environments that move

students from tolerance of differences to truly respecting, valuing and learning from those differences and differing perspectives.

Maria Nichols, the Program Manager, has published widely and worked nationally supporting districts and teachers with the development of dialogic learning environments. She will work with USD staff and teachers in the TIS process to support the development of learning environments where students from varied backgrounds work interactively. The outcome will be instructional units with sources that present varied perspectives to allow students to reflect, rethink, and share with others from different backgrounds as they form their own opinions. Teachers will be supported in creating learning environments that support respectful dialogue.

In addition, the SDUSD has contracted with Campbell Jones and Associates to offer district-wide professional development on Cultural Proficiency – the goal of which is to develop schools that are able to meet the needs of students by responding positively to what they bring into the classroom. The work begins in year one with teachers and administrators, who will participate in monthly workshops. The workshops offer teachers strategies, role-playing opportunities, and team support. The work empowers teachers in creating an environment where they and their students are equipped to capitalize on the power of diversity.

The program expands in subsequent years as the emphasis shifts to working in the same ways with families, community members, and students. As a result, cultural divides will be bridged, building strong learning communities that allow staff, students, families and community members to engage in ways that accelerate academic rigor and close achievement gaps. Understandings developed in Cultural Proficiency will be incorporated in the design of STEAM curricular units, creating learning opportunities that capitalize on dialogue, various perspectives, and inquiry processes. As Cultural Proficiency strengthens, classrooms become more dialogic,

collaborative work through inquiry increases, and students learn to harness the energy of varied perspectives as they build understanding.

Additionally, SDUSD's Race Human Relations and Advocacy department has designed an anti-bullying program aimed at elementary students. *Don't Laugh At Me* promotes character education and conflict resolution while teaching tolerance and respect for diversity. The 19-lesson module and supporting staff development are designed to work in collaboration with Cultural Proficiency strategies. Students at all grade levels participate, providing opportunities for students to: (1) develop awareness, acceptance, and appreciation of cultural, ethnic and individual contributions and differences; (2) work as part of a team; and (3) interact in meaningful ways with students from a variety of ethnic groups.

As the grant project is implemented, opportunities beyond the classroom for students and families to interact will develop and/or strengthen in venues like Lego robotics team competitions and cultural activities with community partners. The lessons learned about valuing diversity and working together developed through the TIS process, Cultural Proficiency, and anti-bullying efforts, will be reinforced in these wider integration opportunities.

Character education will establish the framework for valuing diversity and building trust and respect among students from different backgrounds. On this framework, each school will add inquiry-based and project-based collaborative learning as its primary mode of instruction. This structure requires students from diverse backgrounds to work together to study and solve problems. Extended learning opportunities such as STEM clubs, robotics teams and cultural trips will also be sponsored to reinforce the integration efforts established in the classroom. Examples of specific actions planned at each site to promote desegregation and increase interaction among students of different social, economic, ethnic, and racial backgrounds include:

Franklin Elementary will use the MSAP grant to develop a science lab where inquiry-based experiments can be conducted by student teams that have different backgrounds and abilities. Students will have the opportunity to work collaboratively and learn from each other's perspectives as they problem solve, thus breaking down barriers between groups.

Jefferson Elementary incorporates the International Baccalaureate Learner Profile into curriculum design and instruction in a collaborative learning process. The Learner Profile consists of a list of attributes that promote academic rigor and the establishment of a personal value system leading to international-mindedness. Among the attributes is the development of a principled approach: Acting with integrity and honesty, with a strong sense of fairness, justice and respect for the dignity of the individual, groups and communities. This principled way of working with others guides all collaborations, both academic and social, and offers a reflective lens that enables students continued growth.

Through the MSAP grant, Jefferson will develop cross-class and cross grade level science and technology lab modules that provide added opportunity for interaction among students of different backgrounds. Students will continue to grow in their understanding of principled behavior as they widen social and learning networks.

Valencia Park Elementary is currently a performing arts magnet, and offers opportunities for students to use the arts as a means of interacting with others inside and beyond the classroom. Through the MSAP grant, Valencia Park will use the Artist in Residence program, and robotics, math, science and technology modules to create added opportunity for interaction among students of different social, economic, ethnic, and racial backgrounds.

Located adjacent to the Little Italy section of downtown, **Washington Elementary** has taken advantage of opportunities for students to interact in diverse learning situations beyond the

classroom. Fundraising efforts in conjunction with the community, support part time specialty teachers who offer learning experiences that engage students across classrooms and grade-levels. A music teacher organizes choir and musical theater. Language teachers offer Spanish and Italian. Art Reach, a nonprofit organization that offers visual experiences to elementary students, brings arts opportunities based on standards, inclusive of ballroom dancing for fourth and fifth grade students. As students mix and match with others, they continue to learn, think and grow.

Through the MSAP grant, cross-classroom and cross grade level opportunities will be expanded. Extended science and technology programs will be added to the instructional day, creating added venues for Washington students to interact with students of different backgrounds thus allowing for collaborative learning and the appreciation for different perspectives.

(ii) Improve student academic achievement for all students attending each magnet school program, including the manner and extent to which each magnet school program will increase student academic achievement in the instructional area or areas offered by the school;

Advancing STEAM Education will incorporate science, technology, engineering, the arts, and math (STEAM), immersing students in the disciplines that transform our world. A STEAM curriculum recognizes that the arts play a critical role in expression, innovation and design, allowing for varied means of accessing information in our world and expressing the outputs of the technical disciplines. Students with a foundational understanding of scientific and design processes, a strong conceptual base, integrated mathematics, the use of visual texts to understand, the importance of visually pleasing design to inform and persuade, and connecting in-school studies to real-world issues will be prepared to excel in any career. At these STEAM magnet schools, instructional delivery and curriculum design will incorporate best practices for promoting achievement across STEAM disciplines. The Technological Pedagogical Content Knowledge (TPACK) framework (Mishra and Koehler, 2006) will be used to ensure that the

complex interplay of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK) are incorporated into the design of STEAM curriculum.

Students will engage in lab-based, technology-supported, and project-based learning activities that focus on fundamental STEAM concepts. Across content areas, students will work collaboratively to solve problems by using scientific, mathematical and/or design processes in interconnected ways. For example, fifth graders involved in a team exploring water quality in science might design technical devices to support necessary measurements, and then use a range of mathematical processes to work with the resulting data. Their findings may be interpreted through the lens of social and political issues surrounding water use, and their resulting understandings shared through a variety of written and visual forms, both traditional and digital, inclusive of photo essays, videos, or other artistic mediums.

Through the TPACK model, technology will be incorporated into instruction. Students will have access to virtual learning materials to gain a deeper understanding of a variety of content. They will keep a digital science journal, incorporating the arts as they use digital photography to document research findings and observations of their natural world. In keeping with the intent of the Common Core State Standards (CCSS) and STEAM methodology, units will be project-based and focused on real-world issues and problem solving. Aspects of service learning will be incorporated, helping students to recognize that STEAM processes and competencies enable leadership, positive societal change, and a stronger connection to the world.

Access to engaging, rigorous STEAM curriculum and activities is essential for advancing academic achievement and deep learning and closing achievement gaps. MSAP funds will be used to purchase the following curricular supports above the standard district curriculum:

The JASON Project: Education Through Exploration offers a digital platform that connects students with scientists and researchers in real- and near-real time, to provide mentored, authentic and enriching science learning experiences. The JASON Project offers teachers added professional development designed to increase expertise in implementing inquiry-based science experiences in the classroom. It offers interactive web-casts, connecting students and families with STEM role models to put a human face on the topics being studied.

ST Mind Math + Music: Incorporates innovative visual instructional approaches to teach students math concepts with integrated music. Music has a mathematical architecture, and as young students learn music they also learn the concepts of counting and fractions and recognize patterns and symmetries. ST Mind Math + Music has an additional self-paced learning program for students, consisting of on-line innovative games which lead students through multi-step problem solving, and offers teachers added assessment information about student progress.

Artful Thinking K-5 is an arts-infused curriculum developed at Harvard's Project Zero in which the arts are used as entry points for students to develop deeper critical thinking and learning skills. The program focuses on viewing and interpreting art, rather than making art and has two goals: to help teachers create rich connections between works of art and topics they are teaching; and to use the power of art as a force for developing students' thinking dispositions.

The Mindstorms and We Do Lego Robotics materials offer students the opportunity to design, build and program small-scale robots. The materials are flexible and adaptable to the needs of a range of student populations. They allow for hands-on problem based exploration in collaborative learning environments and the development and understanding of engineering concepts. All schools will use We Do robotics in grades K-2, and Mindstorms Lego robotics in

grades 3-5 inside engineering and technology classes. After school robotics clubs and robotics teams formed to participate in competitions will also be created to further student engagement.

Brain Pop Jr. offers resources in varied media forms developed with an emphasis on Howard Gardner's theory of multiple intelligences and the belief that children have different learning styles. The materials support instruction in all content areas.

Classroom and Follet e-book libraries funds will fill classrooms with updated nonfiction, biography and informational traditional and digital texts that support STEAM instruction. Common Core State Standards emphasize a movement towards reading and writing nonfiction texts. MSAP funds will be used to replenish diminished classroom libraries, and to purchase texts that explore STEAM-related topics, concepts, and careers. SDUSD's Instructional Materials department is teaming with the MSAP project to identify supportive digital sources for similar texts, such as the Follet e-book libraries.

Instructional Books funds will allow for the purchase of updated reading instruction materials that support students in learning to read across disciplines to meet the demands of Common Core State Standards (CCSS). Purchases will include guided and shared reading materials to be used across grade levels.

The Artists in Residence program brings practicing artists into the classrooms to plan and teach side-by-side with classroom teachers, enabling teachers to grow as students learn. The program is designed with a three-year, release of responsibility model, beginning with full support and gradually allowing teachers to take over as their understanding of art, their ability to construct art curriculum, and their ability to infuse art with other disciplines strengthens.

Additional instructional materials to supplement the district's Full Option Science System (FOSS) curriculum will be purchased, such as science lab equipment, microscopes, glassware, and models from EnviroScape that can be shared across grade levels.

District curriculum will be incorporated into MSAP purchased supports to create the fullest possible learning experiences for students. District teachers currently use Full Option Science Systems (FOSS) kits to support science instruction. While the FOSS kits offer opportunity to meet the three dimensions of the CCSS science framework (Scientific and Engineering practices, crosscutting concepts, and disciplinary core ideas), added curriculum will be necessary to prepare students for secondary and post-secondary STEAM course work. The MSAP teachers will work with STEAM Resource Teachers to develop Common Core curriculum based on the Next Generation science Standards., incorporating cross-disciplinary practices inclusive of disciplinary literacy.

SDUSD's science Body of Evidence rubric (sample in Appendix E) will be adapted to support the design of science investigations within each curricular unit, guide attention to a scientific concept or concepts which form the foundation for the unit, the teaching of academic language, the use of data for communication, and the use of tools in data collection. Additionally, the rubrics will offer support for detailed observation of student's investigative process, offering critical information for reflections on unit design.

The arts curriculum will focus on both the critical reading of visual texts and the presentation of ideas that are technical, well-engineered, and pleasing to the eye. The Visual and Performing Arts (VAPA) department will team with the MSAP project, supporting teachers in infusing their integrated science and arts curriculum into the design on STEAM units.

Emphasis at the MSAP STEAM schools will be placed on integrating writing instruction,

using a writing process approach in conjunction with science, design and mathematical process. Students will use a science notebook to learn about informational writing, argument and persuasive forms of writing, and technical writing as they document their processes for others.

Rubrics will be designed across the STEAM curriculum to provide feedback to students and teachers. This feedback will support progress in curricular design that meets learning needs, ensuring students are making consistent progress towards academic targets.

Based on need and community interest, Franklin Elementary School will fill one STEAM Resource Teacher position with a credentialed teacher who has proven strength in the visual arts, and the other with a credentialed teacher who has proven strength in science and technology. The Franklin staff had begun work with an Artist-in-Residence program, and teachers are requesting added support in arts integration, particularly as they look forward to a fully integrated STEAM curriculum. Science is already a passion on campus, with an ongoing partnership with Ocean Discovery that allows third through fifth graders additional science instruction outside of the classroom. The MSAP grant would allow this and added opportunities to be extended to all students, with the professional development necessary to support teachers.

The result of the teacher professional development efforts will be a qualitatively different instructional experience for students. Occasional learning opportunities such as those provided through the Ocean Discovery partnership will evolve into full environmental stewardship units, with students investigating, discovering and researching environmental issues, posing and advocating for solutions, and drawing from the arts to communicate beliefs persuasively. Technology will be used as both part of the solution design, and to communicate findings, thus reinforcing understanding of the role of STEAM competencies in solving “real world” issues.

At Jefferson Elementary, the development of an IB STEAM program will provide a clear

alternative fully focused on the whole child; developing learning attitudes while offering rigorous problem based curriculum that requires the attitudes to succeed. In keeping with IB parameters, Jefferson teachers have designed units of inquiry based on a collaborative, problem-solving instructional approach but needs support in revising their IB units to bolster STEAM content, and moving towards integrated STEAM curriculum. Two STEAM RT positions will help them bring in Science and Art expertise, ensuring that units are project-based and focused on conceptual understanding. As reading is an added need, nonfiction and disciplinary reading will be incorporated into all unit designs.

IB units that incorporate STEAM competencies will result in students immersing in service-learning projects, defining local community issues, and reaching out with solutions. Students will learn to notice and define problems, research those issues, use the STEAM disciplines to problem solve, and campaign for change. They will learn to use technology tools such as video cameras, computers and iPads to document and communicate their projects.

The Jefferson staff invites experts and community members to be guest speakers and discuss their profession or expertise. Collaboration with STE[+a]M Connect and College and Career Technology Education will spur invitations to people in STEAM specific fields who can create the awareness of possibilities and an understanding of the importance of the STEAM academic pathway. The MSAP STEAM Specialists at the district office will help facilitate this effort and leverage the program across all magnet sites.

Valencia Park's magnet theme will be significantly revised, turning it into a STEAM school with STEAM curriculum fully integrated into every aspect of the instructional day. Based on need and community interest, Valencia Park will fill one STEAM Resource Teacher position with a credentialed teacher who has proven strength in the visual arts, and the other with

a credentialed teacher who has proven strength in mathematics. The arts focus will be on maintaining the performing arts emphasis and culture already in place while adding dimension with the visual arts and art integration into science, technology, engineering and math. Math will move towards collaborative opportunities that draw on the developing dialogic environment to teach flexible, strategic problem solving.

The intense focus on content knowledge and process skills across the disciplines will create learning experiences that are more engaging, calling on students to use strategies and skills in ways that construct conceptual understanding. The infusion of the arts will not only bring added opportunities for critical thinking as students learn to make meaning of visual images, but create added modes of expressing ideas and concepts in all content areas.

At Washington Elementary, the STEAM focus will not only help the school leverage the rich arts culture they have started to build, but strengthen academics as well with the added support for STEM topics. Washington will use its two STEAM RT positions to bring credentialed teachers with strength in arts and mathematics. They will support the expansion of the arts into all content areas and work to bolster mathematics instruction in order to further collaborative and flexible problem solving abilities in all students.

Research continually affirms the importance of the teacher in student learning (Allington and Johnson, 2000), and an emerging body of STEM research confirms this critical relationship as essential to inspiring and preparing children to pursue STEM careers. Integrating STEM across the curriculum and embedding the arts into STEM instruction will require intensive professional development for these sites. The professional development plan for the magnet program includes teacher-to-teacher training and peer support that targets content knowledge and pedagogical practice; assistance in implementing Common Core State Standards; creation and

use of STEAM-based materials and resources aligned to state standards; district-level support for practice and inquiry; and access to site-based support through the STEAM Resource Teachers. The professional development will be on-site, cross-site, and beyond, drawing in the University of San Diego, district curriculum departments, and STE[+a]M Connect. The goal and priority of the STEAM Teaching and Learning Specialist will be to develop the professional learning networks and relationships necessary to sustain learning and focus beyond the close of the grant.

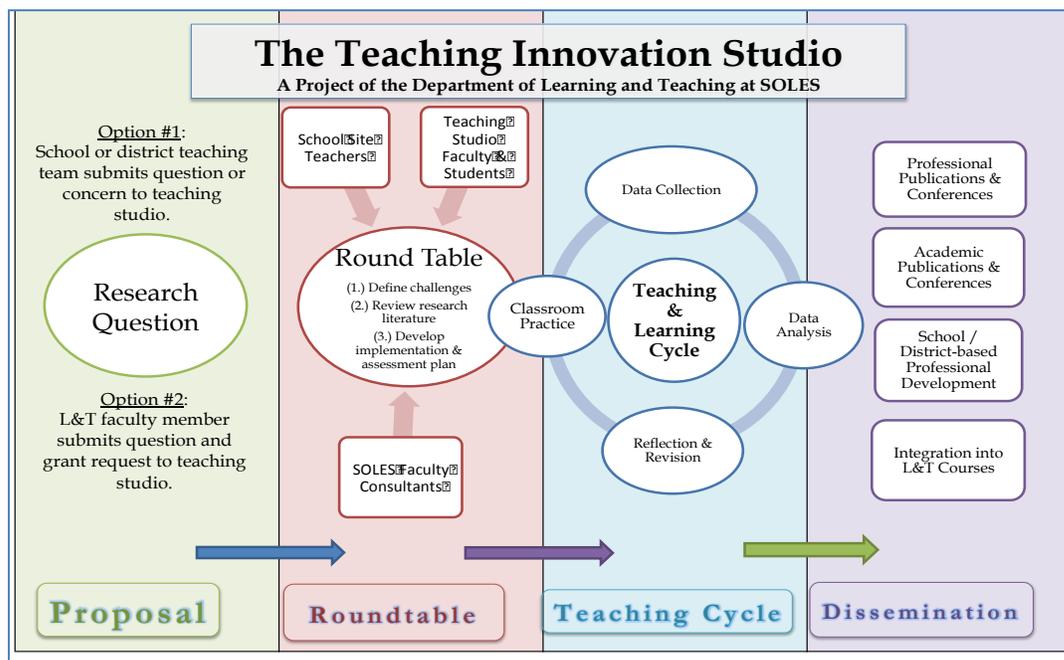
The four MSAP STEAM schools have established Professional Learning Communities (PLCs) where teachers can work collaboratively to share best practices for achieving better results for their students. Currently, teachers at each site meet weekly in grade-level teams to monitor student progress towards proficiency. During the PLC's, teachers focus on the analysis of student performance data and work to problem solve, link data to instruction, determine instructional gaps, plan for next steps and revise curriculum accordingly. Teachers will bring student STEM work to analyze as part of this process.

The MSAP grant will support PLC's through a partnership with the University of San Diego (USD). University faculty will partner with teachers at each site, using the Teaching Innovation Studio (TIS) design process to lead teachers in action research. Action research involves educators in the process of identifying questions that they want to explore in their own classrooms to improve their practice and achieve student success. Through the action research process, teachers see the impact of their decisions on student STEAM learning (Elliot, 2007).

Lesson Study, which is called for in the SDUSD Science Advisory Blue Ribbon Task Force and the Math Task Force, will be incorporated into the TIS process. This alone will strengthen the work on-site, as research goals in lesson study are generally focused on large instructional questions such as students as collaborators or critical thinkers, as opposed to

specific lesson objectives (Ertle, Chokshi & Fernandez, 2001), which is currently found in some of the grade level PLC work.

The emphasis of the TIS process will be on the development of inquiry-based dialogic instruction that creates integrated, collaborative learning environments and strengthens critical thinking. Teams of teachers will not only read professionally, but take on the role of classroom researcher together, collecting data for further understanding. This data will be shared in TIS meetings, where teachers will be supported in turning data into insights and further research questions driven by their own student needs. Analysis of data and new learning about the needs of students will lead to best practices for improving student achievement. Outcomes will be shared cross grade levels at each site and across the four sites themselves, as well as with colleagues across the District and beyond.



A study of the TIS process found that, with this support, “teachers began to shift their planning from that which is highly teacher-directed to that which is more student-centered.” (Edstrom, Jennifer Harris, 2012). This shift is critical to teaching STEAM content, which

requires an open-ended inquiry approach (Marshall, J. C., & Horton, R. M., 2011). The inquiry approach to instruction, so vital to STEAM learning, supports diversity goals as well. With inquiry instruction, students with diverse backgrounds and abilities will have shared experiences as a basis for their ideas, making learning accessible to all students because the explorations are made and experienced by all students. (Marshall & Horton, 2009)

To ensure active, successful participation in learning for all students, the TIS process and all curricular design will draw from Universal Design for Learning (UDL) guidelines, defined in the Higher Education Opportunity Act of 2008 as a "scientifically valid framework for guiding educational practice". UDL facilitates the design and implementation of a flexible, responsive curriculum by developing options for how information is presented, how students respond or demonstrate their knowledge and skills, and how students are engaged in learning. Curriculum created with UDL awareness provides the opportunity for all students to access, participate in, and progress in the general-education curriculum by reducing barriers to instruction.

To further help teachers implement STEAM programs that increase student academic achievement, each site will have two STEAM Resource Teachers with expertise in content areas that meet their specific site's needs. The STEAM RTs at each site will be involved in the grade level TIS process, adding STEAM content, concept and process knowledge support at each site. Across sites, the STEAM Science and Technology Specialist will provide science, technology and engineering assistance as well as coordinate support from the STEAM RTs with math content strength, from the district math department and from a math consultant.

Added access to professional learning will come through the STE[+a]M Connect, a local collaborative of STEAM-related businesses and educational entities offering networking, workshops, formal presentations, and materials. Teachers will have access and some stipend

support towards master's level course work at USD, including The Nature of Creativity and Innovation in STEAM, STEAM and Special Student Populations, Engineering Design Process in Math and Science Education, Artistic Modeling and Representation in Science and Math Education, and Communication, Technology, and Curriculum Design will be available online. Teachers may take these courses individually or as a team.

As an example of how these courses will help teachers to more closely meet the needs of students, "The STEAM and Special Students Populations" course will give teachers an opportunity to research, discuss and work collaboratively towards strategies to address STEAM specific instructional challenges for students. The course explores four critical questions:

1. Which students have not been served well in relation to STEM education?
2. How have systems (technical and normative) constrained success for these groups?
3. Which models (technical and normative) of success exist in relation to these populations?
4. How can these models be actualized in our own instructional practices?

Information gleaned from teachers who attend this course will be woven into ongoing instruction and curriculum design. This added emphasis on research and instruction while strengthening content and process knowledge will enable teachers better address student needs, thus improving student achievement. Teachers involved in action research self-report that, "*they have learned more about effective instructional practices that directly impact student literacy performance through their inquiries*" (Elliott, 2007).

From a student standpoint, the outcome of teacher's participation in the TIS process will be increased time for inquiry as curriculum design shifts towards collaboration and the development of dialogic learning environments. In STEAM content learning, instruction will have added rigor and relevancy due to increased teacher content and process knowledge.

(iii) Encourage greater parental decision-making and involvement

Surveys sponsored by the District and the city of San Diego in 2006 and 2009 found that STEM is viewed as a strong academic program and attracts parents to schools. Adding arts to develop a STEAM curriculum will create an even stronger attraction for a wider range of families. Parent access to information is the most critical variable in achieving diversity in and across magnet schools (U.S. Department of Education, 2004). Every district family receives an Enrollment Options Catalog by October 1 of each school year. This catalog describes all district school options, provides extensive information about district magnet programs including the STEAM magnet articulation patterns, and includes the option to apply online in English or Spanish. The catalog and application are also available at all school sites and on the district web site. Catalogs are available in English, Spanish, Tagalog, Somali, and Vietnamese.

Parent and community engagement activities will follow the Joyce Epstein Model for Parent Involvement. Activities following this framework will include: development or strengthening of parent participation committees at each school; development of school site, teacher and classroom websites; and distribution of school newsletters. Regular activities for parents will include: invitations to participate in events that provide real-world applications of student learning; implementation of home/school contracts as specified in the school site plan; implementation of the Family Friendly Schools program to provide a welcoming environment; and providing parent access to computers and technology through school labs.

Parents will have various means of communicating with teachers about their child's progress and have access to current information about classroom instruction, homework and activities to be able to provide the home support that their children need to succeed in school. Teachers will communicate with parents face-to-face and across networks. All teachers have an

open-door policy, inviting parents into the classroom to volunteer or observe. They are available to meet individually with parents, offering constant feedback and conversations about student's progress and needs, and guidance for parents to work with their students at home.

Teachers also offer on-line access and communication. Each school has a website with email access to teachers. MSAP funds will be used to enhance these websites, adding teacher pages and offering greater detail for academic programs and family and community events. Skype can be used for conferences when parents aren't able to attend conferences in person.

Should a student struggle for any reason, a site-based and/or district level team of professionals is available to work with the parents to collaborate on improvement plans. The Student Study Team (SST) consisting of the classroom teacher, site administrator, nurse, resource teachers, and counselor meets with parents on an ongoing basis to devise a course of in-school and home support. Homework clubs guide students and parents alike with content-specific help, study skills strategies, and offer the opportunity to build networks of support. This is vital for STEAM schools, as many parents struggle to support their students as math and science work grows more complex.

At the magnet schools, parents will have multiple, flexible avenues for involvement in the school community beyond a connection with the classroom teacher. SDUSD has just purchased My Big Campus, a learning management system that allows for on-site and cross-site collaboration. With support from the district's i21 technology department and MSAP funds to cover the cost of inputting users, the family component for My Big Campus will be activated as a district pilot. This will allow parents access to classroom projects, homework information, blogs, and resources. Videos can be posted, and parents can comment. My Big Campus can also be used to harness the potential of parents virtually, allowing them to volunteer without actually

having to be at the school site. Parents in specific careers can make videos that outline the benefits of their career choice to upload, or create virtual “job shadowing” videos, showcasing a day in the life, and the reasons science or math matter in their day. Families might also make videos of read alouds in a native language to upload and enhance cultural sharing.

Ed-Connect, a computer-generated phone calling system, is capable of reaching all families, offering reminders of upcoming academic and social family events. Marquees displaying current information are in front of each school as another way to offer quick reminders to parents and students about events.

In order to enable parent’s voices to be heard and their ideas to become part of the decision-making process that defines the school’s vision, each site has an ongoing School Site Council (SSC) team, consisting of parents, the site administrator, teacher representation from each grade level, and classified staff representation. Together, the SSC guides budgetary decisions using the theme and vision of the academic focus as a guide. The SSC contributes to the development of each site’s Single Site Plan, and discusses, supports, and tracks progress towards its implementation. The SSC also plans for celebratory and other community involvement events. These may include but are not limited to book fairs, potlucks, craft fairs, arts fairs, and family content nights such as science night or math night.

Each school holds a monthly Family Friday. Family Fridays are designed as part meeting, part insight into classroom instructional practices, and part strategy support to help parents work with their child at home. The structure of the event emphasizes developing parent involvement in six areas: parenting, communicating, volunteering, learning at home, decision making, and collaboration with the community (Epstein, 2002). The event generally begins with a meeting led by the principal that provides updated information about site-wide academic

progress. Parents are able to ask questions about the broader academic focus of the school, offer suggestions, and plan for volunteering. A brief training follows this section on a chosen instructional strategy such as problem solving in math, a scientific inquiry, or strategies for reading with a child. Parents are then sent into their child's classroom to observe or actually try the strategy, and then gather back together to debrief. Family Fridays may also involve supports from the broader community, such as visits from professionals to discuss career tracks or community educational organizations such as museums. The district's STEAM Specialists in conjunction with the department of College, Career and Technical Education (CCTE) will help facilitate guest lectures and leverage their impact across all of the magnet schools.

MSAP funds will be used to promote STEAM awareness at Family Friday gatherings, developing an awareness of STEAM-related career opportunities, understanding the importance of the foundation students are developing at the elementary level, and planning for an academic journey that leads to success. Family Friday speakers will include middle and high school students from STEM-related courses of study, middle and high school counselors, and individuals working in STEM-related fields.

A key goal of the MSAP STEAM schools will be to support students and parents in developing a vision of career possibilities, and defining the academic course that will lead to success. To help achieve this goal, SDUSD's Department of College, Career and Technical Education (CCTE) has created career pathways consisting of a coherent sequence of coursework that allows students to see what is required for each industry sector. The STEAM specific or related Career Pathways available to SDUSD students include Arts, Media and Entertainment; Energy and Utilities; Engineering and Design; Environmental Science and Natural Resources; Health Sciences and Medical Technology; Information Technology; and Manufacturing and

Product Development. CCTE will coordinate interactions with high school student-mentors involved in these career pathways for the MSAP STEAM schools. The mentors will visit the schools to speak with students and parents about their coursework and internships, supporting families in envisioning STEAM careers, and planning the necessary academic path.

In addition to these activities for encouraging greater parental decision-making and involvement, each school has developed their own unique programs for parental outreach.

Franklin Elementary has Monday morning events to launch the week. Parents often join the students in celebrating citizenship and academics. Additionally, monthly Principal Coffees, English Learner Advisory Committee meetings, Parent Teacher Organization meetings, Strategic Process Committee Meetings, and the School Site Council offer ample opportunity for parents to work collaboratively towards site goals.

Leadership and staff at Franklin have reached out into the community, forging partnerships with The Kensington/Talmadge Community Associations, The Sisters of Talmadge, Whole Foods, Target, ELKs club of Allied Gardens, and the Partnership for Children. Copley YMCA draws the community together by coordinating and running Family Fun Nights, as well as using the auditorium to offer after-school fitness classes for families.

Jefferson Elementary staff has coordinated guest speakers for their units of inquiry, with experts and community members discussing their profession or expertise. Collaboration with STE[+a]M Connect and CCTE will broaden invitations to people in STEAM specific fields who can help create awareness of the possibilities and an understanding of the importance of a strong STEAM education. Additional events such as Star Gazing evenings, with parents and the community involved in explorations side-by-side with students and other families creates the necessary environment to link families through their shared goal of enhancing learning.

Valencia Park is proud to have a very active PTA that advocates for the students and parents. The Valencia Park PTA supports activities that offer students and families opportunities to interact by organizing events, raises funds, and providing volunteers for school activities. Family opportunities include movie nights and book fairs. Valencia Park has a rich history of drawing from the arts to bring families, students and staff together, recognizing the power of linking families to learning through extended activities. School day and evening events provide parents and staff the ability to have focused conversation about goals, academic pathways, and future options. MSAP funds will allow the expansion of these extended events.

Washington Elementary has built community partnerships with the Italian Cultural Center, Little Italy Association, the Washington Foundation, and the New Children's Museum that give a range of options to build parental interest and encourage participation. Washington hopes to integrate these partnerships more fully with outreach events supported by MSAP funds. Science, technology and engineering partnerships facilitated by CCTE will round out the community partnerships, and offer parents a greater understanding of the potential of a STEAM course of study. MSAP funds will also allow for systemic family involvement in learning, with an expanded Family Friday that brings parents into classrooms to observe, learn about literacy and mathematics support, and become involved in STEAM projects.

For all schools, site STEAM-RTs and MSAP STEAM Specialists will work with community partnerships to plan for and implement community service projects that will strengthen networking and offer parents added opportunities to deepen their involvement, share perspectives on solving community issues, and learn about the diversity in our community.

Additionally, CCTE has worked to cultivate over 800 local business partnerships. As San Diego has a strong STEAM-related industry base, many of the partnerships are with

STEAM-related entities. CCTE will work with MSAP grant schools to provide adult industry mentors. As with the student mentors, these adult mentors will work directly with students, parents and teachers to create awareness of STEAM-related career opportunities, and an understanding of the necessary academic pathway.

Recognizing that word of mouth from satisfied families is often the best recruiting tool, relationships with parents and the community will be a key focus for the MSAP project. These relationships are cultivated on-site by a caring, capable staff and the added outreach efforts of the STEAM Resource Teachers and MSAP Office. The STEAM Resource Teachers will offer weekly tours for interested families, set up informational tables at District Enrollment Fairs and community events, and, with support of the MSAP STEAM Specialists, ensure website information is current. The STEAM elementary magnet schools will also operate articulation fairs with their middle schools and high schools to parents can understand and appreciate the available STEAM education continuum that SDUSD is creating.

The MSAP project's communication services will provide information to parents and the school communities in a variety of formats, including just-in-time access to magnet school programs, events and awards via the magnet program website and Connect-Ed mass communication tools; newspaper articles and advertisements, contributions to community forums, and participation in local and national competitions; an appealing, safe environment that communicates the STEAM theme when entering the campus; enrollment fairs and district-wide open house activities; print and electronic advertising; and community partnerships.

The SDUSD Community Relations, Communications, Parent Involvement and Translation Departments will provide guidance to support the MSAP office and MSAP schools

in their marketing and recruitment activities. The translation department translates all parent communication into the needed languages to ensure access to information for all families.

MSAP STEAM sites will work towards continuously increasing opportunities for parents to become involved in student's learning experiences, including a range of parent and community events, family Fridays, family nights, STEAM clubs, and more. *Advancing STEAM Education* is designed with a foundational understanding that "[w]hen schools, families, and community groups work together to support learning, children tend to do better in school, stay in school longer, and like school more." (Southwest Educational Development Laboratory 2002).

Through each school's efforts, parents will have expanded access to information to aid in their decision-making processes about their children's education. With the planned multiple communications channels, variety and diversity of parental and community outreach programs, and by leveraging resources and approaches across sites, it is the intent of the SDUSD to build a parental involvement model that is sustainable long after the grant period ends for these schools.

(D) BUDGET AND RESOURCES.

(1) The adequacy of the facilities that the applicant plans to use

The facilities of the four proposed MSAP sites include classrooms, libraries, auditoriums, storage space, and playgrounds that are similar to those provided at other district sites. In 1998, San Diego voters approved Proposition MM, a \$1.5 billion bond measure that enabled SDUSD to make significant improvements to each school site included in this project. Proposition MM has supported improvements that enhance student learning and instruction such as installing a wireless network (WIFI) and providing technology upgrades, including audiovisual projection capabilities for all students. Proposition MM has supported improvements that support student health, safety and security such as providing a campus-wide emergency communications system, and installing security lighting. Proposition MM has funded improved school accessibility, such

as code compliance upgrades, renovating existing restrooms, and improving accessibility to all classrooms, labs, restrooms, and other school facilities to comply with accessibility regulations including ADA Title I & II. And lastly, Prop MM funded major building systems repairs/replacements, restorations of interiors, exteriors, finishes and fixtures, repair/resurfacing of worn and damaged concrete and asphalt paving where needed, repair/replacement of deteriorating plumbing and sewer systems, replacement of aging wiring and upgraded electrical systems as needed, and repair/replace/upgrade performance spaces/multipurpose rooms.

All other district facilities are adequate and available to the project. These facilities include an Office of School Choice (which includes the Magnet Office); district curriculum departments; the Educational Technology Office; Special Education Department; Business Services; Facilities; and district and site meeting rooms.

(2) The adequacy of the equipment and supplies that the applicant plans to use

In 2008, San Diego voters approved “Proposition S,” a bond measure that provides over \$25 million per year through 2014 for educational technology (and a total of \$400 million over 15 years). The Proposition S-funded i-21 Technology Initiative delivers digital tools designed to create an engaging and personalized learning environment. The main components include an interactive whiteboard, audio/visual cabinet, a teacher’s presentation station, a wireless voice amplification system, a document camera, and a DVD player. Classrooms are being equipped across the district. The magnet schools will have the technology equipment funded by i-21 and ongoing support from this initiative to assure that their equipment remains operational and updated. As the schools implement the STEAM curriculum, this technology will be further integrated into lesson plans to help reinforce the STEAM theme. Students will use the technology for digital science journals, virtual field trips and for accessing rigorous on-line

content to help deepen their knowledge and understanding of STEAM topics. They will be able to interact with virtual guest speakers through the Jason Project and share perspectives on what they are learning with virtual mentors.

Beyond the technology equipment, the district will provide standard instructional materials, textbooks and science kits from the general funds for the magnet schools. The school district operates an Instructional Media Center (IMC) of resource materials available for checkout and use by all certificated teachers and administrators. The instructional supplies, materials, and equipment requested through the MSAP grant will supplement district-provided materials to assure that each site has the STEAM-related learning materials required for the new instructional units that will be offered to create the STEAM magnet curriculum. Examples of these include supplies for Lego Robotics classes, Engineering is Elementary kits, the Jason Project and ST Math+Music site licenses, water quality survey kits, eLab Renewable Energy sets, science lab equipment and supplies, plus nonfiction STEM-related texts and materials.

(3) The adequacy and reasonableness of the budget for the project in relation to the objectives of the project

The objective of SDUSD with this grant is to create STEAM focused magnet programs at four of the district's elementary schools to augment the STEM magnet educational continuum that has already been implemented at the middle and high school levels. This will give students a sound foundation in STEAM concepts and enhance their abilities to succeed as they move into the established upper grade-level programs. The participating elementary schools currently have a high percentage of minority groups (African-American and Hispanic) and a goal of introducing the STEAM magnet programs at these sites is to eliminate the isolation of these groups and more fully integrate the learning environment for all students at the schools.

Three of the schools will be completely new to the magnet process, while the fourth will have its magnet program significantly revised to add a STEM focus to its existing Arts theme. For the new magnet programs, initial expenses will be required for marketing and to get the word out to a wide audience so that many applicants will be attracted to the benefits that these STEAM sites will offer. Multiple communication venues and recruiting forums will be used to assure that a target audience is reached that can benefit from the STEAM curriculum and reduce minority isolation at these schools.

With the new STEAM focus, initial expenses will include (1) the specialized curriculum, supplies and equipment needed to build the STEAM programs; (2) the specialized personnel and professional development inclusive of the USD partnership necessary to build the level of teacher knowledge for STEAM disciplines; and (3) the specialized personnel needed to build the cross-site networks and partnerships necessary to create the professional relationships to sustain the program beyond the close of the grant. The first-year budget of \$3.85 million for the four schools is the highest, reflecting the initial marketing push, initial material and supply purchases and initial professional development required to launch the STEAM curriculum. The budgets drop in subsequent years as more of the STEAM program methodology is put in place and the schools can start building on their reputations for recruiting. SDUSD plans to have the magnet programs completely sustainable with the support of district resources after the end of the grant.

SDUSD obtained competitive estimates for all of the costs of implementing the proposed MSAP schools, with economies of scale in purchasing applied to keep costs down. The costs as planned will sustain the sites for years beyond the close of the grant. The professional expertise of teachers and carefully planned curriculum, supplies and equipment purchasing will have all variables in place to allow for the continuation of the STEAM theme. Additionally, the costs will

cover the level of recruitment necessary to significantly reduce minority group isolation at each site by the close of the grant, and involve families so they will appreciate the value of the STEAM curriculum and want to keep their children in the programs.

SDUSD requests \$2000 in MSAP funds per student per year for three years. The per-student cost decreases each year of the grant, starting at a total of \$2,176 in Year 1. The annual per-student cost drops to \$1,960 in Year 2, and then drops further to \$1,865 per student in Year 3, when all of the MSAP project schools are enrolling their full complement of students. SDUSD currently spends \$8541 per-student per-year in combined state and federal funding. The use of funds required to implement the STEAM magnet program is detailed in each school's budget.

(E) EVALUATION PLAN

SDUSD will enact a rigorous evaluation of *Advancing STEAM Education* that will produce cogent metrics and feedback regarding implementation and outcomes of the project for the schools, the district, and for the U.S. Department of Education. SDUSD will contract with Ms. Patricia Trandal to provide the evaluation services necessary for monitoring, adjustment, and oversight. Her credentials are summarized in the Personnel Section (resume in Appendix C).

The evaluation plan is designed to answer the following research questions:

- (1) What effect does the STEAM magnet theme have on recruitment so that minority group isolation is significantly reduced at each of the four schools?
- (2) To what extent does an integrated STEAM curriculum advance achievement for all students in all subjects and engage students in compelling learning experiences that develop deeper knowledge and skills across content?

(3) To what extent does an integrated STEAM curriculum affect student interest and competency in STEAM-related subjects and careers, particularly that of underrepresented groups (girls, African Americans, and Hispanics)?

(4) To what extent does integrated STEAM professional development (content, process, and pedagogy) affect student achievement, school reform, and continuous improvement?

The proposed plan includes formative and summative components and uses multiple sources of quantitative and qualitative data and methods of analysis.

(1) Includes Methods that are Appropriate to the Project

The methods for evaluating the project include analysis of student demographics, population, and performance data; newly developed rubrics to measure achievement where current data is not available; on-site observations and material reviews; and surveys.

Objective and Performance Measures	Data
<p>Objective 1: <i>Accelerating STEAM Achievement in the San Diego Unified School District</i> will promote voluntary desegregation in its public schools by reducing minority group isolation in four elementary STEAM sites with substantial portions of minority students (MSAP purpose 1).</p>	
<p><i>Performance Measure 1.1:</i> Each year, the applicant pool for admission into the four sites will increase by at least 10% among targeted recruitment groups for each site.</p>	<p><i>PM 1.1</i> Applications for each school with race/ethnicity demarcated. Collected after deadline to apply, provided by SDUSD</p>
<p><i>Performance Measure 1.2:</i> Each school will reach at least 90% of its enrollment targets each year, reducing minority group isolation of Hispanic students in three schools and of African-American students in one school. (GPRA PM A)</p>	<p><i>PM 1.2</i> 45-day enrollment of each school disaggregated by groups, provided by SDUSD; Target Enrollment percentages as delineated in MSAP application, provided by SDUSD</p>
<p><i>Performance Measure 1.3:</i> Each year, feeder schools will not show increased isolation of Hispanic or African-American students.</p>	<p><i>PM 1.3</i> 45-day enrollment data for feeder schools disaggregated by subgroups</p>
<p>Objective 2: <i>Accelerating STEAM Achievement in the San Diego Unified School District</i> will increase academic achievement among all students in participating STEAM schools. (MSAP Purposes 2 & 6)</p>	

<p><i>Performance Measure 2.1:</i> The percentage of students from major racial and ethnic groups in magnet schools who score proficient or above on CST or Smarter Balance State assessments in English/language arts and in mathematics will meet state targets each year. (GPRA PM B & PM C)</p> <p><i>Performance Measure 2.2:</i> The percentage of students from major racial and ethnic groups in participating schools who score proficient or above on State assessments of science in 5th grade will meet state target each year.</p> <p><i>Performance Measure 2.3:</i> The percentage of students in 3rd and 4th grade from major racial and ethnic groups in magnet schools scoring proficient or above on SDUSD end-of-course science exams will increase by 10%.</p> <p><i>Performance Measure 2.4:</i> The percentage of students from major racial and ethnic groups scoring proficient or above on MSAP-created science process rubrics measuring science understanding and conceptual knowledge will increase by at least 10% each year.</p> <p><i>Performance Measure 2.5:</i> Each year of the project, the percentage of students in grades 3 and 5 at each participating site scoring proficient or above on MSAP-site created engineering/technology rubrics will increase at least 10% each year.</p> <p><i>Performance Measure 2.6:</i> Each year of the project, the percentage of students in grades 2 and 4 at each participating site scoring proficient or above on MSAP-site created artistic design process rubrics will increase by at least 10%.</p>	<p><i>PM 2.1</i> CST (CCSS) grade-level and school-wide disaggregated data for school, state targets, provided by SDUSD</p> <p><i>PM 2.2</i> CST Science target, grade-level disaggregated data for school, provided by SDUSD</p> <p><i>PM 2.3</i> Disaggregated data for each school for 3rd and 4th grade on district science end-of-course exams, provided by SDUSD</p> <p><i>PM 2.4</i> Disaggregated performance data on MSAP-created rubrics in science for all grade levels at each school, provided by SDUSD, MSAP schools (baseline in Year 1)</p> <p><i>PM 2.5</i> Disaggregated performance data for grades 3 and 5 at each MSAP school on MSAP-created engineering/ technology rubrics (baseline data in Year 1), provided by MSAP schools, SDUSD</p> <p><i>PM 2.6</i> Disaggregated performance data for grades 2 and 4 at each MSAP school on MSAP-created artistic design rubrics (baseline data in Year 1), provided by MSAP schools, SDUSD</p>
<p>Objective 3: <i>Accelerating STEAM Achievement in the San Diego Unified School District</i> will advance systemic reforms at each MSAP site, improving the quality of STEAM-based instruction and integration strategies in each classroom (MSAP Purposes 2, 3, 4, & 6)</p>	
<p><i>Performance Measure 3.1:</i> At least 90% of teachers at each site will integrate professional development on cultural competency and integration strategies into curriculum and lesson plans</p> <p><i>Performance Measure 3.2:</i> AT least 95% of participating teachers will apply the TIS Professional development on instructional cycle into their lesson plans.</p> <p><i>Performance Measure 3.3:</i> At least 95% Teacher STEAM content knowledge and confidence in teaching STEAM subjects will increase each year</p>	<p><i>PM 3.1</i> Rubric for Cultural competency and integration strategies to be used with Observation and document review (Curriculum, Lesson plans), collected by Evaluator</p> <p><i>PM 3.2</i> TIS implementation rubrics (designed with USD) documented by observation, lesson plans, curriculum, and PLC feedback</p>

<p>of the grant as documented by pre/post-tests, surveys, and lesson plans.</p> <p><i>Performance Measure 3.4:</i> Attitudes toward STEAM and interest in STEAM-related careers will increase/improve by at least 20% among children at each site.</p>	<p><i>PM 3.3</i> MSAP-created survey, pre/post tests (with USD STEAM), and lesson plan rubric (to be developed)</p>
	<p><i>PM 3.4</i> Surveys and Career Interest Inventories (baseline with growth)</p>
<p>Objective 4: <i>Accelerating STEAM Achievement in the San Diego Unified School District</i> will increase parental and community engagement and satisfaction regarding the four STEAM schools. (All MSAP Purposes)</p>	
<p><i>Performance Measure 4.1:</i> Attendance of parents at school STEAM events will increase each year of the grant by 10% percent.</p> <p><i>Performance Measure 4.2:</i> Volunteerism and mentoring by parents and community members will increase each year of the grant period by 15%.</p> <p><i>Performance Measure 4.3:</i> Attendance of parents at student-parent-teacher conferences will be 100% by the end of Year 3.</p> <p><i>Performance Measure 4.4</i> Parent satisfaction with each school will increase by 15% each year.</p>	<p><i>PM 4.1</i> Attendance rosters for each MSAP-related event at each school (baseline Year 1),</p> <p><i>PM 4.2</i> Volunteer and mentoring rosters (and time commitment) tracked by each school, baseline in Year 1, <i>PM 4.3</i> Attendance and schedule tracked by each school (baseline Year 1), <i>PM 4.4</i> Parent Survey (to be created)</p>

Upon notification of funding, the MSAP Project Manager and the evaluator will review and refine these Objectives and Performance Measures and the data needed to assess progress. The evaluator will work with the Project Manager, each school’s team, and professional development providers to create school implementation rubrics that will be used (and refined) throughout the grant period to establish clearly identified benchmarks that measure progress towards meeting MSAP grant expectations. Data collection instruments (including those to be created) will be reviewed to assure that meaningful data on activity effectiveness is acquired in order to gauge how well the project is meeting goals. The cycle of tasks is shown below.

Annual Evaluation Schedule

- October-December Meetings with District MSAP staff and project sites to discuss project objectives and measures; create and refine project and school implementation plans; create rubrics and refine timeline for data collection; create/refine survey items for piloting; gather baseline data (where appropriate).
- October Provide sites with necessary enrollment data to review and revise recruitment plans; site visits including interviews and observations.
- November Observations, walk-throughs, interviews; written report to schools.

December	Review unit development; review dosage and reach; discuss surveys.
January	Mid-year formative evaluation including discussion of recommendations.
February	Review school plans; review STEAM rubrics; review curriculum unit progress
March	Observational walk-throughs, interviews, written report to schools.
April	Support Annual Performance Report preparation by providing data analysis.
May	Observational walk-throughs, interviews, written report to schools.
June	Collect final school data and obtain feedback from professional development providers.
Summer	Analyze and prepare summative data; collect standardized test data to prepare annual Ad Hoc Report; prepare summative evaluations for project schools.
September	Submit annual or final report to Project Manager

Data Collection. The evaluator will develop a complete set of data collection instruments including document requests, observation and site visit rubrics, adapted college and career interest inventories, rubrics to assess student performance in science content and process, engineering design, technology proficiency, and artistic design, interview protocols, and surveys for students, teachers, and parents.

Documentation. The evaluator will request and review documentation from teachers and MSAP staff, measuring this data against rubrics to help determine the quality and extent of MSAP implementation. Documents will include lesson plans, curriculum maps, curriculum, professional development schedules, minutes, and materials, planning and advisory meeting minutes, parent event and conference notifications, agendas, and attendance lists. Records of walk-throughs by each principal will provide critical information about classroom implementation in classrooms. The schedules of all MSAP district and school-based personnel will be examined to determine level of classroom support for each school.

Site Visits. The evaluator will visit each school at least six times each year. During each visit, the evaluator will conduct a walk-through accompanied by the principal and Project Manager, observe lessons and lesson planning, gather lesson plans and curricular information, and interview a sampling of students, teachers and parents. Observations will inform adherence

to implementation plan. A written report/rubric will be submitted to the MSAP staff within two weeks of the visit, summarizing findings and including recommendations for improvement. The evaluator will discuss the findings and recommendations with the MSAP staff and the school.

Surveys. Annual surveys, including a baseline survey in Year 1, will be administered at each MSAP school. Each survey will be pilot-tested and refined before full implementation. Students, parents, and teachers will receive separate surveys. Teacher surveys will be designed to assess teacher confidence and attitudes toward teaching integrated STEAM content; perceptions of school's magnet planning activities and effectiveness; their communications with parents and community members; and their implementation of professional development. Student surveys will be designed to assess student perceptions of the STEAM program and its effect on their interest and attitudes toward STEAM content and careers. Parents will be surveyed to determine their satisfaction with the magnet program at the school. Survey results will be used to provide feedback to MSAP staff, school staffs, and parents.

Project assessment rubrics will be developed to assess MSAP outcome measures, including: curriculum plans and units; adherence to the systemic reform principles; innovative educational methods and practices, including integration and use of technology, engineering projects, and art strands; evaluator rating of teacher implementation of instructional content and strategies learned through professional development; and teacher ratings for student projects.

Analysis and Reporting: The evaluator will have the primary responsibility for analyzing formative and summative evaluation data and for regularly sharing findings with the MSAP Project Manager and project staff to ensure adequate information is available for continuous improvement. The evaluator will provide three quarterly reports and the annual/final report to the Project Manager each year of the grant.

(2) Will determine how successful the project is in meeting its intended outcomes, including its goals for desegregating its students and increasing student achievement

Formative Evaluation and Reporting. The formative evaluation of *Advancing STEAM Education* will keep MSAP staff informed of progress in recruiting and enrolling students so that overall minority group isolation is reduced, student achievement increases, and systemic reforms that build capacity for excellence are created. Formative reports will also address the degree to which program components are being implemented and strategies to improve implementation. The MSAP Project Manager will use the information to further effective and efficient management of all project activities.

The school visit reports provided by the evaluator will address: *Fidelity* or degree of implementation of the school plan; *Reach* or the proportion of the target group that participates; *adherence* or the degree to which the program adheres to its goals, plans, activities and timeline; *dosage* or the amount of the program delivered, and *program differentiation* or the unique features of the magnet when compared to non-magnet schools.

Three quarterly formative reports or rubrics and an annual report will be written by the evaluator throughout the year and will address (for each site):

Student enrollment and reduction of minority group isolation: Within four weeks of the student applicant pool release to the schools, student selection and recruitment data will be examined and compared with enrollment data. The dosage, quality, and effectiveness of the recruitment will be determined by changes in the number of applicants and eventual school enrollments. Demographic enrollment data will be compared with the resident enrollment, applicant pool, and student selection data from the previous year, and with the performance measure targets. By October, this information will guide each school in developing revised recruiting plans to improve results for reducing minority group isolation.

Magnet Implementation: Descriptive and quantitative data related to the magnet curricula, systemic reforms, professional development, and parent activities will be examined. Adherence to planned activities, development of standards-based curricula, the level of dosage of teachers in professional development, and student/parent engagement dosage will be assessed.

Continuous review, refinement and improvement cycle: The MSAP evaluator will address: *access* to resources, level of support, student background and any other factors that could influence implementation and outcomes; *ongoing documentation* of student achievement on standardized tests at the MSAP schools; *fidelity* of implementation; and *analysis and recommendations* to shape adjustments and meet the local and federal reporting requirements.

The MSAP leadership team at each school (composed of MSAP STEAM RTs, staff, principal, teacher and parent representatives and the evaluator) will review reports at their regularly scheduled meetings and in-depth performance review at the end of each school year. They will use the results to identify successful practices, areas of challenge, and needed improvements to ensure success. The Project Manager will work with each school site to address the team's recommendations.

Summative Evaluation and Reporting: The summative evaluation will examine the overall activities of the grant and the individual school programs to determine program quality and effectiveness. The summative evaluation will assess: Outcomes including resulting changes in minority group isolation at each school; increases in academic achievement levels of the students at each school; degree of implementation of systemic school reforms and their effects on the program at each school; and the effectiveness of staff development.

(3) Includes methods that are objective and that will produce data that are quantifiable

Objective 1. Forty-five day enrollment data for each school will be disaggregated by race/ethnicity to address performance measures related to meeting desegregation goals.

Recruitment activities, applicant pool, and student selection data will be reviewed to determine the impact of recruitment and marketing strategies on demographics.

Objective 2. Quantifiable data from standardized annual performance tests and end-of-course examinations will address student achievement performance measures. Standardized test data includes the California Standards Tests (CST), criterion-referenced tests mandated by the state for children in grades 2-5 on ELA, mathematics, and writing, and CST Science tests, which are administered to students in Grade 5. Achievement data from state standardized end-of-course science tests will be used for grades 3 and 4. Performance data from developed rubrics in STEAM-related content will assess student learning. These performance rubrics will measure: 1) science process and content knowledge for students in all grade levels; 2) engineering process and content knowledge for students in grades 3 and 5; and 3) artistic design process and content knowledge for students in grades 2 and 4. The performance data will be disaggregated into socio-economic and subgroups so that progress can be measured within each sub-group.

Objective 3. Designed rubrics, surveys, redacted pre/post-tests, lesson plans, curriculum, and observations will be used to measure the quality of STEAM instruction. In the first quarter, the evaluator and Project Manager will work with partners (Campbell Jones and University of San Diego staff) to develop rubrics that assess how teachers include cultural competency and integration strategies into their instruction and how they incorporate pedagogical professional development and STEAM content into their classrooms. The evaluator, principal, and MSAP district staff will use these rubrics during class observations. Additional data will be gleaned from monthly document reviews of lesson plans and curriculum.

Data from surveys, administered at each school twice a year (start and end), will assess teacher confidence, preparation, and attitudes towards magnet implementation and identify progress and challenges. Also, a redacted pre-test on STEAM content knowledge will be administered to all teachers in the initial quarter to establish a baseline, with a post-test on STEAM content (also redacted) administered in the last quarter to identify progress and growth. Student surveys concerning attitudes, perceptions, and interests in STEAM content and careers will be administered in Year 1 (spring) as a baseline and each spring to measure changes.

Objective 4. Schools will provide the evaluator with 1) marketing items and attendance rosters for each MSAP-related event at each school (baseline Year 1); 2) volunteer and mentor inquiries, rosters, and time commitment (baseline in Year 1); and 3) attendance at parent/student/teacher conferences. Surveys to gauge parental satisfaction will be issued as baseline (Year 1) and spring of each subsequent year.

(F) COMMITMENT AND CAPACITY

(2) (i) Is committed to the magnet schools project

SDUSD's network of magnet schools has been the cornerstone of the district's Court-ordered integration program. SDUSD proposes to implement a Magnet Schools Assistance Program (MSAP) project that will expand the capacity of the District to offer students the opportunity to attend high quality magnet programs in their areas of interest throughout their K-12 education. The proposed MSAP magnet schools will address racial and ethnic group isolation and help fill the gaps in the District's magnet school continuity across the STEM theme. They will create needed seats for elementary students who have been unable to participate in a STEM/STEAM program because other district magnets with these themes are at capacity, and will provide additional rigorous academic options to students from low-performing schools.

Teachers and parents at all four sites advocated for the STEAM theme with the MSAP office and voted to approve the development of their STEAM theme and to participate in the project. All have committed to concentrating categorical funds and district integration funds to support their magnet program to help reduce racial and ethnic group isolation and improve student achievement and graduation rates. Each site's magnet leadership team and site governance team understands that MSAP funds will cease in three years. Their program planning, conducted with technical assistance from the Magnet Office, includes the development of a plan and process for continuing the program as designed with other district funds and/or external funds (such as Title I) after the MSAP grant is completed. The schools understand and agree that funding must be set aside in their future budgets to support the professional development of new teachers joining the staff and for the ongoing professional development of all staff needed to keep the program viable.

SDUSD provides for the Magnet office daily operations by funding classified support through a .20 Administrative Aide, bilingual (\$14,468.56 annually) and a .20 Secretary II, bilingual (\$8,671.85 annually). Custodial is supplied through the district as well. SDUSD's 36-year history of developing and maintaining magnet schools provides the strongest indication that the district will continue magnet school activities after MSAP assistance is no longer available. The 1977 Court Order required SDUSD to take reasonable and feasible steps to alleviate school segregation in racially isolated schools. The Court Order also directed the district to take steps necessary to prevent racial isolation from occurring at "tipping schools" that were at risk of becoming racially isolated. To promote integration of its schools, SDUSD has developed a wide range of enrollment options for students and their families, including the *Magnet Program*; the *Voluntary Enrollment Exchange Program (VEEP)* which pairs schools

with significantly different racial and ethnic compositions; an *Open Enrollment* program that offers parents the opportunity to apply to any school, but does not offer transportation; and *Program Improvement School Choice*, which offers additional non-PI school choice to students whose schools are designated Program Improvement.

A 1998 decree from the Court of Appeals, Fourth Appellate District in the State of California stated that the school district has “demonstrated its good faith commitment to both the decree and the constitutional provisions that were originally the predicate for judicial intervention.” In keeping with the Court order, the school district periodically assesses its various district integration programs and, when indicated, refocuses themes or modifies magnet programs to improve effectiveness in attaining and maintaining racial-ethnic balance and student achievement outcomes. The SDUSD Board of Education has established explicit policies that demonstrate district commitment to magnet schools (See letter in Appendix A). The Board’s philosophy on integration is stated in its Policy Manual, section A-4500: “*The Board of Education believes that children and staff of all races and ethnicities benefit socially, politically, and economically from integration programs. The district’s integration programs promote positive race/human relations, solicit the exchange of ideas, and respect diversity of opinion and culture. All students have the right to a quality education that ensures excellence in academic achievement and full participation in the democratic process. Quality in education demands equity in outcome where race, ethnicity and gender are not distinguishing variables of student success.*”

The Policy Manual goes on to state that “full integration of a school is achieved when all students have equal status; receive the same high level of instruction; feel trusted, valued and supported; and student representation in the decision-making bodies reflects the ethnic diversity

of the school” (Board Policy A-4600). SDUSD also has developed extensive administrative procedures governing magnet school enrollment options that further demonstrate the district’s commitment to magnet schools.

The 2001 and 2007 MSAP grants received by the district have demonstrated the impact of the MSAP program on integration, student achievement and graduation rates. All four schools supported through the 2001 MSAP grant continue as successful magnet schools, attracting students throughout the district and beyond because of their innovative themes and high levels of achievement. Four of the six schools in the 2007 MSAP program are not in Program Improvement, and take students from under-performing schools as a top priority. Three of the six schools have been named California Distinguished Schools, an honor given to schools that inspire rigor and innovation. One of the 2007 MSAP schools was named a Successful NASA Explorer School. Another has been honored with the International Confucius Classroom of the Year award, and recently had a teacher named the California Language Teachers Association teacher of the year. Our two 2010 grant funded sites have made noteworthy strides in reducing minority group isolation through the development of a rigorous academic program.

SDUSD is committed to all of its MSAP-funded magnet schools, and has further committed to significantly revising one of the proposed magnet schools and taking steps towards a STEAM focus for all four even if the MSAP grant is not awarded. However, implementation would take much longer, and the potential lessened due to costs of the intensive, long term staff development and materials and equipment needed.

In alignment with district integration goals, the Magnet staff is committed to developing continuity across the district magnet themes, ensuring that each program is a total school magnet program (rather than a program within the school), evaluating their effectiveness, conducting

curriculum development and staff training, marketing and recruitment of students, monitoring enrollments to prevent resegregation, and maintaining budget integrity. The District supports all of the district's 32 magnet schools and continues to provide support to magnets that were in previous years' grant applications. It will continue to operate and support Jefferson, Franklin, Valencia Park and Washington through the district partnerships formed during the grant when funding from the grant is no longer available.

(2) (ii) Has identified other resources to continue support for the magnet school activities when assistance under this program is no longer available

SDUSD has identified other resources to continue support for the magnet schools when assistance under the MSAP grant is no longer available. Specifically, the Enrollment Options Office will provide continuous support to the participating schools on the equitable selection of students into schools. Several other district offices and departments are supporting the implementation of the MSAP project and will continue to support MSAP schools after the completion of the grant. The SDUSD Community Relations and Communications Department will continue to provide advice and guidance to support schools in their marketing and recruitment activities and in building each school's Partnerships in Education program. This Department also will continue to provide interpreters and translators for parent meetings and written communications.

The SDUSD Office of Curriculum and Instruction will provide ongoing support to schools as they develop and implement rigorous academic and elective curriculum. The Science, Technology, Visual and Performing Arts, Mathematics, and College and Career Technical Education departments are committed to the success of all four sites well beyond the duration of grant funds, realizing that these sites will become potential lab sites for the development and implementation of inquiry based, integrated curriculum that meets the demands of Common

Core State Standards. The Office of Language Acquisition will support the use of instructional materials related to STEAM and pedagogy for English learners. The district GATE office and Special Education Office will support the training of teachers in GATE practices and ongoing implementation of differentiated instruction at magnet schools. Finally, the SDUSD i-21 Initiative will provide up-to-date technology for use in instruction and learning throughout the district, and professional development to support effective use by teachers and students. The district resources allocated to equipment replacement will help ensure that the MSAP schools maintain their equipment to district standards. District funds also will help maintain the technical support needed to keep the instructional technology running properly. The SDUSD Information Technology Department's online technical assistance system provides just-in-time support through the district network to troubleshoot equipment and software problems in the classroom and labs and will provide the additional technical assistance that schools will need to maintain technology systems implemented through the grant.

To further ensure that the magnet programs will continue at the selected schools after the grant period, SDUSD will actively pursue additional grants – especially in areas that support STEAM programs like NSF and NASA grants, along with private foundation opportunities.

Additionally, the State of California provides the Targeted Instructional Improvement Block Grant (TIIG), originally designed to assist schools in meeting the obligations of court-ordered desegregation. These funds have now been made unrestricted in response to the California budget crisis. SDUSD will use this state funding to support facilities, materials, and magnet school staff. Each MSAP school will develop a plan and budget to sustain their magnet program staff and activities, and will apply their TIIG funds to address this plan.

Even though the MSAP Specialist positions will be discontinued at the end of the grant, the support that these roles provide will continue as these functions will be integrated into the services available from existing district offices. The Specialist roles are particularly important during the initial implementation phase of the magnet school project, but will not be as intensive after year three as the operation of the magnet program becomes institutionalized at the target sites. For example, the MSAP STEAM Science and Technical Specialist's role will be incorporated into the SDUSD Technology Department with support from the i21 Initiative which will provide ongoing training and technical support to the MSAP schools' teachers to help ensure that they are able to continue to integrate instructional technology into the curriculum, and the College and Career Technical Education department, which will continue to offer engineering support. The MSAP STEAM Teaching and Learning Specialist's functions will be continued with support from the Office of Curriculum and Instruction and the STE[+a]M Connect consortium, which will have developed strong sharing networks with the magnet schools by the end of the grant period and will have the ability to help keep their programs thriving.

At the end of the grant period, each school site will decide the funding needed to allocate for the STEAM Resource Teacher positions based on the level of continued support required. However, effective staff development, technology training and curriculum development will ensure that the MSAP schools have the capacity to maintain their magnet themes and instructional programs when MSAP funding is no longer available. SDUSD departments and offices will continue to provide support to the MSAP schools in the ongoing implementation of facets of their magnet programs. Although SDUSD is facing significant budget challenges, the district and the San Diego Board of Education has made the magnet program a priority and is determined not to negatively impact its efforts towards diversity.

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