

USDOE: HSI STEM and ARTICULATION PROGRAM - CFDA: 84.031C

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Institutional Overview

Mountain View College (MVC) opened in 1970, and has a proud history of serving students primarily from groups that are traditionally underrepresented in postsecondary education. MVC is a comprehensive community college with an open admissions policy offering associate's degrees in 19 programs, certificates in 28 program areas, and one of the most affordable tuition rates in the state at \$59 per credit hour. MVC is accredited by the Southern Association of Colleges and Schools and authorized by the Texas Higher Education Coordinating Board (THECB) as a state-supported public college.

Chart 2: Mountain View College Spring 2016 Data	
Spring 2016 Headcount	9,092
Part-Time Students	7,622 / 83.8%
African-American	2,095 / 23.0%
Hispanic	4,985 / 54.8%
White	2,313 / 25.4%
First Generation	7,069 / 77.7%

(a) QUALITY of the PROJECT DESIGN: 1. Extent Design Will Address Needs

Magnitude of the Need for Services: MVC is located in Dallas County, the 9th largest county in the United States and the 2nd largest county in Texas. Of the 2,553,385 residents (U.S. Census QuickFacts; 2016), 19.3% live in poverty (compared to 14.8% nation-wide), and the per capita income in the past 12 months was \$27,195 (*Dallas Morning News*; 2-22-16). Of the 26 cities in Dallas County, Dallas is the largest. 23.9% of Dallas

residents live below the poverty level, and the “number of poor

Chart 3: Mountain View College (Census Tract 107.04)	
Income for Zip Code 75211	
\$0 - \$14,999	19%
\$15,000 - \$29,999	26%
<i>U.S. Census American FactFinder: 2014 Profile Data</i>	

people in Dallas rose by 41% between 2000 and 2012” (Research Supplemental Poverty

Measure; US Census Bureau / *Data accessed 8-20-2015*). Also, while the Hispanic population in Dallas has increased by 22% since 2000, the number of Hispanics living in poverty has more than doubled to 52%. As noted by the United Way during a presentation before the Dallas City

QUALITY OF PROJECT DESIGN *continued*

Council (10-23-2014), “Dallas residents are more likely to be impoverished than any of America’s biggest cities except for Detroit, Memphis and Philadelphia”. United Way staff added that “one out of every three Dallas Hispanics and Blacks live in poverty.”

High Number of Hispanic Students with Multiple Barriers: Using the latest 2015 American Community Survey data published by TownCharts.Com, Dallas County has the smallest percent of high school graduates of all counties in the North Texas area – 78% - and only 29% of Dallas County residents have a baccalaureate degree. Education attainment levels are also low in the city of Dallas, TX where only 28.2% of individuals 25 years of age and over have some form of a college degree (US Census Bureau; American FactFinder; *2014 Demographic Profile Data*). More specifically, in the Census Tract where Mountain View College is located, 59.74% of residents have not earned their high school diploma.

A Dallas ISD study analyzed postsecondary completion results for the most recent class (2009) for which data is reported. **Out of 6,795 graduates, only 754 (11%), received any type of college degree in the six years** following high school graduation. Please see Chart 4 below for an overview of the two largest high schools located near Mountain View College.

<i>Chart 4:</i> DALLAS ISD HIGH SCHOOLS NEAR MVC			
<i>Source:</i> <i>TX Education Agency</i> <i>(TEA)</i>	% At-Risk* TX Average 46.3%	Dropout Rate 2014-2015 State of TX 7.3%	Economically Disadvantaged State of TX 59.2%
Molina H.S. / ≤ 1 mile from MVC <i>2,099 Total Students / 95% Hispanic</i>	62.3%	10.1%	86.6%
Kimball H.S. / 4 miles from MVC <i>1,441 Total Students / 65% Hispanic</i>	80.2%	10.7%	85.3%

While community college access does not present a formidable barrier for Hispanic students in North Texas, entry does not mean completion. Since a majority (77.7%) of our enrolling

QUALITY OF PROJECT DESIGN *continued*

students are the first in their families to enroll in a postsecondary institution, they enroll with a very limited understanding of what they should do in college and what courses they should take. Additionally, students from first-generation college-going families often lack a supportive network of family members, adults or peers who understand the value of earning a college degree, and the time and emotional commitment required to be successful in college.

Chart 5: Significant Problem #1: High number of Hispanic Students With Multiple Barriers

STEM CONNECT Response: Hispanic and other underrepresented students attempting to change the pattern of education and careers in their lives need Academic Mentors at MVC who have successfully navigated the higher education system and can advise students on how to succeed. These Academic Mentors will also help students overcome their confusion and lack of information about the wide variety of careers available for STEM professionals who graduate with degrees in math and science. Studies have identified that having a relationship with faculty or staff has a positive impact on student success* in that it makes a huge difference when the student knows that someone is holding them accountable. [Goal One-Activity One, pp. 16-19 & 33-34]
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*Hernandez, John C. 2002. "A Qualitative Exploration of the First-Year Experience of Latino College Students." <i>NASPA Journal</i> , 40(1): 69-84.

Low Math Assessment Levels and Challenging Math Completion/Success Rates: As noted by the Dallas Morning News in October, 2014, Texas high school students slipped to their lowest SAT math scores in more than two decades (1992) with an average of 495. State education officials have attributed the declining SAT scores in Texas to an "increase in the number of minority students taking the exam" (*Dallas Morning News*; 10-2014). At MVC, 85% of students enrolling for the first time each semester are not 'college ready' in Math based on their assessment test results, meaning that only 15% of students have sufficient math skills to enroll in transfer-level STEM courses. This means that even when a student indicates an interest in STEM, they must take (on average) five courses before beginning the advanced math needed for a STEM degree. A review of student data from 2011-2015 revealed that it takes an average of 3.7 years for students to advance from Developmental Math to Pre-Calculus. Another data

QUALITY OF PROJECT DESIGN *continued*

analysis from fall 2015 revealed that only 16% of Developmental Math students satisfied the assessment requirements to enroll in College Algebra within two years of college enrollment. Equally alarming is that these statistics do not consider the high number of students that MVC ‘loses’ through the many exit points along the traditional course sequence for a STEM degree and that Developmental Math course success rates have also been dropping steadily - from 51.6% in Fall 2013 to 40% in 2015.

Chart 6: Significant Problem #2: Low Math Assessment Levels and Challenging Math Completion/Success Rates
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STEM CONNECT Response: MVC students need dedicated math tutors and interactive technology integrated into math courses and during tutoring sessions. As noted by M. Miller in the <i>Chronicle of Higher Education</i> , research shows that interactive technology increases the engagement of minority students.* Students will work alongside a STEM professional in the development of an APP (iPhone and Android) that will connect with actual MVC course content. [Goal One-Activity One, pp. 16-19 & 33-34]

*Mary Helen Miller, “How Interactive Technology Can Help Minority Students Learn,” <i>The Chronicle of Higher Education</i> (April 24, 2014).

Low Hispanic Enrollment, Retention and Success Rates in STEM Courses: Within the last four years, MVC has experienced a 4.9% increase in fall enrollment. Although high when compared to surrounding college enrollment rates, the increase has not resulted in a comparable increase in the number of Hispanic students enrolling in STEM courses. Of the 1,298 students enrolled in transfer-level STEM courses during the 2014-15 academic year (AY), only 36% were Hispanic, and only 59% of those achieved course success with a grade of A-B-C. Fall-to-fall retention rates are also a concern with only 45.9% of students (37.3% for Hispanic students) returning in fall 2015 from fall 2014. By analyzing the academic records of first-time students who enrolled at MVC with a STEM degree plan in 2010, the STEM Connect Taskforce found that 48% switched majors out of STEM, and 31% dropped out of MVC entirely. This is aligned

QUALITY OF PROJECT DESIGN *continued*

with the Department of Education's IES 2013 report entitled "STEM Attrition: College Students' Paths Into and Out of STEM Fields" which stated that "69% of associate's degree students who entered STEM fields between 2003 and 2009 had left those fields by spring 2009. Roughly one-half of the leavers switched their major to a non-STEM field, and the rest of them left STEM by exiting college before degree attainment."

Chart 7: Significant Problem #3: Low Hispanic Enrollment, Retention and Success Rates in STEM Courses
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STEM CONNECT Response: STEM academic and student supports need to be expanded. Faculty and students have noted that services are disconnected, only sporadically offered (an example is that tutoring is rarely offered during evenings), and not connected to future earnings that accompany a STEM career choice. Thus, the centerpiece of the STEM Connect design is the implementation of a STEM Connect Resource Center . This Center will serve as a central gathering place for STEM learning by providing contextualized math tutoring, small group instruction with a focus on increasing student collaboration, and research support. As noted at the 2014 Higher ED Conference, students who participate in research programs are more likely to remain in their STEM major.* [Goal One-Activity One, pp. 16-19 & 33-34]
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*Chang et al (2014). Participation in Undergraduate Research at Minority-Serving Institutions. Paper Presented at the 2014 Association for the Study of Higher Education Conference.
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Hispanic and other traditionally underserved students are failing to graduate and transfer

to four-year institutions to pursue baccalaureate STEM degrees.

MVC lacks a well-defined pipeline for training STEM professionals and moving them through the pipeline to earn an associate and then baccalaureate degree. In 2014-15, a total of 1,155 associate degrees and certificates were awarded to MVC students with only 431 (37.3%) Associate in Science (AS) degrees - all which were noted as "General" on transcripts with no STEM field. Of the 55 AAS degrees awarded, only 27 students had a STEM discipline indicated, and **only 3 were Hispanic students**. Hispanic students earned 54% of all degrees/certificates awarded and 53.3% of Associate in Science degrees. It took an average of 6.7 years for all 1,155 students to attain their degree and only 247 transferred to a Texas public four-year postsecondary institution. Of this,

QUALITY OF PROJECT DESIGN *continued*

the single largest transfer institution was UTA accepting 115 (46%) of all transfer students.

Helping students graduate and then navigate to a four-year postsecondary institution is only the beginning. Once students attempt to transfer, many report that they are missing essential classes needed to complete their lower-division STEM curriculum. The result is that MVC students are less competitive than other transfer applicants. For example, Juan Sandoval (STEM Connect Taskforce) relayed a story about a student who transferred to UTA and realized upon enrollment that he had taken one ‘extra’ Biology course at MVC than he needed.

Chart 8: Significant Problem #4: Hispanic and other traditionally underserved students are failing to graduate and transfer to four-year institutions to pursue baccalaureate STEM degrees.

STEM CONNECT Response: MVC is committed to developing a culture of transfer for Hispanic and other underrepresented students. D. Cole notes that this requires dedicated staff, and that students with academic support relationships are more likely to persist to graduation*. Therefore, STEM Connect includes funding for a full-time Transfer Manager & Articulation Specialist. **[Goal Two-Activity Two, pp. 20-22 & 34-35]**

*Cole, D. (2008). Examining the Academic Success of Latin Students in STEM Majors. *Journal of College Student Development*; Jul/Aug 2008: 49, 4; ProQuest Psych. Journals-p.285

Lack of Research Agenda and Scholarly Reviews to Study and Improve STEM Programs:

Within the last four years, MVC STEM faculty and staff have worked diligently to create an environment that promotes STEM enrollment and student success. While there have been individual successes, the STEM Connect Taskforce noted the need to create a more wide-spread and consistent culture of evidence. As stated by faculty during one of the brainstorming sessions, we need to encourage and support college-wide conversations regarding data-based inquiry to inform our peers around the nation about our effectiveness in producing equitable outcomes for underrepresented students. The challenge is to define *which* high-quality and timely data elements are critical in impacting student outcomes. STEM Dean Dr. Stephen Jones stated that faculty and staff had done an “...adequate job of transmitting random data, but fell far

QUALITY OF PROJECT DESIGN *continued*

short in identifying specific data elements that would lead to an informed program design that leveraged identified solutions and would lead to future institutionalization of successful program components” (MVC 2014-15 Program Compliance Report Meeting Minutes; 11-12, 2015).

Chart 9: Significant Problem #5: Lack of Research Agenda and Scholarly Reviews to Study and Improve STEM Programs.

STEM CONNECT Response: Research shows that interventions for the improvement of student success are most effective when programs and professional development are driven by the institution’s assessment process*. A STEM Incubator will be formed to lead an ongoing cycle of research and assessment that will (a) inform program design elements adjusted as a result of formative evaluations, (b) identify solutions transferable to other education institutions; and (c) be aligned with shared professional development initiatives to improve P-16 STEM educational practices. **[Goal Three-Activity Three, pp. 23-24 & 35-36]**

*Batsche, G., Elliott, J. Graden et al. (2005) *Response to Intervention Policy Considerations and Implementation*. Alexandria, VA: National Assoc. of State Ed. Directors.

Goal, Objective, Outcome Overview: After a year of hosting brainstorming sessions with

faculty and convening focus groups with students, MVC is proposing **STEM Connect – a**

comprehensive, coordinated and intensive

response designed to transform project goals

into a new institutional reality for Mountain

View College and other HSIs (and MSIs)

around the nation. The program design exists

under the aegis of a *new* model of holistic

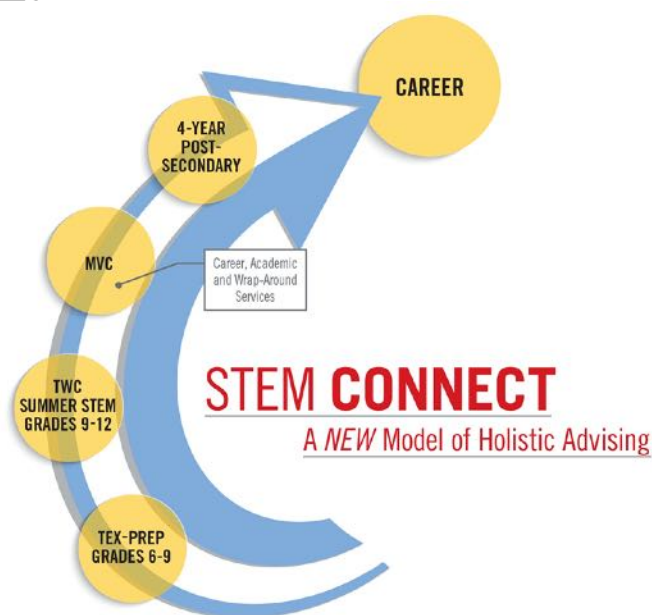
advising providing students with a

comprehensive array of wrap-around, student-

centered services. These services will be

holistically connected to the pre-college

environment via *existing* STEM programs serving middle and high school students (TexPREP



QUALITY OF PROJECT DESIGN *continued*

for MS and Summer STEM for HS) and *newly developed* P-16 and career partnerships, such as the ones with the UTA and Los Alamos National Research Laboratory. The concept is that **advising, coaching, and tutoring don't just START when a student enrolls, and doesn't STOP when a student graduates.** STEM Connect Objectives are results-oriented, specific, measurable, and directly aligned with the program's purpose to increase the number of Hispanic students pursuing and graduating with STEM degrees.

STEM CONNECT A NEW Model of Holistic Advising

Career • Academic • Wrap-Around Services



Chart 10: STEM CONNECT (PM = Performance Measures)		
Goal/Activity One STEM Connect Resource Center	Goal/Activity Two STEM Graduates, Transfers & Articulations	Goal/Activity Three STEM Incubator
Improve academic success for Hispanic and other underrepresented students by supporting comprehensive student centered program services and activities designed to help retain students and move them rapidly into core courses and through program completion. PM 1,2,6,7,8	Increase the number of Hispanic students who graduate with STEM degrees, students who transfer to four-year postsecondary institutions and develop and enhance transfer/articulation models with four-year postsecondary institutions. PM 3,4,5,6,9,10	Establish an inclusive, collaborative assessment process for baccalaureate pathway development in STEM programs which engages faculty & higher education leaders in meaningful research to evaluate interventions/initiatives and identify the most effective means of meeting Hispanic and other underrepresented student needs. PM 6,10
Absolute Priority #1	Absolute Priority #2	"Build Evidence of Practices"
Significant Problems 1, 2, 3	Significant Problem 4	Significant Problem 5

QUALITY OF PROJECT DESIGN *continued*

Chart 11: Goal/Activity One: Improve academic success for Hispanic and other underrepresented students by supporting comprehensive student centered program services and activities designed to help retain students and move them rapidly into core courses and through program completion. *[Absolute Priority #1]* Pages 16-19 & 33-34

Objective 1. By 2021, MVC will have established a STEM CONNECT Resource Center resulting in the following outcomes:

Outcome 1.a: Increase by 5% per year the numbers of MVC students seeking degrees in STEM fields compared to 2015-16 baseline data.

	Annual Targets					
STEM Degree Seeking Students	2015-16 Baseline	YR #1	YR #2	YR #3	YR #4	YR #5
All Students	Baseline established when 2015-16 Advising Reports are finalized in August, 2016.	5% increase indicated each year.				
Hispanic Students						

Outcome 1.b: Increase by 8% per year the numbers of students taking *transfer-level* (Calculus+) math courses.

<i>Transfer Level Math/Science Enrollment</i>	2014-15 Baseline	2016-17	2017-18	2018-19	2019-20	2020-21
<i>All Students</i>	523	564	609	657	709	765
<i>Hispanic Students</i>	207	223	260	280	302	326

Outcome 1.c: Increase student success rates (A-B-C) in all math courses by 2 percentage points per year in program years 1-3, and 3 points per year in program years 4-5.

<i>Math Course Success Rates</i>	2014-15 Baseline	2016-17	2017-18	2018-19	2019-20	2020-21
<i>All Students</i>	67.2%	69.2%	71.2%	73.2%	76.2%	79.2%
<i>Hispanic Students</i>	66.3%	68.3%	70.3%	72.3%	75.3%	78.3%

Outcome 1.d: Double number of students participating in field research activities and/or conducting external research poster presentations by 2021.

<i>Student Researchers</i>	2015-16 Baseline	2016-17	2017-18	2018-19	2019-20	2020-21
<i>All Students</i>	12	13	16	20	22	24+
<i>Hispanic Students</i>	03	05	06	08	10	14+

Address Needs Significant Problems 1, 2, and 3	77% of enrolling students are first-generation	85% of enrolling students are not 'college-ready' in math.	Only 16% of students are ready to enroll in College Algebra after being in Developmental Math for 2 years.
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Strategies: STEM CONNECT Resource Center	Academic Mentors providing holistic advising techniques, and helping students navigate STEM pathway.	Math tutors and online (APP) support.	Research opportunities / scientific research paper development and presentation skills.
	STEM volunteering and STEM-a-Palooza for family connections.		

QUALITY OF PROJECT DESIGN *continued*

Chart 12: Goal/Activity Two: Increase the number of Hispanic students who graduate with STEM degrees, students who transfer to four-year postsecondary institutions and develop and enhance transfer/articulation models with four-year postsecondary institutions.

[Absolute Priority #2]

Pages 20-22 & 34-35

Objective 2. By 2021, MVC will have established a STEM graduation and transfer culture and developed STEM pathways with four-year postsecondary institutions resulting in the following outcomes:

Outcome 2.a: Beginning grant year two, increase the number of students who *attain* an AS degree by 4% per year and the number who receive an AAS degree with STEM discipline indicated on transcript by 11% per year.

		<i>Annual Targets</i>				
<i>STEM Degrees</i>	2014-15 Baseline	2016-17	2017-18	2018-19	2019-20	2020-21
<i>All Students</i>	431AS & 27AAS	431/27	448/29	465/32	483/35	502/39
<i>Hispanic Students</i>	229AS & 03AAS	229/03	238/04	247/05	256/6	266/7+

Outcome 2.b: Beginning grant year two, increase the number of MVC students who transfer to a four-year postsecondary STEM program by 5% per year.

<i>STEM Transfer Students</i>	2014-15 Baseline	2016-17	2017-18	2018-19	2019-20	2020-21
<i>All Students</i>	84	84	88	92	97	102
<i>Hispanic Students</i>	42	42	44	46	48	50

Outcome 2.c: By 2021, identify all gaps in existing STEM major articulations and develop new/revised agreements for at least 85% of these gaps and complete a minimum of 12 new STEM articulations with four-year postsecondary institutions.

Address Needs Significant Problem 4	It took an average of 6.7 years for the 2014-15 graduates to attain their degree and only 247 transferred to a four-year IHE.	Of the 1,155 degrees awarded in 2014-15, only 37% were Assoc. in Science Degrees, and not all of those had a STEM field-of-study degree plan on file.	Students report that when they transfer to four-year postsecondary institutions, they are missing essential classes needed to complete lower-level STEM degree plans.
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Strategies: <i>STEM Graduates, Transfers & Articulations</i>	Staffing plan includes a full-time Transfer Manager & Articulation Specialist who will develop a ‘culture of transfer’ at MVC with students, while streamlining the transfer requirements between MVC and top transfer institutions. This individual will holistically work alongside Academic Mentors to provide students with a roadmap to degree attainment and baccalaureate transfer.	MVC STEM Alumni – MVC STEM graduates enrolled at 4-yr postsecondary institutions assisting current MVC students with university requirements and culture. Develop ‘STEM Partner Advising Model’ with the University of Texas at Arlington – located only 14 miles from MVC.
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QUALITY OF PROJECT DESIGN *continued*

Chart 13: Goal/Activity Three: Establish an inclusive, collaborative assessment process for baccalaureate pathway development in STEM programs which engages faculty & higher education leaders in meaningful research to evaluate interventions/initiatives and identify the most effective means of meeting Hispanic and other underrepresented student needs.

Pages 23-24 & 35-36

Objective 3. Create a STEM Incubator to research and study innovations, ensuring that all grant strategies will collect, analyze and *use* high-quality, timely data to improve STEM student outcomes relating to two-year and four-year STEM degree attainment.

Outcome 3.a: Beginning grant year two, STEM Incubator data featured on the MVC website in dashboard format, two papers annually produced, three conference proposals annually submitted and annual State of STEM report issued.

Outcome 3.b: Strengthen the P-16 STEM pipeline by providing shared (ISD, community college and university) professional development experiences (informed by research) for STEM faculty/instructors. **Annual Targets:** In each program year, at least 4 collaborative STEM activities will be sponsored by STEM Connect with at least 25% of attendees from ISD and 25% from four-year postsecondary institutions. STEM Connect Conference hosted in 2018-19 and 2020-21.

Address Needs Significant Problem 5	College-wide conversations need to be fostered regarding data-based inquiry leveraging a culture of evidence.	Faculty and staff unsure which data elements directly impact student outcomes and would lead to an informed program design and institutionalization of successful program components.
Strategies: STEM Incubator	A STEM Incubator will be formed to lead an ongoing cycle of research and assessment that will (a) inform program design elements adjusted as a result of formative evaluations; (b) identify solutions transferable to other education systems; and (c) be aligned with P-16 professional development offerings.	Staffing plan includes a full-time STEM Incubator Director who will also serve as the in-house data-lead for STEM Connect evaluative functions.

“As we were designing STEM Connect, the Taskforce kept referring to the ‘Culture of Evidence’ cited in *Community Colleges Count* by the Lumina Foundation for Education. That is what initially formed the idea for the STEM Incubator – a way to more fully engage a co-institutional culture of success for Hispanic students based on evidence. We realized that we could only do that if we provided more opportunities for P-16 STEM faculty to engage in the discovery and research process. With the STEM Incubator, we will be able to ignite courageous – and critical – conversations about Hispanic students and what we can collegially do to support their educational success.”

Dr. Stephen L. Jones; Dean – Mountain View College and STEM Connect Taskforce Lead

QUALITY OF PROJECT DESIGN *continued*

2. Literature Review, Analysis & Planning Process, High-Quality Implementation Plan and the Use of Methodological Tools To Ensure Successful Achievement of Objectives

Literature Review: Each Goal/Activity has been carefully designed to incorporate empirically proven methods (Chart 14) that were carefully analyzed over the past fourteen months by MVCs STEM Dean Dr. Stephen Jones, the STEM Connect Taskforce (page 15) and STEM faculty.

Chart 14: Literature Review	
Goal/Activity	Evidence of Impact
Goal/Activity One: STEM Connect Resource Center Strategy Components: ➤ Academic Mentors providing holistic advising techniques and helping students navigate STEM pathway to degree and career attainment ➤ Math Tutors and online (APP) math support ➤ Research opportunities / Scientific research white-paper development & presentation skills ➤ STEM volunteering, and STEM-a-Palooza for family connections	<u>Academic Mentors:</u> Studies have identified that having a relationship with faculty or staff has a positive impact on student success in that it makes a huge difference when the student knows that someone is holding them accountable. [Hernandez, John C. 2002. "A Qualitative Exploration of the First-Year Experience of Latino College Students." <i>NASPA Journal</i>, 40(1): 69-84.] <u>Math Tutors:</u> Research shows that underrepresented students who did complete their degrees were more likely to have made effective use of academic and support services. [L.Tsui, "Effective Strategies to Increase Diversity in STEM Fields," BNET.com (2007).] <u>Math APP:</u> Research shows that interactive technology increases the engagement of minority students. [Mary Helen Miller, "How Interactive Technology Can Help Minority Students Learn," <i>The Chronicle of Higher Education</i> (April 24, 2014).] <u>Research Opportunities / Scientific Presentation Skills:</u> As noted at the 2014 Higher Education Conference, underrepresented students who participate in research programs are more likely to remain in their STEM major. [Chang et al (2014). Participation in Undergraduate Research at Minority-Serving Institutions. <i>Paper Presented at the 2014 Association for the Study of Higher Education Conference.</i>] <u>Careers Volunteering, and STEM-a-Palooza:</u> If a student has not been exposed to STEM, they cannot develop an interest. [Miller, L.S. (2005). Exploring the high academic performance: The Case of Latinos in Higher Education. <i>Journal of Hispanic Higher Education</i>, 4(3), 252-271]. Experiential education that takes students <i>into the community</i> helps students connect classroom study to the world and transform inert knowledge into knowledge-in-use. [Nunez, A. M. (2009). Latino Students' Transition to College. <i>Harvard Educational Review</i>, 79(1), 22-48.

QUALITY OF PROJECT DESIGN *continued*

Chart 15: Literature Review <i>continued</i>	
Goal/Activity	Evidence of Impact
Goal/Activity Two: STEM Graduates, Transfers & Articulations ➤ Create a Culture of Transfer and Solidify the Articulation Pathway ➤ MVC STEM Alumni ➤ STEM Partner Advising Model with UTA.	<u>Culture of Transfer / Solidify Articulation Pathway:</u> As noted by Jeffrey Froyd in 2013, because of the complex nature of articulations, concurrent enrollments and reverse transfers between community colleges and universities, institutions require sufficient resources and dedicated staff (Transfer Mgr. & Articulation Specialist) to establish structures that support solid higher education partnerships. [Jeffrey E. Froyd, <i>White Paper on Promising Practices in Undergraduate STEM Education</i>, The National Academies / nationalacademies.org/bose/.] <u>MVC STEM Alumni:</u> Joe Cuseo of Marymount College noted that underrepresented students who have successfully transferred to a 4-year institution are a great help as peer mentors to 2-year students – both to help them consider transfer and later upon enrollment in a university. [Joe Cuseo; Marymount College. “The Transfer Transition from 2-Year to 4-Year Institution: Critical Issues & Promising Practices.”] <u>UTA – Partner Advising Model:</u> Collaborative partnerships are key to create transfer student success, as stated by presenters at the 2015 ACPA National Convention. [<i>Collaborative Partnerships Create Transfer Student Success</i>, ACPA National Convention: Presentation led by James Madison University.]
Goal/Activity Three: STEM Incubator ➤ Incubation = Innovation! ➤ P-16 STEM Professional Development Offerings	<u>STEM Incubator Director:</u> A key recommendation in A. Dowd’s 2011 report was to “create regional think tanks and research centers involving STEM faculty, deans and department heads”.* <u>P-16 STEM Professional Development Offerings:</u> A “Keystone Recommendation” forwarded by Dr. Dowd in her 2011 report was to collaboratively involve STEM P-16 educators and educational researchers in dynamic professional development opportunities.* *[Alicia C. Dowd; Co-Director Center for Urban Education. <i>Developing Supportive STEM Community College to Four-Year College and University Transfer Ecosystems</i>. Commissioned by “Summit on Community Colleges in the Evolving STEM Education Landscape”. 12-2011.]
Other Studies Reviewed / Planning Documents	• MVC Strategic Plan, Institutional Reports and Aspen Prize for Community College Excellence Application • Compression Planning Sessions held with students at MVC: February 4, 2016 and May 2, 2016. • <i>Barriers and Opportunities for 2-Year & 4-Year STEM Degrees: System Change To Support Diverse Pathways</i>. National Academies; 3-2016 • “Potential Impact of an Initiative to Increase the Pool of Hispanic Graduates on Business Activity in Texas” (The Perryman Group)

QUALITY OF PROJECT DESIGN *continued*

Analysis & Planning Process: Planning for this initiative began over two years ago when in 2014, MVC was honored to be identified by the Aspen Institute as one of the nation's top 150 community colleges eligible for the 2015 Aspen Prize for Community College Excellence. To advance in the competition, a very detailed and comprehensive data review was submitted to the Aspen Institute, which revealed **critically significant gaps in achievement between different groups of students** (ethnicity, etc.) and challenging retention rates for first-generation students. As this project design began to be formalized fourteen months ago, a Taskforce was formed to solicit input and form

strategies. These stakeholders (Chart 16) reviewed a series of planning

Chart 16: STEM CONNECT Taskforce	
Eduardo Prieto Cabellero <i>MVC STEM Student</i>	Dr. Stephen Jones <i>MVC – STEM Dean</i>
Farzin Farzad <i>MVC – Instructional Support Dir.</i>	Dr. Lyn Peterson <i>UTA – Dean of Engineering</i>
Dr. James Grover <i>UTA – Assoc. Dean for Research</i>	Juan Sandoval <i>MVC Math Tutor</i>

documents, studied empirically proven high impact practices, developed goals and outcomes in alignment with the HSI STEM and Articulation Program *Performance Measures*, and secured substantial input on the selection of strategies following the principles outlined in Chart 17.

Chart 17: STEM CONNECT Design Principles
1. The problem is urgent and requires an intensive, coordinated and comprehensive response. 2. An intensive and coordinated P-16 effort is needed to ensure that Hispanic students are exposed to STEM careers and academic support opportunities prior to and during college enrollment. 3. Evaluation is imperative to ensure the eventual expansion of best practices. 4. Each Goal/Activity will be aligned with the Board of Trustees' <i>Strategic Priorities</i>: <i>Goal/Activity One = Board Priority #2: Address college and career readiness and create pathways for seamless transition.</i> <i>Goal/Activity Two = Board Priority #3: Build on increasing success in production of degrees and successful transfers to four-year universities.</i> <i>Goal/Activity Three = Board Priority #1: Increase our ability to respond rapidly</i>

QUALITY OF PROJECT DESIGN *continued*

High-Quality Implementation Plan: MVC proudly proposes STEM Connect, an innovative program design with three Goals/Activities – each with strategies that build upon the findings of relevant studies and capitalize on the strengths of MVC and our partners.

Goal/Activity One – STEM Connect Resource Center.	<i>Absolute Priority 1</i>
Improve academic success for Hispanic and other underrepresented students by supporting comprehensive student centered program services and activities designed to help retain students and move them rapidly into core courses and through program completion.	
Key Strategies: <i>[HSI STEM & Articulation Performance Measures 1,2,6,7,8]</i> ▪ Academic Mentors providing holistic advising techniques, and helping students navigate STEM pathway to degree and career attainment w/ help from web-based system (Focus2) ▪ Math Tutors and online (APP) support ▪ Research opportunities / Scientific research white-paper development and presentation skills ▪ STEM volunteering and STEM-a-Palooza for family connections	

Key to successful implementation of STEM Connect is a dedicated space for STEM students – the STEM Connect Resource Center. This was a highlight of the STEM faculty brainstorming session to develop this application and what was originally planned to be only 891 square-feet has now 1,400+ square-feet designated.

Chart 19: Characteristics of Ideal Spaces for STEM Learning Communities
The space promotes the productive synergy of faculty, students, tutors, and advisors through thoughtful proximity of spaces for learning, teaching and research.
The dissolving of boundaries between the STEM disciplines is evident and encourages with the capacity to adapt and reconfigure as new projects evolve.
PKAL; <i>What Works, What Matters; What Lasts</i> – 2008

The STEM Connect Taskforce studied the qualities of “Characteristics of Ideal Spaces for STEM Learning Communities” (Chart 19) when designing the Center. The space will include computers and work stations for group work and sessions with Academic Mentors and math tutors and faculty, soft space to encourage bonding between students and MVC STEM Alumni, a library area with core STEM texts and journals, graphing calculators, and other tools difficult for many of our students to afford. As noted by the National Training Laboratories in their 2005

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

study, “...learning is not a spectator sport... [students] must talk about what they are learning and relate it to past experiences.” A well designed study area will increase levels of engagement, foster active learning, and allow tutors and students to interact in meaningful ways.

Academic Mentors: Academic Mentors will work with MVC STEM students – holistically advising them and helping them navigate the STEM pathway to degree and career attainment. These individuals will be certified STEM tutors (academic component) and once hired, trained by MVCs Dean of Students to provide holistic advising and mentoring services. Academic Mentors will create one-to-one

mentoring relationships to

guide and equip students to

achieve academic and personal success. Academic Mentors will conduct an in-depth needs analysis using information available from the online advisor database (Focus2) licensed to the STEM Connect Resource Center and develop an Individualized Education Plan, which will be made available college-wide to faculty, staff, and tutors, who have received FERPA training.

Math Tutors and Online Support: When interviewed for this application, faculty noted that the average skill of learners at MVC is ‘not what it used be’. While national research indicates that 40% of all college students and nearly 60% of community college students enroll in at least one developmental education course (Adelman, 2004; Bailey, 2009), at MVC this statistic is 85%. Contextualized Teaching and Learning (CTL) has been identified as a promising strategy that actively engages students and promotes improved learning. The United States Department of Education (2001) characterized CTL as a “concept of teaching and learning that helps teachers relate subject matter content to real-work situations”. Therefore, Math Tutors will be trained in

Chart 20: Academic Mentors Will Help STEM Students...	
Clarify academic goals	Develop a plan to accomplish goals
Utilize tools to address academic challenges	

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

the delivery of providing ‘Contextualized Math Tutoring’ sessions. As noted by Swail and Redd in *Retaining Minority Students in Higher Education* (2003), **minority students are more likely to persist and succeed in college courses when a clear alignment can be established between the coursework and skills needed for future employment.** This is the basis of Contextualized Tutoring – the action of capturing a student’s attention by illustrating the relevance of the learning experience.

Math support will also be provided with the development of interactive technology – a free APP (mobile device application) specific to the math course content offered by MVC faculty. **This will be a collaborative project between students and a professional developer of mobile device applications.** Recognizing that expertise in mobile development environments is becoming a highly valuable skillset (and that students are likely to enthusiastically engage in this project), the professional developer (and current adjunct faculty member) will create three separate student working groups to assist him with APP development: (1) sensors and context switching; (2) memory and hardware; and (3) user interface and graphics. While the goal is to create a college-friendly (and curriculum-aligned) APP to support students, the students assisting the developer will also receive valuable skills, and experience in working with a professional.

Research: One fourth of the Center will be dedicated to research, both linking our students with field research experiences and then providing them with assistance in developing research papers and preparing for poster presentations. Due in large part to a CCRAA-funded Federal grant MVC received in 2009, MVC is proud to have developed a strong relationship with both Brookhaven National Laboratory and Los Alamos National Laboratory ensuring that each summer since 2011, students have had the opportunity to conduct scientific research at these

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

locations and shadow STEM professionals. As noted by our faculty *and* students, however, our students can't compete with other undergraduate STEM students when they conduct poster presentations or format their research papers for review by Los Alamos Laboratory staff.

STEM Volunteering & STEM-a-PALOOZA: Studies show that students who participate in internships and field research opportunities are the most successful, but many of our students are intimidated at the thought of traveling to New Mexico to participate in the Los Alamos summer research opportunity offered to high-achieving MVC STEM students. Therefore, STEM Connect proposes a series of STEM volunteering activities to help students engage in STEM, and also consider the vast array of careers available to them with a STEM baccalaureate degree. For example, an urban farm has just been developed 6 miles from MVC and the staff has requested college student support in collecting soil samples. Opportunities like this can be modeled into a 2-week service-learning initiative whereby students receive course credit, and real-world experience of STEM activities.

Exelencia in Education's 2008 *Modeling HSIs Report* shares examples of colleges successfully partnering with high school students and their families in preparation for college and persistence through transfer institutions. Last year, MVC hosted Dia de la Familia – a day-long event to encourage families and children to visit the college and engage in a variety of fun and educational activities. During this event, one of the most popular booths was hosted by the MVC Physics Club as students showcased experiments involving static electricity. STEM Connect will feature a fall and spring STEM-a-Palooza event for students, their families, and the community. Event components will include bilingual financial aid workshops, educational plan development, and fun activities such as a portable planetarium and use of 3D technology.

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

Goal/Activity Two – STEM Graduates, Transfers & Articulations:	<i>Absolute Priority 2</i>
Increase the number of Hispanic students who graduate with STEM degrees, students who transfer to four-year postsecondary institutions and develop and enhance transfer/articulation models with four-year postsecondary institutions.	
Key Strategies: <i>[HSI STEM & Articulation Performance Measures 3,4,5,6,9,10]</i> ▪ Create a Culture of Transfer and Solidify the Articulation Pathway ▪ MVC STEM Alumni ▪ STEM Partner Advising Model with UTA	

Create a Culture of Transfer and Solidify the Articulation Pathway: On student satisfaction surveys, common themes emerged regarding students’ perceptions of transfer opportunities: (a) confused by core curriculum requirements; (b) isolated and unsupported; (c) generally overwhelmed by the college experience; and (d) a lack of connection between academics and future career goal (*Spring 2014 Noel-Levitz Student Satisfaction Inventory Survey*). Therefore, this application supports the full-time position of a Transfer Manager & Articulation specialist – a highly-qualified individual who will initiate, revise and manage articulation agreements with four-year institutions **while fostering a culture of transfer at MVC.**

Since so many students begin their higher education experience at MVC uninformed and generally confused about which classes to take, the Transfer Manager & Articulation Specialist will help students understand the need to carefully consider their selection of courses as part of the roadmap towards graduation, and transfer to a four-year postsecondary institution. While the Academic Mentors will be developing Individualized Education Plans for students, the Transfer Manager will offer ‘maps’ specific to STEM majors and top transfer institutions so that the STEM Connect team can help the student **“connect” to baccalaureate degree attainment early on in their college experience.**

A cursory review of our existing articulation agreements by the STEM Connect Taskforce

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

indicated major gaps, particularly with our closest four-year institution – the University of Texas at Arlington (UTA). Currently, some MVC students can't complete even half of lower-division engineering requirements prior to transfer. The Transfer Manager & Articulation Specialist will work directly with top transfer institutions and MVCs Curriculum Committee to develop a plan to develop, revise, and monitor articulation and reverse-transfer agreements, and develop co-enrollment opportunities with UTA and the University of North Texas.

MVC STEM Alumni: The Transfer Manager & Articulation Specialist will also generate student-centered (and in some cases student-led) support programs between two-year and four-year IHEs, specifically the University of Texas at Arlington. While the number of STEM graduates and transfers has been small over the past few years, there have been some shining examples. One student who graduated last year and is attending UTA helped a student who just graduated in early May, 2016.

Eduard called me for advice on what it was like at UTA, what questions they asked me during the interview, and how much money I need each month even with a full-ride scholarship. I gave him a tour and introduced him to other students. I also showed him my class schedule, and explained how much lab experience was needed in this program. I was happy to help, but really wish I could have connected to a former MVC student when I was considering UTA. I had to learn a lot of lessons the hard way. ~ C. Ramos; MVC 2015 STEM Graduate ~

The STEM Connect taskforce realized that one of the best ways to help our existing students 'connect' to the idea of transferring to a four-year postsecondary institution is with former STEM students who had successfully transferred. STEM Alumni will visit the STEM Connect Resource Center (at a minimum) monthly and also work with universities in providing information and tours onsite to MVC STEM students.

STEM Partner Advising Model with UTA: Nationally, one in five PhD graduates attended a

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

community college, and in Texas, currently 75% of all freshmen and sophomores are enrolled at a community college. These statistics fostered the powerful conversations between STEM Dean Dr. Jones and Dr. Lynn Peterson, Engineering Dean at the University of Texas at Arlington (UTA) earlier this year who both affirmed the need to eliminate competitive attitudes between our institutions. The STEM Partner Advising Model is an innovative, replicable model to increase both associate and bachelor's degree completion. Loosely based on the 'Dual Degree Program' between Governors State University and Chicagoland community colleges ("Promising and Practical Strategies To Increase Postsecondary Success"; 2013), this model will recognize "future transfer students" and serve them with a co-advising experience in the STEM Connect Resource Center. UTA advisors will work alongside MVC staff to ensure that students are pursuing a coherent plan of study leading to a STEM bachelor's degree and not just accumulating credits. They will review and adjust the students' Individualized Education Plan initially developed by Academic Mentors with follow-up by the Transfer Manager and Articulation Specialist. Meanwhile, this model will feature collaborative professional development activities for both MVC and UTA STEM faculty. Other ideas being explored include using graduate students to assist MVC students with research projects and designing holistic student support programs (Goal/Activity One), and sharing best practices in the key areas of programmatic alignment, core competency development, and bridge program development (Goal/Activity Three).

"As you know, UTA is now also a HSI, so we share your concern for increasing the number of students from underrepresented groups succeeding in a 4-year degree. It is to everyone's benefit that we make clear the pathways which exist into our 7 science and 10 engineering programs. We want to assist in further developing articulation and reverse articulation processes for our institutions."

Dr. Lynn Peterson / UTA Dean
Engineering

*Complete letter of support on file
in Dr. Jones' office.*

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

Goal/Activity Three - STEM Incubator: Establish an inclusive, collaborative assessment process for baccalaureate pathway development in STEM programs which engages faculty & higher education leaders in meaningful research to evaluate interventions/initiatives and identify the most effective means of meeting Hispanic and other underrepresented student needs. [*“Build Evidence of Promising Practices”*; HSI STEM Application Instructions]

Key Strategies: [*HSI STEM & Articulation Performance Measures 6,10*]

- Incubation = Innovation!
- P-16 STEM Professional Development Offerings

Incubation = Innovation!: As the STEM Connect Taskforce studied the challenge MVC was having in increasing the number of Hispanic students pursuing and graduating with STEM degrees, they quickly recognized the need to understand which data elements were important, and then the need to understand the data and have meaningful discussions. All agreed that we need to reduce the length of time it takes to complete a degree and eliminate exit points where our primarily first generation students get lost. All also agreed that they didn’t want the powerful discussions regarding the analysis of data to stop once the STEM Connect application was written. At the same time, the team also wanted to leverage the MVC-UTA inter-institutional partnership currently being forged.

To establish a collaborative assessment process for baccalaureate pathway development, the STEM Incubator will be developed. P-16 faculty and higher education leaders will be engaged in meaningful research to evaluate interventions and then identify the most effective means of meeting Hispanic and other underrepresented student needs. Led by a STEM Incubator Director, this team will create opportunities for multiple stakeholders to understand which data elements are important, interpret disaggregated data, and trigger transformative change in educational environments by supporting data-proven initiatives. UTAs Engineering Dean Dr. Peterson has already suggested that MVCs STEM Incubator utilize the services of UTAs graduate research

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

students to help design research studies, and also work alongside MVC STEM students in the STEM Connect Resource Center. The STEM Incubator Director will collect data, preliminarily identify promising and practical strategies to increase STEM postsecondary success, evaluate best practices and then share all this information in an annual ‘State of STEM Report’, the STEM Dashboard (website) and via streaming videos offered by STARLINK (page 40).

P-16 STEM Professional Development Offerings: Outputs from the STEM Incubator will serve as the basis for the P-16 STEM professional development sessions. In each program year, at least four development activities will be sponsored by STEM Connect with at least 25% of attendees from ISD and 25% from four-year postsecondary institutions. A larger STEM Connect Conference will be hosted in 2018-19AY and 2020-21AY to ensure the timely dissemination of promising and best practices. While the P-16 development initiatives will be informed by STEM Incubator experiences, the STEM Connect Taskforce has identified the following areas of immediate concern discovered during the application development process (Chart 23).

Chart 23:	STEM Connect P-16 Professional Development Offerings
Curricular Innovation and Collaboration – High School to College to University.	
Integrated Thematic Instruction –Helping students see how STEM curriculum ‘connects’.	
Supporting New STEM Faculty – Developing a peer-network to assist the (e.g.) high school teacher who holds a degree in math and has been assigned an (e.g.) ‘Earth Science’ course.	

Use of Methodological Tools to Ensure Successful Achievement of Objectives: Design elements for this application were collected primarily through semi-structured interviews with staff and students, brainstorming sessions with faculty and participant observation of students receiving math and science tutoring. Following the guidance in “Methodological Tools for Social Research” (T. Steren, ‘09), the Taskforce concluded that the STEM Incubator (Goal/Activity Three) and evaluative component of STEM Connect should utilize “mixed

QUALITY OF PROJECT DESIGN – High Quality Implementation Plan *continued*

method procedures” (qualitative and quantitative), and apply the steps identified in Chart 24 once promising practices are preliminarily identified.

Chart 24: Methodology Procedure Once Promising Practices Are Identified
Step 1: Identify alternatives / Step 2: Barrier Analysis / Step 3: Investment Analysis (time, human capital, funds, etc.) / Step 4: Common Practice Analysis.

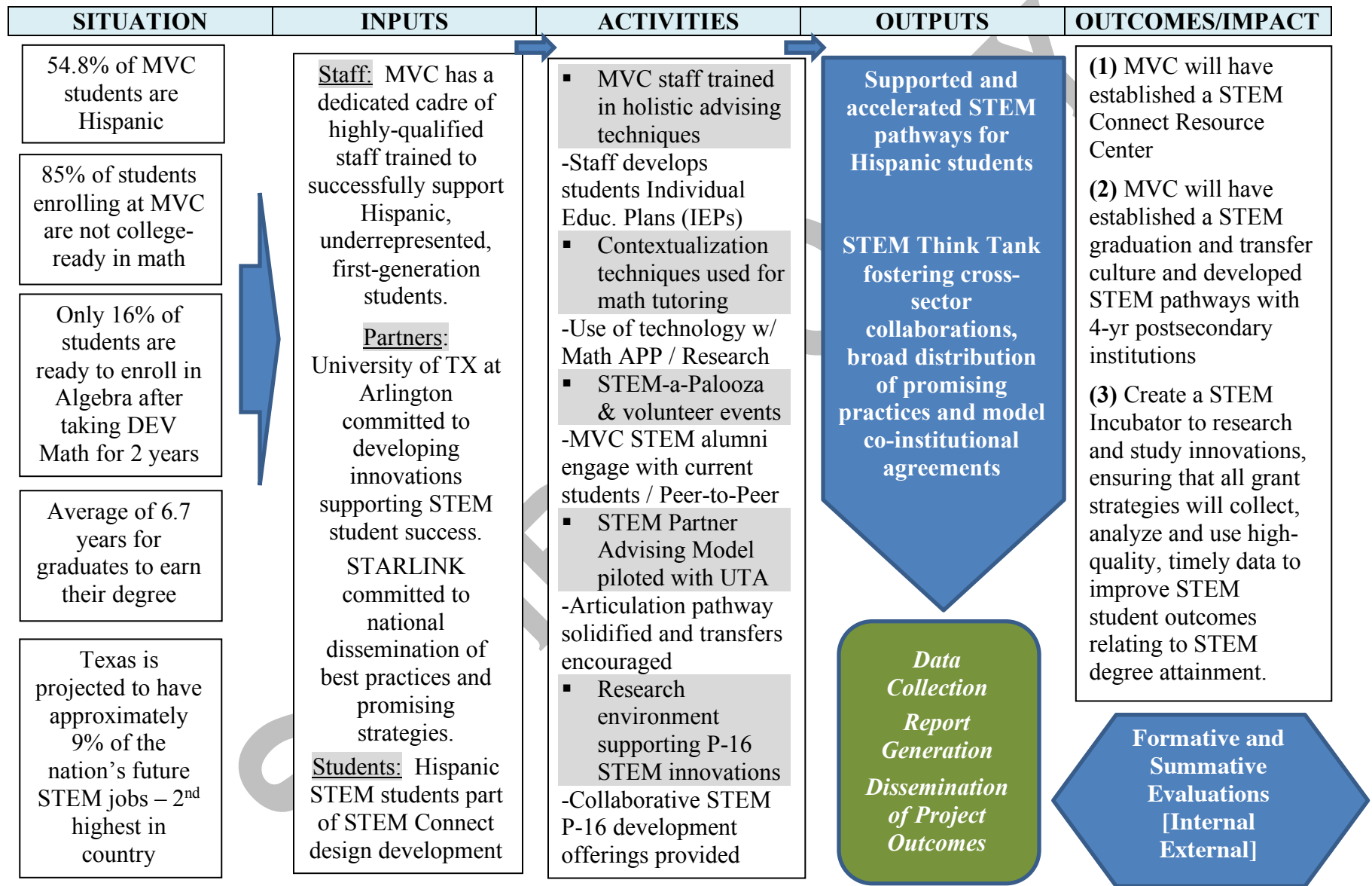
2. Project Supported By Strong Theory / Logic Model

In addition to the Logic Model presented on page 26, staff has also adapted an “Activities Logic Model” to supplement the Logic Model with a representative outline of how a *Plan, Practice & Achieve* methodology will allow staff to track progress and formatively adjust the program design. Please see below for a sample referencing Goal/Activity One, Objective 1.d.

Chart 25: Plan, Practice & Achieve (PPA) Evaluation Model and Methodology Objective 1.d: Double number of students participating in research and/or poster prstns.			
Inputs (PLAN)	Activities (PRACTICE)	Outputs	Outcomes (ACHIEVE)
MVC, UTA and Los Alamos stakeholders surveyed regarding quality of student researchers and resulting presentations. Sample research papers reviewed and scored by UTA.	Array of activities provided for STEM students that will: -encourage participation in field research activities; -provide overview of expectations (scientific process, technical writing, etc.) and -develop network of support with UTA graduate student researchers and STEM Incubator.	Staff collaboratively promotes research across STEM disciplines, aligns opportunities with students’ interests and career exploration results and coordinates corresponding research initiatives.	By 2021, MVC will have doubled the number of students participating in field research activities and/or conducting external research poster presentations.

The Logic Model presented on the next page was designed to not only support staff upon implementation, but to also enhance the participatory role of stakeholders who will be actively engaged in each Goal/Activity. As STEM Dean and key Taskforce member Dr. Jones stated in a planning meeting, program stakeholders need a clear STEM Connect roadmap, much like the roadmap we know our students need to navigate the pathway to STEM degree attainment.

QUALITY OF PROJECT DESIGN - STRONG THEORY / LOGIC MODEL



QUALITY OF PROJECT DESIGN - *continued*

COMPETITIVE PREFERENCE PRIORITY #2 – STEM Connect Supported by Evidence

As noted earlier, this entire program design rests under the umbrella of a New Model of Holistic Advising. This was purposefully and strategically designed after reviewing the two studies identified in Chart 26.

STEM CONNECT

A NEW Model of Holistic Advising

Career • Academic • Wrap-Around Services

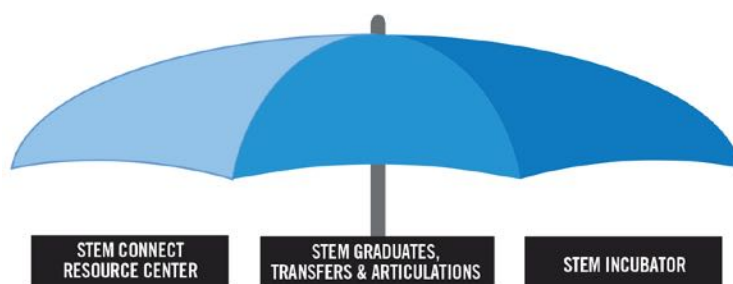


Chart 26: Two Studies Meetings Moderate Evidence of Effectiveness for STEM Connect

Title/Author	Link
<i>The Effects of Student Coaching in College: An Evaluation of a Randomized Experiment in Student Mentoring.</i> Dr. Eric Bettinger and Rachel Backer (Stanford University School of Education). (2011) Formed basis for concept of holistic advising for students while they are AT MVC.	https://ed.stanford.edu/sites/default/files/bettinger_baker_030711.pdf
<i>A Case Study of Evaluating Undergraduate Research Courses as High-Impact Practices Fostering Student Learning Outcomes.</i> Moon, S. Hershey, J. & McMahan, S of California State University. (n.d., WWC Standards with Reservations Posting February, 2016) (2012) Formed basis for concept of supporting undergraduate research projects, and community volunteering/service learning.	http://www.fullerton.edu/analyticalstudies/presentations/AIR_UndergradResearch_HIPS_Sunny_vFinal.pdf
*As these studies formed the basis for the <i>entire</i> project design, the portion of funds dedicated to the evidence-based strategies is the total five-year project funding request of \$4,233,440.	

Chart 27: Considerations To Select Studies Meeting Moderate Evidence of Effectiveness

What is the effective evidence of postsecondary institutions' approaches on retention and the attitudes of Hispanic and other underrepresented students?	What factors (e.g. age of students) and implementation features moderate (or mediate) the effectiveness of strategies?
What types of postsecondary institutions are described in the study?	How robust is the evidence for each strategy?
Does the study examine the effectiveness of the process, intervention or practice being proposed?	Was there a statistically significant favorable impact on a relevant outcome for STEM Connect?

QUALITY OF PROJECT DESIGN – Competitive Preference Priority 2 *continued*

Research Meets Moderate Evidence of Effectiveness Standard:

Both studies satisfy the ‘moderately effective evidence standards’ outlined by WWC standards as indicated in Chart 28 (below) and Chart 29 (page 29).

<i>Chart 28:</i> Alignment Between Effective Evidence Standards and The Effects of Student Coaching (Bettinger and Baker, 2011)	
STANDARD	How <i>The Effects of Student Coaching</i> Meets Standard
Relevance of Time-Frame	- Published in 2011. “Data came from InsideTrack for the 2003-2004 school years and the 2007-2008 school years.” (p.3)
Relevance of Intervention	“InsideTrack randomly divided eligible students into two balanced groups and then allowed the respective institution to choose which set of students would receive support.” (p.3) “Some schools focused on full-time students; others assigned part-time students.” (p.9)
Relevance of Outcome & Adequacy of Measures	“InsideTrack began offering services in the 2000-2001 school year and has coached more than 250,000 students nationally.” (p.8) “The motivating principle is that student coaching in a student’s educational career can lead to engagement, learning, retention and an increased probability of completing a degree.” (p.8) “To evaluate the program, we requested the academic records for all of the students who were invited to work with InsideTrack during the 2003-2004 and 2007-2008 school years. During those two years, performance was measured of 13,555 students across eight different higher education institutions.” (p.10) “Our study includes public, private, and proprietary institutions, and it includes a broad range of students including students who are pursuing associate’s degrees, and bachelor’s degrees.” (p.20)
Focus on Projects Designed to Provide Services Using Strategies Supported by Moderate Evidence of Effectiveness	“...the focus of our paper has been the use of mentors and coaches to facilitate student persistence and completion.” (p.1) “During these two years, InsideTrack conducted a total of 17 different randomized studies in cooperation with participating universities.” (p.3) “We find that retention and completion were greater in the coached group. After six months, students in the coached group were 5.2 percentage points more likely to still be enrolled than students in the non-coached group (63.2% vs. 58.0%). At the end of 12 months, the effect was 5.3 percentage points. / “These differences are all statistically significant over a 99 percent confidence interval.” (p.3) “Our study is one of the first studies to use random assignment to evaluate the effects of student coaching, and additional study is warranted.” (p.20)

QUALITY OF PROJECT DESIGN – Competitive Preference Priority 2 *continued*

Research Meets Moderate Evidence of Effectiveness Standard - *continued*:

<i>Chart 29:</i> Alignment Between Effective Evidence Standards and Case Study of Evaluating Undergraduate Research Courses (Moon, et al)	
STANDARD	How Case Study of Evaluating Undergrad. Research Meets Standard
Relevance of Time-Frame	▪ Posting date in WWC ‘Reviewed Studies With Reservations’ of February 2016. ▪ Data was drawn from students who had taken undergraduate research courses between fall 2000 and fall 2011.
Relevance of Intervention	▪ A total of 739 students participated in undergraduate research courses. ▪ High impact practices (HIPs) include first year seminars, common intellectual experiences, collaborative assignments and projects and service learning/community-based learning. ▪ “A students’ conducting research in his/her major and developing a reflective understanding of his/her own field is an effective means to provide the undergraduate student with deep learning and engagement...” (p. 1) ▪ All of the students who did not participate in undergraduate research were considered the original comparison group. The initial group of over 200,000 was reduced to a matched sample of 739 using propensity scores, yielding students with similar characteristics. (p.3)
Relevance of Outcome & Adequacy of Measures	▪ The study was an investigation of how undergraduate research participation maximizes college impact. ▪ More than one-third of research participants were Hispanic students. ▪ “We sought to investigate three outcomes variables: time-to-degree and graduation GPA after research participation as a short-term outcome as well as graduate program placement as a long-term outcome.” (p.5) ▪ “To regulate for extraneous factors (variety of student backgrounds)...., we employed a quasi-experimental design and developed a simulated control group utilizing a matching process to equate treatment group and their counterparts”. (p.18)
Focus on Projects Designed to Provide Services Using Strategies Supported by Moderate Evidence of Effectiveness	▪ “The findings of this study indicated that an undergraduate research program brings about positive student change, including timely graduation, improved GPA and future placement of college graduates in advanced degree programs”. (p.18) ▪ “Undergraduate research was found to be an effective and purposeful academic activity that deepens student engagement in learning and enhances student success...” (p.18) ▪ Meets WWC group design standards with reservations – posted February, 2016.

QUALITY OF PROJECT DESIGN – Competitive Preference Priority 2 *continued*

Demonstrating That Strategy Is Based On Research: Following the ‘Evidence-Based Practices’ methodology (“*Making Informed Decisions About Programs, Policies, Practices, Strategies, & Interventions*”; K. McColskey and K. Lewis, 2007), MVC leadership considered the evidence presented by both studies within contextual considerations and the recognition that an intervention implemented at one educational institution may not transfer well to others. Staff agrees with the *Effects of Student Coaching* (p.20) in that “...further study can shed light on how student coaching might affect other student populations.” Discussions about this study at MVC included questions regarding how coaching would impact a primarily Hispanic student population. This will be suggested for analysis by the STEM Incubator (Goal/Activity 3). The STEM Connect Taskforce also concurs with Moon et al., (*Case Study of Evaluating Undergraduate Research Courses as High Impact Practices...*) that the findings of the study support those of previous research (Kuh, 2008; Moon et al., 2013) that high impact practices are effective in improving student learning. The Taskforce was intrigued by the studies conclusion that high impact practices produce “not only in-college learning outcomes, but also post-college future placement outcomes” (page 19) and will propose this for UTA graduate research analysis.

Alignment Between Research, Strategy and Capacity to Implement: To encourage innovative program development focused on efficiency and effectiveness, the Taskforce utilized Project Kaleidoscope’s characteristics of efficient programs (Chart 30).

Chart 30: Characteristics of Efficient Programs - Sample Elements
The program promotes the productive synergy of faculty, staff, students, tutors and advisors through thoughtful experiences.
The dissolving of boundaries between the tasks of advisors, teachers, tutors, advisors and administrative staff is evident and an environment exists that encourages staff to discover new ways of collaborating with other staff and students.
Tools for teaching, learning, and program assessment are readily accessible.

QUALITY OF PROJECT DESIGN *continued*

4. Extent Project Represents Exceptional Approach to Competition

STEM Dean and key member of the STEM Connect Taskforce, Dr. Stephen Jones, was the Program Manager for NASA's Curriculum Improvement Partnership Award. Therefore, it isn't surprising that STEM Connect follows the principles used by the NASA Marshall Space Flight Center to align strategy with project execution (Chart 31).

Chart 31: STEM Connect – Strategy Alignment with Project Execution		
Define Alignment Criteria Goals, objectives and outcomes in coordination with needs and Board's priorities.	Manage Resources/Monitor Capabilities MVC staff has already committed time and resources to initiation and implementation.	Support Decisions In a Changing Environment STEM Incubator
Actively Communicate with Stakeholders STEM Incubator / STEM Dashboard / State of STEM Report	Disseminate Best Practices and Lessons Learned P-16 Professional Development / STEM Dashboard / State of STEM Report	

Extensive Partnerships to Support Program Design: MVC is proud that a collaborative partnership has been developed with the University of Texas at Arlington, partly due to the development of this program design (see page 22 for excerpt of support letter on file at MVC). An additional letter of support was provided by Dr. Grover of UTA who serves as Project Director for CIRTL-UTA, an affiliate of the national initiative - *Integration of Research, Teaching and Learning*. UTA also houses a regional office of the Institute for Broadening Participation, a nonprofit

"I appreciate that you have designed an inclusive assessment process as part of your program design. I think there is much we can do to help with this important project. In particular, CIRTL-UTA can help to identify graduate students who could do collaborative work with your organization"

Dr. James Grover; UTA

organization focused on increasing minority access to STEM education and careers. These representatives and others will be integrated into STEM Incubator activities and help disseminate promising practices through the State of STEM report, and the STARLINK-produced videos.

QUALITY OF PROJECT SERVICES

(b) QUALITY of PROJECT SERVICES: Ensuring Equal Access / Treatment for Members of Groups Traditionally Underrepresented

Serving underrepresented and disconnected students is key to the mission of MVC and inherent in the program design for STEM Connect. Due in part to the composition of the service area (pages 2-4), MVC enrolls many educationally and economically disadvantaged students who are typically under-prepared to enter college. All proposed Goals/Activities adhere to §427 of the Department of Education's General Education Provision Act. MVC actively maintains equal access and non-discrimination policies in place to ensure that all barriers are removed for students, faculty and staff. Efforts to minimize or eliminate barriers related to race, age, national origin or color include (a) providing information/materials in the home language; (b) providing interpreter/ translator at program activities; (c) increasing awareness and appreciation of cultural and linguistic diversity through a variety of activities and publications; and (d) communication to students and their families our appreciation for their linguistic and cultural background. Please see Chart 32 for an overview of plan elements.

<i>Chart 32:</i>	"Ensuring Equal Access" Plan Elements for STEM Connect
	Conduct STEM Connect presentations at MVC for staff and trustees, and around the southwestern Dallas area to ISDs and four-year postsecondary institutions.
	STEM Connect personnel and stakeholders will serve on key College committees with institutional leaders to keep entire campus informed of project.
	Weekly updates to President Dr. Robert Garza, the Vice President of Instruction and the college's Executive Team comprised of all Deans and Directors.
	Provide STEM faculty members with advising and tutoring reports and meet with faculty to discuss STEM Connect initiatives and potential modifications.
	Academic Mentors to review students' assessment test results and academic transcripts.
	Academic Mentors to review students' background and any perceived 'persistence barriers' such as work, family, etc.
	STEM Connect Project Director will work with other MVC departments (TRIO SSS, Dual Credit, Upward Bound, etc.) to ensure a comprehensive array of services is offered to students.

QUALITY OF PROJECT SERVICES *continued*

1. Extent Services Provided Reflect Up-To-Date Knowledge from Research & Practice

The Taskforce agrees with the Tomas Rivera Policy Institute in that the “STEM pipeline for Latinos is broken in terms of acquiring the necessary academic training to both get into a STEM major in college and, more importantly, to actually graduate with a STEM degree” (*Latinos in STEM Professions*). They strongly feel, however, that the student-centered design of STEM Connect will seal the leaks in the pipeline. This program is designed around a new model of holistic advising – an integrated college-wide approach to facilitate student success. **STEM Connect personnel will utilize a holistic case-management approach to serve students, utilizing cross-divisional strategies and resources to ensure student engagement – before, during and after enrollment at MVC.** This design incorporates the principles of effective advising noted by M. Lowenstein in a 2009 NACADA Journal.

Chart 33: Principles of Effective Academic Advising / Informed STEM Connect Design	
Student engagement	Provide personal meaning to students’ goals
Use the full range of institutional resources	Establish rapport
Connect academic interests with personal interests	Stimulate and support student academic and career planning
Promote intellectual and personal growth and success	Assess, evaluate or track student progress
Lowenstein, M. (2009). If Advising is Teaching, ...? <i>NACADA Journal</i> , 29(1), 123-131.	

Goal/Activity One (Absolute Priority One) - The **STEM Connect Resource Center** will serve as the hub of STEM engagement, learning, and research, while providing students with the opportunity to engage with STEM professionals and graduate researchers from the University of Texas at Arlington (UTA). As noted by the National Training Labs in their 2005 study, a well-designed study area will increase levels of engagement, foster active learning, and allow tutors and students to interact in meaningful ways. **Academic Mentors** will work with MVC STEM

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QUALITY OF PROJECT SERVICES *continued*

students in the STEM Connect Resource Center – holistically advising them and helping them navigate the STEM pathway to degree and career attainment. These individuals will be certified STEM tutors to provide academic tutoring when needed alongside holistic advising and mentoring services, and will work alongside **Math Tutors trained in contextualization techniques**. The American Mathematical Association of Two Year Colleges established standards of recommended pedagogy, including the importance of helping students “make connections” and build upon their experiences as they work on mathematical problems. This is key to the contextualization training math tutors will receive.

<i>Chart 34:</i> STEM Connect Resource Center - Elements	
<i>Space:</i> Designated space to encourage STEM fields’ identity and prominence at MVC. Work stations for group work, research stations, STEM references and ‘soft space’ for Academic Mentors to work with students utilizing holistic advising techniques.	<i>Advising:</i> Academic Mentors will advise and tutor students through the STEM pipeline, personally assisting with their course navigation sequence and ‘connecting’ students to the Transfer Mgr. & Articulation Specialist for four-year transfers.
<i>Research opportunities</i> will be promoted and student researchers will have a dedicated space to practice poster presentations and develop research papers.	<i>Math Tutors</i> trained in contextualization techniques to help students ‘connect’ math with their everyday lives.
<i>STEM Speaker Series / STEM-a-Palooza:</i> Each semester, STEM Speaker Series and family STEM-a-Palooza events, monthly informal STEM seminars encouraging MVC and UTA STEM faculty to directly engage with students.	<i>Math APP:</i> Students working alongside a STEM professional in developing a free mobile device application (APP) that is linked to the curricula offered by MVC STEM faculty.

Goal/Activity Two (Absolute Priority Two) – The Transfer Manager & Articulation Specialist will work to create a **culture of transfer** among MVC students so that they have a roadmap to navigate to our top transfer institutions. Leveraging the Individualized Education Plan initially developed by the Academic Mentors, this individual will ‘connect’ students with the wide variety of STEM careers available, and then help the student work with the ‘end in mind’

QUALITY OF PROJECT SERVICES *continued*

rather than just randomly taking courses suggested by a general advisor/counselor. Once the student indicates an interest in a specific path, staff will utilize the online systems (Focus 2 and Student Tracking System) to develop a sequenced multi-term road map of all courses to meet the student's educational goals, incorporating fast-track options when available. This online path will be available to

all FERPA-trained
college staff and
faculty to create a
true team-based
approach to
individually advise

Chart 35: STEM Graduates, Transfers & Articulations - Elements	
<i>Culture of Transfer:</i> Develop STEM roadmaps to top transfer institutions and review students' Individualized Education Plans to ensure appropriate course sequencing to attain graduation/transfer.	<i>MVC STEM Alumni:</i> Former MVC students majoring in STEM at four-year universities hosting group and individual sessions onsite and offsite to foster peer-to-peer dialogues about STEM graduation and transfer.
<i>Articulation Agreements</i> developed, reviewed, modified and corrected with top-transfer institutions.	<i>STEM Partner Advising Model</i> in development with UTA to cross-advise students with both MVC and UTA personnel <i>in advance of</i> transfer.

students rather than taking a “one size fits all approach”. MVC students will also have the opportunity to ‘connect’ with **MVC STEM Alumni** – former MVC STEM students who have transferred out of MVC to a four-year postsecondary institution. This is a unique twist on the traditional system of having university representatives visit MVC. Instead, former MVC students will engage in peer-to-peer dialogues onsite at MVC about pursuing STEM careers and transferring to a university, and then also host the students offsite at their four-year postsecondary institutions.

Goal/Activity Three: The **STEM Incubator** will be the venue to assess and link data, engage P-16 STEM faculty and staff as we collaboratively focus on research and promising practices - and then ignite the next sequence of innovations! High school, MVC, UTA, university and industry

QUALITY OF PROJECT SERVICES *continued*

partners will all be invited to the table as the STEM Incubator Director creates opportunities to understand and interpret disaggregated data and collegially fosters discussions about challenges and opportunities. Outputs and discussions will form the basis for **P-16 Professional Development offerings**. A true ‘community of learners’ will be developed as ISD, two-year and four-year faculty and staff will participate in activities selected and informed by the review of data and research, which will be highlighted online via the STEM Dashboard and annually in the State of STEM report published and distributed by MVC.

Chart 36: STEM Incubator - Elements	
Review Data: Gather data, understand the data, have meaningful discussions about the data and use data to inform program changes and innovations.	Use Data to track advising and tutoring activities for STEM students and select aligned P-16 professional development offerings.
Leverage Data to formatively adjust programmatic elements, develop innovations, and foster P-16 partnerships.	Share Data with the STEM Dashboard, the State of STEM report and the STEM Connect conference.

2. Likely Impact of Services To Be Provided By Project On Intended Recipients

As noted by Byars-Winston, Estrada and Howard in “Increasing STEM Retention for Underrepresented Students” (2008), minority students benefit from academic support, positive outcome expectations about the achievement of a STEM degree and affirmation about STEM career possibilities. STEM Connect has the capacity to assist in creating a regional pipeline of STEM students that are able to link curricula with career-based objectives. Additionally, the Taskforce spent much time interviewing students to form this project design. As researcher TheodoreSizer said, “...student voices are the missing link in educational reform. Despite the rhetoric of change, students are too often the *subject* of change, and the not the *agent*”. Through data collected from the National Survey of Student Engagement, George Kuh identified high

QUALITY OF PROJECT SERVICES *continued*

impact practices that correlate to college persistence, especially among underrepresented students (2008). Please see Chart 37 below for an alignment of how those high impact practices are directly aligned with STEM Connect.

Chart 37: High Impact Practices Identified by George Kuh ('08) / Aligned with STEM Connect	
High Impact Practices	STEM Connect Strategy
Experiences that bring students together and place a strong emphasis on collaborative learning.	STEM Connect Resource Center
Undergraduate research.	STEM Connect Resource Center – Research opportunities, presentations and paper development.
Service learning and community based	STEM volunteering and STEM-a-Palooza.

Please see Chart 38 for an abbreviated overview of how services will impact recipients.

Chart 38: Sample Overview of STEM Connect's Impact on Intended Recipients			
Goal/Activity One: Improve academic success for Hispanic and other underrepresented students by supporting comprehensive student centered program services and activities designed to help retain students and move them rapidly into core courses and through program completion. <i>[Abs. Priority 1]</i>			
Addresses Needs	Key Strategies	Outcomes	Recipients
Primarily first-generation students, with only 16% able to enroll in College Algebra after being in DEV Math for 2 years.	Academic Mentors Math Tutors	Increase by 8% per year # of students taking transfer level math.	Students
Goal/Activity Two: Increase the number of Hispanic students who graduate with STEM degrees, students who transfer to four-year postsecondary institutions and develop and enhance transfer/articulation models with four-year postsecondary institutions. <i>[Abs. Priority 2]</i>			
Addresses Needs	Key Strategies	Outcomes	Recipients
It took an average of 6.7 years for all 1,155 2014-15 graduates to attain their degree.	Culture of Transfer MVC STEM Alumni	Increase the number of MVC students who transfer to a four year postsecondary institution.	Students Faculty Region
Goal/Activity Three: Establish an inclusive, collaborative assessment process for baccalaureate pathway development in STEM programs which engages faculty & higher education leaders in meaningful research to evaluate interventions/initiatives and identify the most effective means of meeting Hispanic and other underrepresented student needs.			
Addresses Needs	Key Strategies	Outcomes	Recipients
Faculty and staff unsure of what data elements impact STEM student success.	STEM Incubator P-16 Prof. Dev.	State of STEM Report STEM Dashboard Professional Dev.	Faculty/staff from ISD, & 2/4YR IHEs

SIGNIFICANCE

(c) SIGNIFICANCE: 1. Potential Contribution of Project To Increase Knowledge...

A recent report to the President (*Engage to Excel: Producing One Million Additional College Graduates with Degrees in STEM*; 2012) cited the need to develop an adequate base of STEM talent to ensure the economic strength, and competitiveness of the United States. Analysis suggests that 1 out of every 5 jobs in 2011 required a high level of knowledge in a STEM field. According to national research, approximately 8.6 million jobs will exist in STEM fields across the U.S. by 2018.

Texas is projected to have approximately 9% of the nation's future STEM opportunities, the second highest in the country. At the same time – according to research (Chart 39) supported by the Houston Endowment and the Texas Higher Education Coordinating Board – the state's rapidly changing demographic mix will pose challenges as Texas's growing, economically disadvantaged, minority populations have less than a 10% postsecondary completion rate. Therefore, the urgency to identify strategies and innovations to meet this need is critical.

Chart 39: Research Referenced for U.S & TX STEM Data	
Rothwell, J. (2013). The Hidden STEM Economy. Washington, DC: Brookings Institution.	
The Texas Tribune (2014). Higher Ed Outcomes. Austin, TX: The Texas Tribune	Schleicher, A. (2012). Education At a Glance: OECD Indicators 2012.

MVC and the STEM Connect Taskforce are committed to building evidence of promising practices, as well as building upon effective and proven strategies of effectiveness. To establish a collaborative assessment process for baccalaureate pathway development, **the STEM Incubator will be developed.** P-16 faculty and higher education leaders will be engaged in meaningful research to evaluate interventions and then identify the most effective means of meeting Hispanic and other underrepresented student needs. Led by a STEM Incubator Director,

SIGNIFICANCE *continued*

this team will create opportunities for multiple stakeholders to understand which data elements are important, interpret disaggregated data, and trigger transformative change in educational environments by supporting data-proven initiatives.

The STEM Incubator Director will analyze data, review research, and dialogue and consult with other stakeholders to preliminarily identify promising (and practical) strategies to increase STEM postsecondary success. Once the information is published in the annual ‘State of STEM Report’ and available on the STEM Dashboard (MVC website), MVC Dean Dr. Stephen Jones and Dr. Peterson or Dr. Grover from the University of Texas at Arlington will collegially present at the Texas Hispanic Serving Institutions Consortium (Fall 2017 and annually thereafter).

The STEM Incubator will also foster a professional learning community of postsecondary and ISD STEM faculty, staff and education leaders. As noted in the April 13, 2016 letter sent to education professionals by the U.S. Department of Education, connecting educators with each other (and STEM industry professionals) has the potential to support inquiry-based and active learning - with students and

with each other as STEM
Connect stakeholders. Shared
professional development

Chart 40: Professional Development & Convening Topics	
Regulations and policies affecting the transfer of credit between 2-year and 4-year institutions.	
Co-curricular supports for underrepresented students seeking a STEM career.	The effect of mathematics education on the trajectories of STEM students.

offerings will include (but not be limited to) topics indicated in Chart 40.

2. Likelihood that Project Will Result in System Change or Improvement

Mountain View College is one of the seven colleges in the Dallas County Community College District (DCCCD). The DCCCD is the single largest provider of undergraduate education in Dallas County with 72,595 students served by more than 7,000 full- and part-time

SIGNIFICANCE *continued*

faculty and staff. The DCCCD is a key connection point between Dallas County K-12 schools and currently partners on a variety of initiatives with the Dallas Regional Chamber and area universities including the University of Texas at Arlington. The DCCCD is a founding member of the League for Innovation in the Community Colleges and also belongs to the American Association of Community Colleges and the Texas Association of Community Colleges. District STEM Director, Dr. Peggy Shadduck, will help recruit a variety of educators to participate in the STEM Incubator and disseminate lessons learned with other colleges and universities.

As a member of the DCCCD, MVC will also be able to **utilize the services of STARLINK to disseminate promising strategies and best practices identified by the STEM Incubator.** STARLINK is **a statewide, online professional development network consisting of all the community and technical colleges in Texas.** STARLINK provides professional development video services available 24/7 through video streaming and DVD libraries for faculty across the U.S., Canada and 22 countries, and viewing access is available at no cost to all Texas community colleges. The STEM Connect Taskforce firmly believes that by using STARLINK (year three of program period and forward), Mountain View College will truly impact the number of Hispanic students pursuing and graduating with STEM degrees – not just at MVC but around the state and potentially the nation. Ms. Patti Jennings of STARLINK (<http://starlinktraining.org>) has also suggested that STARLINK partnerships could assist with the distribution and dissemination of best practices. These include the Rural Community College Alliance and the National University Technology Network. The STEM Connect budget reflects the production of three modules each in years three through five. For year three, the convening topics on page 39 will be produced and for all years, videos will feature STEM students and P-16 stakeholders.

QUALITY OF MANAGEMENT PLAN

(d) QUALITY OF MANAGEMENT PLAN: 1. Adequacy to Achieve Objectives...

MVC administration is committed to developing policies and procedures for efficient project management that adhere to U.S. Dept. of ED regulations. The comprehensive plan for ensuring feedback and continuous improvement allow for input at all levels. The STEM Connect Project Director will provide the overall fiscal and institutional management and STEM Connect full-time personnel (page 43) will facilitate implementation of their respective endeavors, as well as providing management tasks aligned with the project management objectives in Chart 41.

<i>Chart 41:</i>	Project Management Objectives
1.	Adhere to all Federal, state, and institutional policies.
2.	Establish open communication among project staff, college personnel and with STEM Connect stakeholders identified through the STEM Incubator.
3.	Monitor the project's progress toward specific goals and objectives as scheduled.
4.	Monitor the project objectives to ensure that they follow and address priorities of MVC.
5.	Use reliable accepted practices of evaluation methodologies to ensure appropriate support and objective assessment of achievements.

The STEM Connect Director will have complete *administrative autonomy* to manage the project and *administrative authority* to ensure that project strategies are implemented and objectives are achieved. Full-time STEM Connect staff will monitor and report on the progress of their respective activity components in quarterly reports that will include the following: scheduled tasks completed; impediments to the accomplishment of tasks; tasks not completed on schedule and proposed corrective actions; progress toward the attainment of the activity's goals and objectives; budget status and evaluation data. These reports, in addition to briefings with key personnel and faculty, will be used for internal monitoring, external evaluation, internal and/or Federal audits, annual performance reports and serve as the basis for quarterly updates submitted to project stakeholders.

QUALITY OF MANAGEMENT PLAN *continued*

Adequacy of Resources: Dr. Stephen Jones and the Taskforce are confident that STEM

Connect will develop and strengthen the pathways for Hispanic students to attain STEM degrees and eventually, a STEM career. The STEM Incubator will provide guidance to other HSIs/MSIs regarding promising strategies, best practices, and how to use data evidence to improve educational practices to better serve students. Chart 42 provides an overview of the resources that will be utilized to ensure goal and objective fulfillment by the end of the project period.

Chart 42: Adequacy of Resources to Ensure Fulfillment of STEM Connect Goals

Institutional Management: Dedicated faculty committed to a P-16 environment to foster an articulated educational pipeline. / Low tuition (\$59 per credit hour) and a wide variety of scholarship opportunities available to students. / Highly qualified faculty, many of whom have received national and international awards. / MVC facility provides adequate space for STEM laboratory activities. / MVCs Facility Master Plan provides a multi-year schedule for ongoing maintenance, capital projects and space renovations. / Many family and educational events are provided at no cost to community members.

Partnerships: The University of Texas at Arlington has submitted two letters in support of this application. / Faculty and staff from each of our four top feeder high schools will be invited to participate in STEM Incubator activities. / Other partners who have assisted with this program design and verbally offered their support include (a) Dr. Darrell Davis, CEO of CAPS, nonprofit organization serving minority students; (b) Los Alamos National Research Laboratory personnel; (c) Brookhaven National Laboratory; (d) STARLINK and Ms. Jennings of the LeCroy Center; and (e) Dr. Janice Lombardi, Principal of Trinidad Garza Early College High School.

Fiscal Stability: MVC has an annual budget of \$30,045,119 with strong fiscal management and an established budget development process which is integrated with strategic planning and consistent with the College's core values. / Efficient internal controls exist for budgets and grant-funded expenditures.

Commitment of MVC Personnel: There are already STEM Connect 'Champions' at MVC – personnel who will commit a significant amount of time and expertise to achieve grant objectives. *Vice President of Instruction* will provide a direct line of communication between the project and the President's office (30+ hours per semester); *Dean of Research* will provide quality reports and data analytics to STEM Incubator Director and STEM Connect Project Director (35+ hours per semester); *Dean of Resource Development* will assist with program publicity, recruiting faculty/staff/ ISD/IHE participants for STEM Incubator, and solicit support for additional STEM initiatives (30+ hours per semester); *Dean of Students* will provide 'holistic advising' training to Academic Mentors (20+ hours per semester); and *Career Services Director* will provide access to career inventory tests, and assist with STEM career fairs (27+ hours per semester.). These individuals will form the initial basis of the *STEM Connect Advisory Council*, scheduled to meet quarterly with the STEM Connect Project Director and full-time personnel.

QUALITY OF MANAGEMENT PLAN *continued*

The proposed budget for the five-year project is \$4,233,440, with all line items directly related to the proposed objectives. Personnel are described in the application narrative with an annual salary increase of 3%. Fringe

<i>Chart 43: Activity Summary</i>			
	Activity #1	Activity #2	Activity #3
Year One 2016-17	\$460,001	\$130,764	\$247,392
Year Two 2017-18	\$410,267	\$163,267	\$256,107
Year Three 2018-19	\$416,617	\$153,564	\$302,019
Year Four 2019-20	\$431,504	\$145,348	\$284,823
Year Five 2020-21	\$411,189	\$136,119	\$284,459
	\$2,129,578	\$729,062	\$1,374,800
\$4,233,440			

benefits (22%) include Texas Retirement System, health and dental insurance, life and disability insurance, accrued annual leave, Medicare and unemployment insurance. See Chart 44 below for an overview of full-time funded positions and pages 49-51 for job descriptions.

<i>Chart 44: Salary and Percentage Assigned to STEM Connect – FT Personnel</i>						
Position	2016-17	2017-18	2018-19	2019-20	2020-21	Post-Grant
Project Director <i>Split between Activities 1, 2 & 3</i>	\$68,200 100%	\$70,246 100%	\$72,353 100%	\$74,523 100%	\$76,759 100%	n/a
Administrative Asst.	\$27,610	\$28,438	\$29,291	\$30,169	\$31,074	n/a
Goal/Activity One STEM Connect Resource Center Dir.	\$51,460 100%	\$53,003 100%	\$40,944 75%	\$33,738 60%	\$17,375 30%	MVC funds 100%
Goal/Activity Two Transfer Manager & Articulation Specialist	\$46,750 100%	\$48,152 100%	\$37,197 75%	\$30,649 60%	\$15,784 30%	MVC funds 100%
Goal/Activity Three STEM Incubator Dir.	\$64,310 100%	\$66,239 100%	\$51,169 75%	\$40,935 60%	\$21,081 30%	MVC funds 100%
Goal/Activity Three Research Assistant	\$36,750 100%	\$37,852 100%	\$29,240 75%	\$24,093 60%	\$12,408 30%	MVC funds 100%
	\$295,080	\$303,930	\$260,194	\$234,107	\$174,481	
Fringe Benefits: 22%	\$64,917	\$66,864	\$57,242	\$51,503	\$38,385	
Annual FT Salary	\$359,997	\$370,794	\$317,436	\$285,610	\$212,866	

QUALITY OF MANAGEMENT PLAN *continued*

Chart 45: Adequacy of Budget to Ensure Fulfillment of STEM Connect Goals
All STEM Connect costs were carefully determined by the STEM Connect Taskforce and subsequently reviewed by the Vice President of Business to determine and confirm their adequacy and cost effectiveness.
<u>Reasonableness of Costs in Relation to Objectives, Design and Significance:</u> Utilizing cost effective practices to purchase only items that will have a direct impact on achieving STEM Connect goals, funding will impact MVCs capacity to increase the number of Hispanic students pursuing and graduating with STEM degrees. All items are in direct alignment with the specific actions and deliverables noted throughout this application and reasonable based on a review of other nation-wide and regional programs serving typically underserved students.
<u>Cost Effectiveness and Impact:</u> 85% of enrolling students are not ‘college-ready’ in math, and only 16% of students are ready to enroll in College Algebra after being in Developmental Math for two years. It took 6.7 years for 2014-15 graduates to attain their degree. STEM Connect will pilot innovations such as Contextualized Math Tutoring to help students progress through the STEM pipeline faster. With the STEM Incubator, we will be able to leverage our promising and best practices with other STEM courses at MVC and in other contexts.
<u>Sound fiscal management</u> will be assured through established procedures and an existing, comprehensive system of internal monitoring and reporting. All travel requests and contracts for professional services will be approved by the STEM Connect Director in accordance with established policy. No Federal funds will be used to replace institutional operating funds.

The STEM Connect Project Director will work closely with full-time staff, the Administrative Asst. and the Vice President of Business to develop a comprehensive STEM Connect *Project Manual*. This guide will be distributed to anyone paid from STEM Connect funds, the Advisory Council, and any other college personnel associated with this project. The Project Manual will specify all program policies and procedures, staff responsibilities, and Federal regulations and legislation.

The implementation strategy for STEM Connect is based on strategies developed and successfully implemented by several programs at Mountain View College that successfully serve low-income, academically under-prepared students. This includes but is not limited to TRiO Student Support Services and a 2010 Title V award. The charts on the following pages (pages 45-48) detail the timeframe to achieve project objectives with corresponding milestones.

QUALITY OF MANAGEMENT PLAN *continued*

Chart 46: Combined Implementation Strategies for the five-year grant period detailing tasks, responsible individuals, correlation with goals and timeframe for accomplishment are detailed in the following charts. Strategies that are repeated at intervals or are continued throughout the project are indicated accordingly and are not replicated multiple times.

PD = Project Dir.; **SD** = STEM Dean; **SCRC** = STEM Connect Resource Center Director; **TMAS** = Transfer Mgr. & Articulation Specialist; **SID** = STEM Incubator Director; **RA** = Research Assistant; **EE** = External Evaluator, and **AM** = Academic Mentors.

Year One: October 2016 – September 2017

Activity / Tasks	Responsibility	OBJ	Results / Milestones	Timeframe
Recruit, screen, interview and hire STEM Connect Project Dir.	Vice President & SD	1,2,3	Director hired.	By 12-2016
STEM Connect full-time staff recruited, screened, interviewed and hired.	PD, SD & Human Res.	1,2,3	Full-time staff hired.	By 1-2017
Establish bi-weekly STEM Connect team meetings and quarterly STEM Connect Advisory meetings.	PD and SID	1,2,3	Meetings set on calendar and coordinated with STEM Incubator discovery activities.	By 12-2016
Academic Mentors, Math Tutors, MVC STEM Alumni recruited, interviewed and hired.	PD, SCRC, TMAS, SID	1,2	Part-time staff hired. <i>Mentoring/tutoring services can begin before SCRC fully established.</i>	By 1-2017 & ongoing
Project staff trained in holistic advising techniques	PD, SD and Dean of Stud.	1,2,3	Training conducted. Ongoing training schedule developed.	By 1-2017 & ongoing
Retrofitting of existing space for SCRC development.	PD, SD, Vice Pres. of Bus.	1	Existing space retrofitted as STEM Connect Resource Center	By 3-2017
Focus2 software purchased to facilitate web-based advising support.	PD, SCRC	1,2	Software purchased and installed. Staff trained in usage to ensure 'connections' between SCRC and TMAS.	By 2-2017
Student goals identified and cited on Individualized Education Plan (IEP).	SCRC, AM	1	Students have IEP developed proving a roadmap to their graduation and eventual transfer to 4-yr.	By 11-1-2016 & ongoing
Student grades monitored w/ intensive academic assistance intervention when needed.	SCRC, AM	1	Students receive holistic advising services in attainment of education and career goals.	By 11-2016 & ongoing

QUALITY OF MANAGEMENT PLAN *continued*

Chart 47: Combined Implementation Strategies for the five-year grant period detailing tasks, responsible individuals, correlation with goals and timeframe for accomplishment are detailed in the following charts. Strategies that are repeated at intervals or are continued throughout the project are indicated accordingly and are not replicated multiple times.

PD = Project Dir.; **SD** = STEM Dean; **SCRC** = STEM Connect Resource Center Director; **TMAS** = Transfer Mgr. & Articulation Specialist; **SID** = STEM Incubator Director; **RA** = Research Assistant; **EE** = External Evaluator, and **AM** = Academic Mentors.

Year One: October 2016 – September 2017 *continued*

Activity / Tasks	Responsibility	OBJ	Results / Milestones	Timeframe
Math tutors trained in Contextualized techniques	PD, SCRC	1	Training conducted. Ongoing training schedule developed.	By 12-2017 & ongoing
Math APP Consultant interviewed/hired	PD, SCRC	1	STEM professional begins work onsite at MVC and develops schedule for review by PD	By 4-2017
Research and volunteer opportunities highlighted in SCRC	PD, SCRC	1	Research and volunteer (service learning) opportunities promoted in SCRC	By 3-2017
Research training, support and provision of presentation techniques offered in SCRC for STEM students	SCRC	1	Student work with staff and UTA graduate assistants to develop research papers and present on studies / volunteer activities conducted.	By 4-2017 & ongoing
STEM-a-Palooza event designed for kick-off in Spring 2017 / STEM Speaker series initiated	PD, SCRC	1	STEM-a-Palooza offered to MVC community, ISD partners and area residents.	Spring 2017 – each semester
Existing articulation agreements reviewed / meetings with 4-yr. IHEs	TMAS	2	Gaps identified in existing articulation agreements, and discovery meetings held with top transfer institutions.	Spring 2017 & ongoing
STEM Roadmaps to top transfer institutions developed / EE and SID affirm data set for review/analysis.	TMAS, EE, SID	2	Students have easy access to roadmaps assisting with their path to a 4-yr IHE.	Spring 2017 & ongoing
Students' Individualized Education Plan (IEP) modified to reflect transfer opps.	TMAS, AM	1,2	As students work toward graduation and transfer, their IEPs are modified accordingly and available online via web-based system to college-wide staff.	Spring 2017 & ongoing
MVC STEM Alumni host sessions in SCRC and offsite at 4-yr. IHEs	TMAS, PD	1	Students engaged in peer dialogues with MVC STEM graduates who have transferred.	By 3-2017

QUALITY OF MANAGEMENT PLAN *continued*

Chart 48: Combined Implementation Strategies. Strategies that are repeated at intervals or are continued throughout the project are indicated accordingly and are not replicated multiple times.

PD = Project Dir.; **SD** = STEM Dean; **SCRC** = STEM Connect Resource Center Director; **TMAS** = Transfer Mgr. & Articulation Specialist; **SID** = STEM Incubator Director; **RA** = Research Assistant; **EE** = External Evaluator, and **AM** = Academic Mentors.

Years Two-Three: October 2017 – September 2019

Activity / Tasks	Responsibility	OBJ	Results / Milestones	Timeframe
Recruit, screen, interview and hire Articulation Assistant.	TMAS	2	Assistant hired resulting in additional articulation agreements reviewed for gaps, and the continued development of new articulations.	12-2017
Advising and student tracking software continues to be utilized	PD, SCRC, AM, TMAS	1,2	MVC staff can access student information and assist in supporting IEP development linked with graduation and transfers. IEPs modified by TMAS	Ongoing
STEM Connect Advisory Council meetings continue to be held.	PD, SD	1,2,3	College community continually engaged to ensure institutionalization and fostering of proven innovations.	Quarterly
Papers submitted for presentations, Dashboard developed and updated and State of STEM report annually issued.	PD, SID, RA, EE	3	STEM enrollment, persistence, graduation and transfer data transparently provided	By 1-2018 & ongoing
Professional development offered to ISD, MVC and 4-yr. faculty/staff	PD, SID	3	Collaborative learning and engagement opportunities offered to P-16 STEM educators	Ongoing
STEM Connect conference hosted STARLINK Videos Recorded	PD, SID, RA	3	Collegial STEM education offerings hosted and dissemination of promising strategies/activities.	Spring 2019
Continue evaluative activities, reporting actions and formatively adjust as needed based upon reviews and STEM Incubator outputs.	PD, EE, SID, RA, SD	1,2,3	Continue to college, analyze and use high quality and timely data for decision making. Continual program improvement based on formative reviews and research findings.	Ongoing
Course revisions to revise articulations based on gap analysis	TMAS, SD, PD	2	Transfer pathways between MVC and 4-yr. IHEs developed and solidified	By 3-2018
Math APP piloted.	PD, SD	1	Mobile math APP aligned w/ MVC curricula	12-2017

QUALITY OF MANAGEMENT PLAN *continued*

Chart 49: Combined Implementation Strategies. Strategies that are repeated at intervals or are continued throughout the project are indicated accordingly and are not replicated multiple times.

PD = Project Dir.; **SD** = STEM Dean; **SCRC** = STEM Connect Resource Center Director; **TMAS** = Transfer Mgr. & Articulation Specialist; **SID** = STEM Incubator Director; **RA** = Research Assistant; **EE** = External Evaluator, and **AM** = Academic Mentors.

Years Four - Five: October 2019 – September 2021

Activity / Tasks	Responsibility	OBJ	Results / Milestones	Timeframe
Survey students and staff regarding concept of holistic advising / AM training assessed	PD, EE, SID, AM, RA	1,3	Promising/Best practices identified including student-centered connects with STEM staff	Ongoing
Continue P-16 PD offerings to MVC, ISD and 4-yr. IHEs	SID	3	Co-institutional P-16 STEM pathways and partnerships developed	10-19 to 9-21
Continue to implement and institutionalize process to review and modify articulations	TMAS	2	Transfer articulation requirements and innovative pathway development such as dual enrollment continues to be reviewed, developed and modified	10-19 to 3-20
Assess impact and effectiveness STEM Partner Advising Model with UTA	TMAS, EE	2	Determine co-advising (MVC/UTA) strengths/weaknesses and impact on goals.	12-19 12-20
Review research activity levels and UTA graduate research assistants continue to interact with STEM students – host poster sessions, and score research papers	SCRC, SID	1	Students inspired to participate in research activities, and support collaborative STEM work, resulting in quality papers, studies, and scientific presentations.	Ongoing
Identify students who have left STEM pathways – interview for rationale	PD, SCRC, AM	1,2	Recommendations provided for next steps – student voice continues to be heard for formative review and program adjustments	11-19, 2-21 8-21
Review math course persistence/success rates through sequence to transfer-level math	SCRC, PD, RA	1	Review math progression and impact on students' STEM graduation trajectory	11-19 2-21
STEM Connect conference hosted Dashboard/State of STEM continue	PD, SID, RA	3	Effective strategies for replication widely disseminated / use of STARLINK.	Spring 2019
Complete final evaluation and State of STEM for STEM Connect stakeholders.	PD, EE, SID, RA	1,2,3	EE meets with MVC/UTA leadership, STEM Incubator stakeholders and Advisory Council	9-2021

QUALITY OF MANAGEMENT PLAN *continued*

2. Extent Time Commitments of Project Director and Key Personnel Are Appropriate

Project Director: Upon funding notification, MVC will conduct an external search for this position. To assure effective project oversight and compliance with Federal regulations, the Taskforce has established a high threshold for minimum education and experience levels. The Project Director will have full authority and autonomy to administer the project.

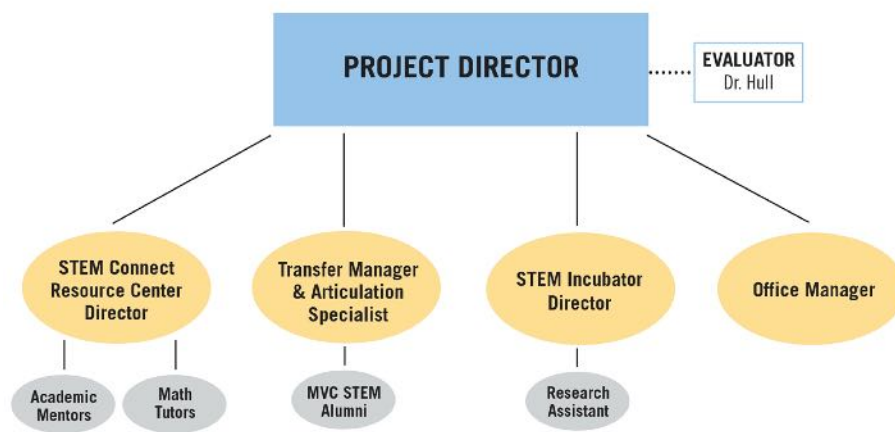


Table 50:

PROJECT DIRECTOR

Essential Duties and Responsibilities:

- Communicate informed understanding of project goals/objectives to all constituencies.
- Authorize all expenditures and maintain responsibility/control for budget.
- Coordinate evaluation activities with the MVC Research Dean and Ext. Evaluator Dr. Hull.
- Supervise the maintenance of required records and documentation for the project, including timely submissions of all Annual Performance Reports to the USDoeD.
- Provide timely and accurate information to the President and college leaders to support critical decision-making regarding project implementation.
- Maintain open, effective communications with STEM Incubator stakeholders and UTA.

Qualifications: Master's degree in education or related field from an accredited university and expertise with program management / fiscal compliance. This position requires a minimum of eight years of experience at the college level with Federal grant management experience highly recommended and the ability to provide leadership in project implementation across the entire college. Strong interpersonal skills, a demonstrated ability to manage large projects, build effective teams, analyze data and write proficiently also required.

The Project Director will have direct access to the President of Mountain View College and will be a member of the Executive Leadership team during the five-year project period.

QUALITY OF MANAGEMENT PLAN *continued*

To ensure that STEM Connect commences immediately upon funding notification, Dr. Stephen Jones, (STEM Dean and key member of the Taskforce) will serve as the project lead (with no grant funding assigned to salary support) and ensure that the key tasks noted in Year One are initiated - including but not limited to the posting of employment opportunities, and the retrofitting of space for the STEM Connect Resource Center. As the STEM Dean at MVC, Dr. Jones is responsible for overseeing the development of programs and activities that encourage underrepresented minority group participation in STEM fields of study.

<i>Chart 51:</i>	Dr. Stephen Jones RESUME Highlights
<i>Professional Experience:</i>	
2014 – Present: Executive Dean of STEM Programs [MVC]	
2009 – 2014: Program Administrator for ‘STEM Infrastructure’ [MVC]	
▪ Established a pre-Mechanical Engineering program with articulation to Univ. of N. TX	

Full-Time Positions are described on the following page. All of these will be new positions funded 100% by STEM Connect in years 1-2, 75% in year 3, 60% in year 4, and 30% in year 5. MVC Human Resources staff will encourage applications from members of groups typically underrepresented and will ensure that positions are filled using a multi-cultural screening committee according to EEOC guidelines. The multi-cultural interview team will be strictly instructed to look for evidence that prospective employees have a belief that postsecondary success is attainable for all Hispanic and other underrepresented students. Requirements for **Part-Time Math Tutors and Academic Mentors** include college hours beyond the associate’s degree, Tutor Certification (minimum of Level II) and demonstrated skills in working effectively with persons from diverse socio-economic backgrounds. Applicants will need to demonstrate to the Resource Center Director or lead faculty knowledge and competence in subject matter. Monthly Time and Effort reports will be collected by the Project Director for all ft/pt staff.

QUALITY OF MANAGEMENT PLAN *continued*

Chart 52: GOAL/ACTIVITY ONE: STEM Connect Resource Center (SCRC) Director

Summary: The Director will provide strategic leadership for the SCRC to ensure quality tutoring, mentoring and that Center activities align with STEM Connect goals. S/He will work with the STEM Connect Project Dir. to foster a student-centered environment in the space aligning advisement, tutoring, mentoring and research opportunities for STEM students.

Essential Duties and Responsibilities:

- Work w/ faculty and UTA representatives regarding the implementation of research experiences and host corresponding student presentations.
- Supervise Academic Mentors and Math Tutors / Design STEM-a-Palooza Events
- Ensure students' Individualized Education Plans developed and modified as needed

Qualifications: Master's degree in STEM program by start-date or Bachelor's with related field and student-service experience. Experience required in tutoring, advising and providing STEM-related services to underrepresented student groups.

Chart 53: GOAL/ACTIVITY TWO: Transfer Manager & Articulation Specialist

Summary: Provides academic advising and degree pathways for students to transfer to 4-year postsecondary institutions, provides mentoring to encourage transfers, and provides ongoing support of student needs related to transfers through ongoing comprehensive assessment. Serves as the key liaison with four-year postsecondary institutions and responsible for the development, revisions, and monitoring of articulation, reverse transfer and dual-enrollment agreements.

Essential Duties and Responsibilities:

- Clarify students' career goals by providing comprehensive advising related to transfer.
- Maintains knowledge of degree requirements and transferability of degrees to.
- Facilitate early interventions for transferring students
- Facilitate and track the successful transfer of participants to baccalaureate institutions
- Supervise and coordinate MVC STEM Alumni.

Qualifications: Master's degree in Counseling, Education or related field and two years of advising at a postsecondary institution. Experience working with diverse and underrepresented students. Knowledge of financial aid and admissions processes.

Chart 54: GOAL/ACTIVITY THREE: STEM Incubator Director

Summary: Provides leadership to the STEM Incubator and perform all functions related to the collection, interpretation and use of data for planning, assessment and decision making.

Essential Duties and Responsibilities:

- Administer and coordinate STEM Incubator convening's of P-16 STEM educators
- Ensure the integrity of data/information released in State of STEM report and on Dashboard
- Implement P-16 professional development activities.
- Publish papers, present at conferences and coordinate STARLINK productions with STEM Incubator stakeholders
- Assist in development of Annual Reports and serve as co-liaison with External Evaluator along with Project Director

Qualifications: Master's degree in Statistics (or related) and 3-5 years of analysis experience in educational settings. Familiarity with higher education data collection and research processes. Excellent interpersonal and communication skills to foster STEM Incubator P-16 collaborations.

QUALITY OF EVALUATION PLAN

(e) QUALITY OF EVALUATION PLAN:

1. Goals, Objectives, Outcomes are Specified and Measurable

Specified: The STEM Connect evaluation model incorporates high quality and comprehensive methods of evaluation. Ongoing, accurate and detailed evaluation is vital to the successful attainment of project objectives and MVC staff is well prepared to conduct this kind of evaluation based on strong college-wide planning and extensive experience with other state and Federal grant programs. **STEM Incubator:** As with so many elements of this program, the STEM Incubator will be an integral part of the evaluation process. Data will be transparently shared via the STEM Dashboard and the annual State of STEM report. The Project Director will work with the External Evaluator and the STEM Incubator Director to ensure that the evaluation will be both formative and summative and will begin immediately at project outset.

Measurable: MVC leadership strongly believes that an exemplary program is one that has (a) successful outcomes that are quantitatively linked to performance measures achieved; and has (b) a quantitative impact on students that *lead* to attainment of objectives and goals.

An external evaluator will be hired to provide an objective evaluation of grant implementation and performance measures. The Taskforce has identified **Dr. Darrell Hull to serve as the External Evaluator**. Please see below for a preliminary list of responsibilities.

<i>Chart 55:</i>	Responsibilities of the External Evaluator
Make two annual site visits to meet with project personnel, faculty and staff; review documentation; and evaluate progress toward meeting objectives.	
Provide consultation in making improvements to assessment processes.	
Offer recommendations on evaluation design and measures.	
Work with the Project Director in the construct and implementation of the summative evaluation including but not limited to (a) the extent to which the grant helped MVC achieve project goals and (b) the extent to which the grant has met the 'Key Performance Measures'.	
<i>Dr. Darrell M. Hull / Ph.D. (Educational Psychology) Baylor University; 2003</i>	

QUALITY OF EVALUATION PLAN *continued*

Chart 56: Evaluation Plan Linked to Project Objectives/Outcomes

Data Analysis: Formative evaluation data will be analyzed by the Project Director and grant staff (including the STEM Incubator Director and Research Asst.) on an ongoing basis.

Formative evaluation data will be used to prepare the summative evaluation.

Data Reporting: For each objective, the Project Director will submit a monthly report to the STEM Connect Advisory Council and Vice President of Instruction and submit an annual report to the MVC Executive Team comprised of all college VPs and academic deans. Formal performance reports will be shared with STEM Incubator stakeholders, made available as part of the STEM Dashboard, and when relevant, incorporated into the State of STEM report.

Objective 1: By 2021, MVC will have established a STEM CONNECT Resource Center resulting in the following outcomes:

Outcome 1.a: Increase by 5% per year the numbers of MVC students seeking degrees in STEM fields compared to 2015-16 baseline data.

Data Elements: Count the number of students who have STEM indicated on their Advising Reports with AS or AAS degree plans on file. **Data Collection:** Annually collected from

Advising Reports and from MVC student info. systems. Once purchased, this will be linked to Focus2 and the Student Workflow Systems allowing for STEM information to be easily queried.

Outcome 1.b: Beginning grant year two, increase by 8% per year the numbers of students taking transfer-level (Calculus+) math courses.

Outcome 1.c: Increase student success rates in all math courses by 5% per year in program years one-three, and 7% per year in program years four-five.

Data Elements: Count the number of students who are taking Calculus and have AS or AAS degree plans on file. Count the number of students who pass *any* math course with an A-B-C.

Data Collection: Annually collected from online grade reporting system DataTel.

Outcome 1.d: Double number of students participating in field research activities and/or conducting external research poster presentations by 2021.

Data Elements: Count the number of students participating in summer, volunteer or other organized scientific research activity, and/or externally presenting scientific data. **Data**

Collection: Annually collected by STEM Connect Resource Center Dir., who will be aware of research activity in Center and send out quarterly research requests to faculty.

Objective 2. MVC will have established a STEM graduation and transfer culture and developed STEM pathways with four-year postsecondary institutions resulting in the following outcomes:

Outcome 2.a: Increase the number of students who attain an AS degree by 4% per year and the number who receive an AAS degree with STEM discipline indicated on transcript by 11% per year. **Data Elements:** Count the number of students who have attained an AS (any) or AAS (STEM). **Data Collection:** Data will be annually collected from registrar's tracking system.

Outcome 2.b: Increase the number of MVC students who transfer to a four-year postsecondary STEM program by 5% per year. **Data Elements:** Count the number of students who have transferred to a 4-yr IHE. **Data Collection:** Bi-annually requested from the TX Higher Educ. Coordinating Board and NCES.

Outcome 2.c: ID gaps in existing STEM articulations and develop new/revised agreements for at least 85% of these gaps and complete a minimum of 12 new STEM articulations. **Data Elements:** Count articulation revisions and new agreements. **Data Collection:** Review of formally executed agreements signed by all Presidents.

QUALITY OF EVALUATION PLAN *continued*

Chart 57: Evaluation Plan Linked to Project Objectives/Outcomes *continued*

Objective 3: Create a STEM Incubator to research and study innovations, ensuring that all grant strategies will collect, analyze and *use* high-quality, timely data to improve STEM student outcomes relating to 2-year and 4-year STEM degree attainment.

Outcome 3.a: Beginning grant year two, STEM Incubator data featured on the MVC website in dashboard format, two papers annually produced, three conference proposals annually submitted and annual State of STEM report issued.

Outcome 3.b: Strengthen the P-16 STEM pipeline by providing shared (ISD, community college and university) professional development experiences (informed by research) for STEM faculty/instructors. **Data Elements:** Items produced and annually tracked. **Data Collection:** Project Director and External Evaluator will print screen shots affirming production and require STEM Incubator to quarterly submit copies of any papers/proposals, and track professional development offerings and attendance.

2. Methods of Evaluation are Thorough, Feasible and Appropriate

The Taskforce considered the best ways to evaluate this project even before all strategies and activities were firmly established. The following purposes (Chart 58) guided the development of evaluative components:

Chart 58: Purposes To Guide Evaluation Components and Plan

Establish and document baseline levels of performance for all goals and objectives.

Collect timely data that will produce a valid assessment of strategies used and results achieved.

Conduct quantitative and qualitative analyses and prepare reports documenting results.

Assure that the evaluation results will provide formative information to guide ongoing planning

This evaluation plan is both feasible and appropriate to measure the attainment of activity objectives. During the first project year, all the measures/methods of collecting both quantitative and qualitative data will be confirmed by the Project Director, External Evaluator Dr. Hull, MVCs Dean of Research and the STEM Incubator Director. Please see Chart 59 for an overview of additional instruments that will be used for review to inform reports, and Incubator activities.

Chart 59: Instruments Utilized and Reviewed To Inform STEM Connect Stakeholders

Student interviews	P-16 Faculty surveys	Math assessment data	Course grades in all STEM areas
Prof. Dev. surveys	Tutor Logs / Tracking	UTA STEM Partner Advising meeting minutes	

QUALITY OF EVALUATION PLAN *continued*

Formative / Summative / Effective Strategies for Replication

During regular staff meetings, the Project Director will utilize the BEST Evaluation Criteria for “Assessing Education Programs” to **formatively monitor strategy effectiveness**.

Chart 60: BEST Evaluation Criteria for Assessing Programs / SELECTED Questions

Were expected outcomes defined before strategy launch?
--

Is outcome data attributable to the strategy intervention?
--

What was the value-added of the experience to the target population?
--

Is there evidence of effectiveness with a population different from that originally targeted?

Building Engineering and Science Talent, A Bridge for All: Higher Education Design, 2004
--

A **summative evaluation** of the achievement of annual objectives will be conducted at the end of each program year, as will the corresponding State of STEM report. Each annual evaluation will include conclusions and recommendations for project modifications. These reports will summarize the annual progress made in comparison to activity timelines, any problems or obstacles not overcome, and the budget status of activities aligned with the objectives.

Strategies for replication will be centered around the P-16 STEM Incubator activities, including but not limited to the STARLINK video streaming modules, which will be available at no cost to all Texas colleges and universities (page 40).

WWC Evidence Standards With Reservations

This evaluation will produce evidence about the projects effectiveness that would meet WWC Evidence Standards as indicated in Chart 61. Additionally, the STEM Incubator P-16 stakeholders will potentially allow for a multi-site analysis to be considered by Dr. Hull.

Chart 61: STEM Connect's Connections to Producing Evidence About Project Effectiveness

Independent External Evaluator (Hull)	Evaluation results will be shared broadly (STARLINK)
---------------------------------------	--

Evaluation design incorporates high-quality implementation data and performance feedback
--

Evaluation design includes a clear and credible analysis plan that aligns with project impact

Pathways through which innovation is expected to affect intermediate and ultimate outcomes
--

<i>These items identified by Instit. of ED Sciences @ 6-2013 "Evidence & Evaluation Webinar"</i>
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