

**The MESA Community College Consortium  
A Model for Industry – Education Partnerships  
WEPAN 2007**

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**Abstract:**

The California Mathematic Engineering Science Achievement (MESA) Program's NSF Scholarship Consortium (S-STEM)

California MESA has aligned both the MESA Engineering Program (MEP) and MESA Community College Program (MCCP) divisions to establish a comprehensive statewide scholarship initiative, which has strengthened the matriculation and communication channels for successful community college transfers in the STEM fields.

Within the context of the presentation MESA will also provide a snap shot of the \$9.2 mm consortium's operational infrastructure. We will discuss the rational of a broad based effort and the resources necessary to manage large-scale grants.

Description of Presentation: MESA will provide a snap shot of the core elements (retention & transfer components) modified to streamline the transfer matriculation process for STEM students.

- MESA will demonstrate the use of effective accountability tools and matrices to improve reporting, monitoring and tracking. We will look at report or queries used to monitor STEM transfers, persistence, graduation and employment data; campus sub-awards, scholarship distribution and collateral storage.
- MESA will demonstrate how the consortium was developed by identifying outcomes that are important to both the participating universities, community colleges as well as granting agencies and private industry.
- MESA will demonstrate how this inter-segmental pathway initiative leverages additional state and federal funds, such as the NSF (S-STEM, AGEP & STEP).
- MESA will demonstrate how this initiative has contributed to aligning STEM academic support infrastructures at both the 4-year and 2-year institutions to ultimately improve STEM transfer rates.

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Purpose: To promote the value of building statewide and/or regional alliances to leverage limited academic support program resources. Maximize outreach and retention resources to help grow the numbers of STEM graduates.

The recommended target audiences for the presentation are woman in Engineering Director's, MEP Directors, MESA Community College Directors, and industry representatives.

We will also share lessons learned with regards to collaboration and external partnerships.

### **Introduction:**

As we complete our 7<sup>th</sup> year of S-STEM activity, the Community College S-STEM (CSEMS) Consortium attributes our success to the effective multi-organizational consortia model. Since 2000 the Consortium has positively improved the transfer rate of MCCP students by over 10%, which brings the rate to an astonishing 98%. The Consortium's academic support infrastructure along with S-STEM continues to demonstrate un-paralleled persistence, transfer and graduation outcomes; but the expanded pool of these academically prepared graduates has revealed the immediate need to reform the delivery of our professional development services to improve employment skill development of the scholars earlier in their academic experience. The Consortium has expanded the professional development services within its infrastructure to better prepare S-STEM scholars with improved employment preparation skills and field related experiences, which will ultimately produce a greater pool of well rounded candidate for the competitive technical workforce.

The Consortium, led by the Mathematic Engineering Science Achievement Program (MESA), will extend further the partnership activities with the University of California, the California State University system wide offices, the NSF Louis Stokes Alliance for Minority Participation (LSAMP), NSF- UC Alliance for Graduate Education and the Professoriate (AGEP), community colleges (35), universities (24), and private industries on behalf of the students. The Consortium offers additional support through partnering with industry volunteers active with the PG &E-MESA Professional Development Trainings and NSF funded BA-STAR (Undergraduate Summer Research initiative), both structured to provide S-STEM scholars with early access and exposure to career-related opportunities in their S-STEM disciplines.

### **A National Model for STEM Transfers:**

A community college and university consortium (CCCTSC) was formally established in 2000 to award scholarships to pre-transfer students enrolled in the MESA Community College Program (MCCP) to: (1) provide financial incentives to help student's maintain full-time educational commitments and continuous collegiate enrollment; (2) minimize pressures to fulfill outside employment responsibilities that impose difficulties on academic success; (3) provide early access to practical career related experiences through internships and research opportunities; and, (4) foster meaningful opportunities for team building, collaboration and workplace socialization.

### **Background:**

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Significant structural trends in the U.S. economy have generated increased demand for employees with education and training in computer science, engineering, and mathematics (CSEM) disciplines. Regardless of slower economic and labor market growth in the short term, labor market demand for people with advanced skills is expected to remain unsatisfied through the year 2009. The five fastest growing occupations over this projected period all require CSEM skills and three of these specific occupations require an information technology or computer science baccalaureate. Seventeen of the top 20 fastest growing jobs in the nation are in fields for which CSEM knowledge is required, including positions in engineering, health care, and technology.<sup>1</sup>

Conservative estimates of the costs incurred by the whole economy from this particular labor shortage range from \$3 billion to \$4 billion per year.<sup>2</sup> Former Federal Reserve Chairman Greenspan, as well as representatives of the National Science Foundation, the US Commerce Department's Office of Technology Policy and the Information Technology Association of America (ITAA) and other notable commentators, has spoken to the critical nature of this problem before Congress and in the media.

This problem is most acute in California. The state's technology-based local economies and the rapid rate of technological diffusion in other industries generate an extraordinary demand for CSEM skills. Moreover, statewide enrollment growth enhances the potential to address the states long-term skill shortages. Through 2010, for example, the University of California expects increased enrollment of 63,000 students, reflecting a 43% increase. Enrollment is expected to increase by 36% at California community colleges and by 37% in the California State University system over the same period.<sup>3</sup> It would seem that more students enrolling would equal more graduates in the CSEM fields, but students must be given incentives to enter and persist to degree or the current decline in the CSEM disciplines will continue. The rising cost of college tuition and the small amount of grant funding available to students reduce the feasibility of college education for low-income students, many of whom are ethnic or racial minorities<sup>4</sup>.

Responding to more immediate needs, numerous business leaders have lobbied Congress for increases in an annual cap of H1-B worker visas. ITAA, however, has termed this response a temporary solution at best. Longer-term solutions, according to this organization, include (1) addressing the under-representation of women and minorities in IT jobs; (2) increased support for educational institutions; (3) increased financial aid to students to foster degree completion, and; (4) and the formation of multi-organizational consortia to coordinate these changes.<sup>5</sup>

Our Consortium responds to these factors by targeting groups of students who, while underrepresented in higher education and industry, tend to be found in greater numbers at community colleges. These students also tend to have greater needs for financial assistance.

<sup>1</sup> Source: 1998-2008 *Occupational Outlook Handbook*. Washington, D.C.: U.S. Department of Labor, 1998.

<sup>2</sup> Gaudin, S. *Network World*, July 13, 2000: 13.

<sup>3</sup> Maclay, K. Higher Education Faces Flood of Students. Berkeley, CA.: *Berkeleyan*, January 26, 2000: 1.

<sup>4</sup> Dr. Gary May and Darryl E. Chubin: A Retrospective on Undergraduate Engineering Success for Underrepresented Minority Students, *Journal of Engineering Education* ((January 2003)

<sup>5</sup> *Bridging the Gap: IT Skills for a New Millennium*. Arlington, VA. - Information Technology Association of America, 1999.

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They are more likely to be non-white, from low socioeconomic backgrounds and generally less academically prepared than other groups.<sup>6</sup>

Over one third (35) of the institutions in the California community college system operate a MESA program and are aligned with the S-STEM Consortium (*See Attachment H*). In addition, there are 59 campuses that have the infrastructure and campus commitment to continue to participate as partners in the proposed 2006-2011 Consortium. Seven of the community college campuses are out of state institutions (*See Attachment H*).

The eligible pool of S-STEM candidates has expanded more than 100% over the past five years. For the 2008 academic year MCCP directors are projected to invite over **500** eligible applicants for the Consortium scholarship.

The impact and visibility of the S-STEM Scholarship on the 35 participating community colleges and their surrounding communities is profound. On some campuses, the MESA cohort makes up a large part of the transfer level classes. For example in a 2004-05 survey of all Calculus I students at El Camino College who successfully passed calculus on the first try, 90% of them say that MESA Academic Excellence Workshops (supplemental instruction) were the reason they succeeded. These students provide powerful role models and send strong messages about success to other underrepresented students who follow. Students who can concentrate on academics and worry less about the financial costs of education are able to commit more time to academic studies. For families and peers, these images of success cut across the boundaries that often separate students from rural and urban settings. Children of farm workers are equally as successful as students coming from inner cities or from remote reservations and Rancherias.

The S-STEM scholarship award presentation is a core element of the MCCP Transfer Awards Banquet, which takes place annually at the 39 participating community college campuses. The S-STEM Scholars are recognized at the banquet as well as through campus and local newspapers. The scholarship presentation at the banquet also serves as an incentive for over **4,200** freshmen and sophomore MCCP students statewide and nationally.

### **Broader Impact:**

The consortium overall objective is to respond to broader societal concerns voiced by policy leaders and eminent industrialists. The demand for trained professionals clearly exists. The need to provide resources to galvanize the two higher education systems (cc & university) is core to our nations need to address the supply side of the equation to help mitigate current and future skill shortages, while providing new pathways to students, families, and communities separated from the scope of opportunity offered by the technological world.

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<sup>6</sup> Source: California Community Colleges Chancellor's Office.

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### **Enhancing the Infrastructure for Education:**

Approximately one-third (**35**) of California's **110** Community College's and **80%** of its accredited engineering institutions are partners in the Consortium. Due to the statewide impact of the Consortium, S-STEM has become a core component of the MESA Statewide undergraduate (community college and university) infrastructure. The comprehensive student support infrastructure (MESA/Consortium) has been institutionalized at each participating university and community college to increase retention and transfer services for the S-STEM scholars. (See table A)

### **Results from Prior NSF Support:**

The recently released American Council on Education study, Increasing the Success of Minority Students in Science and Technology, states "the biggest challenge for institutions seeking to improve student persistence is encouraging students to work less and attend full time consistently<sup>7</sup>.

Through the work of the Consortium, we have distributed over 500 scholarships to qualified students to fulfill successful transfer while maintaining full-time educational commitments and continuous college enrollment. To date the Consortium has produced over 236 graduates who have entered our nation's technical workforce as well as pursuing advanced degree completion. At the same time, these resources have helped the students minimize the pressure to fulfill non-field related employment responsibilities that previously posed difficulties for their academic success. For the past six years the CSEMS (S-STEM) Consortium has worked to improve the academic readiness of over **5,000** community college students primed for transfer in the CSEM disciplines. As we have learned from awarding the CSEMS scholarships, adequate financial aid and appropriate prerequisite CSEM courses are major transfer and graduation enablers for a student in the rigorous CSEM fields.

Since the inception of CSEMS the eligible pool of scholars has risen annually and is now yielding approximately **300** candidates. The number of underrepresented students enrolled in the MESA Community College Program (MCCP) continues to rise due to the effects of Proposition 209 as the 4-year institutions have greater selectivity with their admissions process and criteria. In 2004-2005, over 63% of the MCCP enrollments were students from historically underrepresented groups. MESA directors continue to seek grants, internships and other assistance that will better prepare and expose these groups to CSEM opportunities.

### **The Consortium's National Impact in Reaching Underrepresented Groups:**

The 2002 US General Accounting Office (US GAO) report to Congressional Requesters on Grants from H1-B Visa Fees substantiated the relevance of the **Consortium** as the nation's largest producer of S-STEM scholars. Of the **277 S-STEM Grants** (colleges and consortiums)

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<sup>7</sup> Eugene Anderson and Dongbin Kim Increasing the Success of Minority Students in Science and Technology, American Council on Education, Washington, DC: (Spring 2006)

awarded nationally, the Consortium successfully transferred **24 % of the Latino** scholars and **48 % of the computer engineering** scholars. (*See Table 3*)

#### **Dissemination:**

The outcomes derived from tracking the S-STEM scholars attending the 59 participating community colleges and universities are provided in quarterly and ad hoc reports to a broad constituency. Detailed reports on student persistence, transfer, employment and gross trends statewide, to the University of California Office of the President, California Community College Chancellor's Office, NSF, US GAO, Congress, California State Legislature, Georgia Regents and the California State University Chancellor's Office are provided. The Consortium utilizes four statewide and national forums to showcase the successful collaborative model and share "best practices."

#### **Project Merit:**

Over the past 25 years higher education research has consistently shown the positive impact of financial aid, and especially scholarship aid, on the persistence of low-income and minority students (e.g., Astin & Cross, 1979; Stampen & Cabrera, 1988; Gandara, 1993; Fenske, et al., 1999; Perna, 1997; Fenske et al., 2000). The project builds upon that intellectual base to create a program for the delivery of scholarship aid to transferring students in CSEM disciplines. As indicated by the literature and seven years of outcome data, that increased scholarship aid has and will reduce work hours in unrelated fields and reduce debt burden for recipients of S-STEM awards. By removing these two factors identified in the research as negatively associated with degree completion, S-STEM scholars will be more likely to transfer, persist and complete degrees in a timely manner.

#### **Target: Diverse Technical talent Identified Within the GA, NY, NJ, IL, NM, TX, FL and CA. Community College systems:**

The S-STEM Grant has provided the Consortium with the capacity to award over **500 S-STEM** scholarships nationally, allowing MESA and the Consortium to leverage the long-standing relationship with over **150** technical industry partners. The community college division of MESA has become the point of entry and provides early access for the recruitment of diverse technical talent in the S-STEM fields.

#### **The Consortium's Impact on Enhancing Industry and Education Collaboration:**

While this is not a new concept, there are new avenues being explored. One such effort is linking cash and equipment grants such as HP's Community College Wireless Mobile Classroom (480 Pc's to participating faculty and S-STEM scholars along with printers, digital cameras and Pocket Pc's.)

Student Leadership Development Conference (SLDC) is an annual professional development event reaching over 130 students. The conference is sponsored and facilitated by representative from industry (PG&E, Intel, HP, FedEx, Chevron and AT&T). Leading Industries are shifting

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their philanthropic and recruitment resources to include community colleges. The Consortium will continue to foster an environment for local industries to cultivate, recruit and employ technical talent enrolled at the community colleges. (*See Attachment F*) .In 2005 the industry partners established a formal internship component where 20-25 internships are awarded to participating students each summer.

### **Joint Advising Between Community College and University Educational Systems:**

The participating universities and community colleges offer joint advising sessions for pending transfers to enhance transfer articulation. Success in demystifying transfer articulation for transfers in CSEM disciplines has improved California's transfer rates.

The S-STEM scholars are required to participate actively in MESA's core retention services (i.e. math/science Academic Excellence Workshops, tutoring, advising, career awareness/orientation course and student-faculty interaction). Rigorous academic preparation is encouraged and facilitated through MESA. A preliminary examination of data for the 2002-2003 academic year continues to show that students entering MCCP increase their grade point average one-half grade point within the first two semesters

### **Tables Demonstrating Consortium Progress and Success:**

**Application and Funding:** In fall 2000, **274** eligible transfer-ready students from **39**<sup>8</sup> **community colleges** applied for S-STEM funding. **60** of these students were awarded scholarships on the basis of established selection criteria. In addition, 313 eligible transfer-ready students from **35 community colleges** applied for S-STEM funding in fall 2001, **75** of these students were awarded scholarships. In fall 2002, **95** students were awarded scholarships. In fall 2003, **59** students were awarded 2-year awards.

In fall 2004, 41 students were awarded four-year scholarships with the initial year funded at the community college while 54 transfer students were awarded three-year scholarships. In addition 33 continuing scholars received one-year augmentations to support continued enrollment at their respective universities. In fall 2005 25 students were awarded four-year scholarships with the initial year funded at the community college, while 44 transfer students were awarded three-year scholarships. These groups of CSEMS scholars transferred to four-year institutions<sup>9</sup>.

The Consortium presently represents 35 of 110 California community colleges along with 6 out-of-state programs, and in 2004-05 MESA produced 2142 underrepresented minority transfers in CSEM disciplines. Since 2000 the Consortium has produced 422 CSEM Transfers. Of all the students in the Consortium, 39 percent have transferred to the University of California member institutions (UC), the state's flagship major research university. In addition 57 percent have

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<sup>8</sup>35 of these sites are a part of the Consortium.

<sup>9</sup>22 of these sites are a part of the Consortium.

transferred to California State University (CSU) member institutions. All of these students are underrepresented.

**Table 1**<sup>10</sup> refers to the transfer destinations of the Consortium Scholars:

<b>TABLE 1: -3-Year Transfer Destinations of Consortium Scholars</b> (See Roster of Partnering Campuses)							
<i>University/System</i>	<i>AY '00-'01 Transfers</i>	<i>AY '01-'02 Transfers</i>	<i>AY '02-'03 Transfers</i>	<i>AY '03-'04 Transfers</i>	<i>AY '04-'05 Transfers</i>	<i>AY '05-'06 Transfers</i>	<i>System Total</i>
	42	39	39	31	42	49	<b>242</b>
<b>Private (2)</b>	4	3	6	2	0	3	<b>18</b>
<b>University of California (8)</b>	14	33	50	26	17	20	<b>160</b>
<b>Column Totals</b>	<b>60</b>	<b>75</b>	<b>95</b>	<b>59</b>	<b>59</b>	<b>74</b>	<b>422</b>

**Major Disciplines:** 422 S-STEM scholars have successfully transferred to four-year institutions as majors in the following disciplines through Spring 2006: (See **Table 2**<sup>11</sup>)

<b>TABLE 2: Major of Consortium Scholars</b>								
<i>Discipline</i>	<i>AY '00-'01 Transfers</i>	<i>AY '01-'02 Transfers</i>	<i>AY '02-'03 Transfers</i>	<i>AY '03-'04 Transfers</i>	<i>AY '04-'05 Transfers</i>	<i>AY '05-'06 Transfers</i>	<i>Discipline Total</i>	<i>Pct.</i>
<b>Computer Eng.</b>	6	12	13	5	5	7	<b>48</b>	11%
<b>Civil Eng.</b>	7	5	12	10	6	8	<b>48</b>	11%
<b>Electrical Eng.</b>	11	25	20	12	7	12	<b>87</b>	22%
<b>Mechanical Eng.</b>	10	11	12	8	10	10	<b>61</b>	14%
<b>Computer Sci.</b>	10	3	11	5	3	5	<b>37</b>	9%
<b>Mathematics</b>	4	7	12	5	11	8	<b>47</b>	11%
<b>Other Engineering</b>	12	11	15	14	17	24	<b>93</b>	22%
	<b>60</b>	<b>75</b>	<b>95</b>	<b>59</b>	<b>59</b>	<b>74</b>	<b>422</b>	<b>100.0</b>

<sup>10</sup> Source: Database: MESA Consortium Scholarship System

<sup>11</sup> Source: Database: MESA Consortium Scholarship System



**Cohort Demographics:** In addressing the needs and concerns common to private industry, public organizations and local communities, the Consortium continues to make awards to a diverse cohort of transfer-ready scholars in the CSEM disciplines. (*See Tables 3 and 4*)<sup>12</sup>

**National Impact:** In contributing to the diversity of the national S-STEM effort, the Consortium has awarded **24% of all Hispanic S-STEM Scholars (233 out of 957)**. The Consortium is also bridging the “Digital Divide” by supplying **48% of all S-STEM scholars majoring in Computer Engineering (36 out of 75)**. (*See Table 3*)<sup>13 14</sup>

TABLE 3: <u>The Impact of the Consortium on the National S-STEM Effort</u>						
Category	Characteristic	Total of all S-STEM Recipients (Nationally)	% of All S-STEM Recipients	Total of all MESA S-STEM Consortium Recipients	% of MESA Consortium Recipients	Consortium % of All S-STEM Recipients (Nationally)
<b>Gender</b>	Male	4,610	60%	<b>203</b>	<b>70%</b>	<b>4%</b>
	Female	2,859	37%	<b>85</b>	<b>30%</b>	<b>3%</b>
<b>Ethnicity</b>	African American	1,409	20%	<b>48</b>	<b>17%</b>	<b>4%</b>
	Hispanic	957	14%	<b>233</b>	<b>80%</b>	<b>24%</b>
	American Indian	117	2%	<b>7</b>	<b>3%</b>	<b>5%</b>
<b>Major</b>	Computer Science	2,958	38%	<b>29</b>	<b>10%</b>	<b>1%</b>
	Computer Engineering	75	1%	<b>36</b>	<b>13%</b>	<b>48%</b>
	Mathematics	790	10%	<b>28</b>	<b>10%</b>	<b>4%</b>
	Other Engineering*	2,844	37%	<b>195</b>	<b>67%</b>	<b>7%</b>

*\*Note: Other Engineering consists of Civil, Electrical and Mechanical Engineering disciplines. Table 5 reflects combined data from U.S. GAO Report (2002) and the MESA Consortium Scholarship System.*

**Persistence:** On average nationally, it takes community college transfers 3.5 years to graduate. The graduation rate at universities for transfer students persisting in high unit majors is closer to 4.5 years.

Over the first six years, the S-STEM scholars transfer persistence is greater than 94%. 37% of the scholars graduated needed only two years to complete degrees at the four-year institution. After 6 years of offering CSEMS (S-STEM) scholarships over 52% of the scholars had graduated. (*See Table 4*)<sup>15</sup> The latest CSU<sup>16</sup> and UC<sup>17</sup> persistence data over a 10-year period

<sup>12</sup> Source: Database: *MESA Consortium Scholarship System*

<sup>13</sup> Source: U.S. General Accounting Report to Congressional Requesters: *High Skill Training, September 2002*

<sup>14</sup> Source: Database: *MESA Consortium Scholarship System*

<sup>15</sup> Source: Database: *MESA Consortium Scholarship System*

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indicates that the average time to degree after transfer to the four-year University for high unit CSEM majors is 3.8 years. The average time to degree after transfer to the four-year university for high-unit MESA S-STEM Scholars is less than three years.

**TABLE 4: MESA/NSF S-STEM Consortium Persistence, Graduation, and Time-to-Degree**

Entering Transfers		Persistence Rates		Graduation Rates		Avg. Time to Degree
Cohort	Number	1-Year	2-Year	2-Year	3-Year	Calendar Years
<b>Fall 2000-02</b>	60	98.5%	90.9%	<b>37.4%</b>	<b>57.3%</b>	<b>2.7</b>
<b>Fall 2001-03</b>	75	98.8%	96.2%	<b>37.9%</b>	<b>52.8%</b>	<b>2.6</b>
<b>Fall 2002-04</b>	95	99.2%	98.1%	-	-	-
<b>Fall 2003-06</b>	59	-	-	-	-	-
<b>Fall 2004-05</b>	59	-	-	-	-	-
<b>Fall 2005-06</b>	74	N/A	N/A	N/A	N/A	N/A

#### **New Cohort of Transfer-Ready Scholars :**

Since the spring of 2000 MESA has tracked the progress of all S-STEM Consortium applicants and awarded scholars through professional employment, thus committing to serve S-STEM scholars beyond the life of the grant.

The Consortium and MESA look to serve S-STEM scholars beyond graduation. The Consortium will further support:

- ❑ The academic support infrastructure preparing over 500 CSEM students for fall 2008 transfer as well as an additional 250 transfer candidates for spring 2008.
- ❑ Scholars after professional employment by formalizing the S-STEM mentor and alumni network, to match alumni volunteers with related Student Professional Development activities and networks.
- ❑ Expanding the pool of eligible candidates' for advanced degree opportunities.

<sup>16</sup> Source: *California State University Statistical Abstract to July 2001*

<sup>17</sup> Source: *The Regents of the University of California*

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Several of the Consortium's (MESA) industry partners have shifted their outreach and recruitment efforts to engage students at the community college level. The S-STEM Consortium continues to yield great results for our scholars with our industry partners. The past three cohorts of awarded scholars and applicants were granted **267 internships, co-ops and summer jobs**. Also during the past six years over **45 Undergraduate Research opportunities** were granted to scholars and applicants. (*See Attachment E*)

- ❑ **Career opportunities** - Over **40 technical industries** and **25 research centers** modified their MESA partnership to expose community college students to technical opportunities.
- ❑ **Resume building** – The community college students are able to demonstrate academic achievement by featuring the NSF S-STEM Scholarship on their resume. Industry recruiters identify the scholarship as recognition of community involvement and academic achievement indicating a well-rounded student (marketable pre-university talent).
- ❑ **Industry focus** – In the race to attract the best and the brightest CSEM talent, partnering industries are revising recruitment strategies to access talent at the community college level. The PG&E Student Leadership Training has become a forum to expose partnering universities and industries to S-STEM scholars.
- ❑ **Increased student interest** – The S-STEM Scholarship has enabled industry to match technical employment opportunities with CSEM scholars, which ultimately contributes to broadening student interest in these fields. Industries and agencies that are benefiting from the partnership include HP, Intel, IBM, AT&T, PG&E, Lockheed-Martin and Caltrans.

#### **Workforce Enabler:**

The Consortium has enabled local industries to recognize the technical talent pool at the community colleges as an environment to cultivate for recruiting and employment. This exposure has helped to dispel a long-standing stigma created by technical recruiters who may believe that community colleges do not provide an environment to cultivate students through internship and professional development training. Industries will continue to support campuses and communities active in the Consortium. (*See Attachment D/E*) HP has partnered with the Consortium by providing over \$3, 000,000 in equipment for student use (lap tops, printers and digital cameras) and with technical support and “E-mentors” for 24 MCCP centers (academic years 2001-Present).

- ❑ In 2004 Pacific Gas and Electric Company (PG&E) funded a four-year, \$300,000 partnership with MESA to offer industry-lead Professional Development trainings serving over 600 MESA students including 240 S-STEM scholars who demonstrate promise and/or potential as leaders upon successful transfer.
- ❑ Intel has provided \$75,000 in seed money to pilot an accelerated algebra and calculus project for 75 underrepresented minority CSEM students. Intel plans to expand the project in 2004 (approximately \$1.5 to \$2 million) to serve over 3,000 community college students statewide.
- ❑ The partnering industries have identified volunteers from their technical workforce to support the Consortium's professional development components. HP, Caltrans, Intel and

AT&T each have established a statewide and national presence as corporate partners with community colleges. Several companies have active volunteers at community colleges to engage current and future S-STEM scholars.

- ❑ Enlist Consortium's alumni to remain involved as mentor/role models with the Student Leadership Conference and campus-based activities.

The Consortium has become a major outreach beacon for MESA Community College Programs (MCCP) and has captured the attention of parents, alumni, community leaders and clergy by:

- ❑ Promoting and gaining support and opportunities via churches, community centers and informal learning environments for the families of students interested in CSEM fields.
- ❑ Educating potential talent at the community college about the realities of university transfer in CSEM fields. With 30 percent of the Consortium's community colleges situated in rural and remote communities, the Consortium's scholarship is typically the only financial assistance (other than need-based financial aid) granted to those students while enrolled at the community college.
- ❑ Improving community college, university undergraduate and graduate school articulation in CSEM majors through the collaboration of math, science and engineering community college instructors and university faculty.
- ❑ Promoting CSEM staff/faculty to visit (outreach) community colleges to assist with transfer advising and matriculation and enhancing the MCCP Transfer Awards Banquet. The annual event is a forum to honor transfer students in the presence of faculty, parents, peers and administration. For the past three years S-STEM and technical employment presentations has become core to the banquet's success.
- ❑ Student Leadership Conferences (PG&E/SDG &E) –enlisting the involvement of additional corporate volunteers from AT&T, Intel, Lockheed-Martin, HP, etc.

### **Infrastructure:**

The MESA statewide organization, under the auspices of the University of California Office of the President (UCOP), will continue to serve as the coordinating unit of the Consortium. The 2006-10 Consortium will maintain the successful alliance established with the 39 MESA community colleges (MCCP) and 24 university programs (MEP), which include the NSF sponsored Louis Stokes CSU AMP, UC CAMP and both AGEP. The Consortium model will expand its efforts by formally including NSF funded BA –STAR initiative and industry lead PG&E SLC to support S-STEM scholars with early career related exposure and experience. The collaboration continues to close the gap for CSEM transfers from our historically underserved communities. The Consortium has also drawn together personnel and resources in a statewide as well as national campaign to better expose and prepares these students.

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- ❑ The cross-divisional collaboration will continue to improve the number and rate of transfers to four-year institutions.
- ❑ The Consortium will continue to lead MESA (MCCP & MEP), NSF funded (CAMP,AMP, UC AGEF & BA-STAR) and their partnering faculty to greater physical presence within 39 community colleges, 24 undergraduate engineering programs and 9 graduate programs in the CSEM disciplines.
- ❑ The Consortium monitors existing scholars from community college enrollment through technical employment or advanced degree completion.
- ❑ UCOP will continue to facilitate the efficient distribution of funds to participating community colleges and four-year institutions on behalf of the S-STEM scholars.

The MESA infrastructure is ideal for the operational support of the Consortium. The 00-11 S-STEM grants have enhanced the student support infrastructure on all participating universities and community college campuses. The grant made provisions for the MCCP's and MEP's to provide a 1-unit Transfer Orientation Course to serve all MESA transfers, particularly Consortium scholars. In the past six years over 7,500 transfers have enrolled in the orientation course, including all of the S-STEM scholars. The Consortium delivers a comprehensive career and professional development element to reach all scholars before their junior level.

**MCCP:** With field operations at **39** community colleges, MCCP will serve nearly **4,000** students annually and prepare an average of 500-600 students to successfully transfer to four-year institutions. Most recent figures (04-05 data) indicate a 98% success rate for MCCP transfers to four-year institutions. In any typical academic year, approximately **90** % of the MCCP cohort reaches degree completion in computer science, engineering or math majors. The ultimate goal is to serve all students interested in CSEM on all participating campuses. Each MCCP is structured to provide **13** components for ultimate student success (*See Attachment A-3*). Under the Consortium the seven MESA Student Academic Service components listed below continue to be enhanced through the availability S-STEM scholarships and infrastructure:

- **Student Study Center/Computer Lab**
- **Academic Excellence Workshops**
- **Transfer Orientation Courses**
- **Career Development Workshops**
- **Academic Advising**
- **Financial Aid Advising**
- **Major Advising**
- **Academic Plan Consultation and Review**

**MESA Engineering Program (MEP):** Operating under an affiliation with the University of California's MESA Program, MEP serves more than 6,300 undergraduates in the fields of computer science and engineering attending 20 accredited engineering programs in California and four out of state. (*See Attachment A-4*)

Listed below are established California statewide educational outreach programs, which are committed partners in the Consortium, supporting the S-STEM scholars to matriculate to universities as math majors:

**Lewis Stokes Alliance for Minority Participation (AMP):** The NSF funded alliances are composed of 17 CSU and 9 UC institutions. The objective of these statewide initiatives is to double the annual rates of baccalaureates in CSEM.

#### **Monitoring System and Award Process:**

MESA tracks each transfer cohort effectively through advanced degree completion or technical employment. Five-year longitudinal studies show that it takes approximately 3.5 years to graduate from either the UC or CSU system. By implementing a mechanism to track student progress and persistence, MESA possesses an effective system for reporting accurate data to NSF, community college and university educational segments and the US GAO.

The Consortium has the infrastructure to monitor scholars from transfer through graduation and career. Information regarding the scholars and applicants is centrally located within a database developed with Microsoft Access and SQL by the S-STEM Coordinator. This system allows ease in generating reports for all scholars within each cohort on a term-by-term basis. In addition, the database maintains an accurate fiscal accounting of funds disbursed, which can be cross-referenced in a multitude of ways; i.e. scholar, university, cohort, student retention or attrition, and on a contractual basis.

The Project Coordinator routinely requests and receives persistence and matriculation data from universities and community colleges throughout the academic year according to a deliverables schedule. These data are compiled and incorporated within the database routinely. The database generates fixed and ad-hoc reports to NSF, US GAO, UC Contracts and Grants and Consortium schools to deliver vital information to and about scholars.

The Project Coordinator initiates the award process by submitting a request to the UCOP contracts and grants officer to execute the contract for each university. Each contract lists the eligible scholars for each term of award and a summary of funds disbursed to the campus to date (*See Attachment G2*). Once the UCOP contracts and grants officer submits the fully executed contract to the campus financial aid official, the sponsored projects administrator and the MEP Director, funds are released to the eligible scholars. All participating campuses are under contract to provide deliverables, such as student transfer and persistence/attrition data, eligibility information and invoices, on a term-by-term basis.

Monitoring the scholarship has helped strengthen on-campus relations with student service divisions (financial aid, MEP, MCCC, UC AGEP, AMP and counseling centers) and the collaborative efforts of this team have been vital in ensuring the rapid disbursement of funds to S-STEM scholarship recipients.

#### **Accountability through Student Advising:**

Every incoming MESA student is required to meet with advisors who create and maintain a six-semester educational plan. Each semester the student meets with the advisor again to review and update his/her academic plan. The monitoring of student progress includes an “Early Alert” system to provide early assessment of problems that may arise in student matriculation. On or about the fifth week of the semester each faculty member turns in a short electronic report on the progress (or lack thereof) of MESA students in that class section. Monitored categories include attendance, class participation, skills levels and work completion. The advisor uses the system to help the student choose appropriate classes and seek supplemental instruction, tutoring or other support services.

#### ***Objectives and Plan:***

The Consortium utilizes a student-centered approach to promote the successful transfer and graduation of students majoring in CSEM disciplines. Funds provide students with the opportunity to continue their studies as full-time students instead of as full-time employees. Awards provide the Consortium with the means to recognize scholars’ efforts and provide substantial incentives to continue progress towards their career and academic goals. Moreover, the array of collaborations assembled under the Consortium provides scholars with meaningful internships or research experience where they can gain valuable applied experience with CSEM skills, as well as workplace socialization. Offer industry-lead professional development trainings to all S-STEM scholars so they are better prepared for field related employment opportunities.

Through the work of the Consortium, we continue to distribute resources to qualified students in order to help them: **1)** maintain full-time educational commitments and continuous collegiate enrollment, transfer and graduation; **2)** minimize the pressures to fulfill outside employment responsibilities that previously imposed difficulties on their academic success; **3)** motivate a closer collaboration between MEP and MCCC, AMP as well as AGEP, **4)** gain early awareness and exposure to graduate school and/or technical/career related employment opportunities.

Due to the large number of Spanish-speaking students and families served through the Consortium, financial aid, matriculation, advising and S-STEM materials are provided in Spanish. The Transfer Orientation Course will remain a requirement of the S-STEM sub-contract with partnering campuses. Through fall 2009 the Consortium will require all MESA transfers to enroll in the Transfer Orientation Course. The S-STEM list-serve for current scholar and alumni will be maintained through 2015.

#### **Addressing the Needs:**

By working together these programs have addressed the resource constraints affecting community college students transferring to four-year universities to pursue baccalaureate degrees in computer science, engineering or math. The Consortium has and will continue to address the following needs:

- ❑ To mitigate the adverse impact of universities' financial aid policies regarding CSEM transfer in high-unit-load majors. Although 100% of the MESA community college transfers demonstrate financial need (Pell Eligible), universities financial aid priorities are on addressing incoming freshmen financial needs. The proportions of grant funds are reduced by class level and the packages offered to transfers are primarily comprised of loans, work-study and family contributions termed in this proposal "Net Cost". This imbalance in aid distribution requires transfers to seek or maintain non-career related employment upon transfer. Typically, the financial aid package offered to transfers will reflect a high financial need but the available resources, excluding loans, meet less than 33% of the student's overall need.
- ❑ To address the lack of career-related employment or research experience possessed by community college students in the STEM disciplines.
- ❑ To mitigate the adverse impact of CSEM students' dependency on loans and non-field related employment prior to university transfer.
- ❑ To reduce or eliminate non-field-related employment of all CSEM students enrolled in MESA. Prior to CSEMS (S-STEM) near full-time employment was necessary for financial survival, which created negative academic consequences (60% of the students have GPAs below 2.5). The majority of students (76%) must work an average of 35 hours per week in non-career related jobs.
- ❑ To address the importance of transfer and matriculation support (Transfer Orientation Course) for CSEM majors. The first year of university matriculation is a time when the correlation between academic performance, technical employment opportunities and eligibility for graduate education is critical for students.
- ❑ To access and serve 100 percent of the underrepresented minority students preparing for university transfer in CSEM.
- ❑ To demonstrate the value of pre-engineering or lower division engineering courses at the community colleges level. Without sufficient funding and prerequisite courses in CSEM fields, students who apply for regular admission to the four-year institution are not able to satisfy articulation agreements. Students are forced to transfer as pre-engineering students, extending their university experience up to a year.
- ❑ To offer industry facilitated professional development training and early exposure to career opportunities in the technical workforce.

### **Outcomes of the Consortium:**

The S-STEM scholarship has provided local visibility and awareness in the following ways:

- A valuable source for student recruitment via churches, community centers and community college math/science instructors.
- A means of educating youth in the local community as well as community college students about the realities of university transfer in CSEM fields and giving them needed funding support. This scholarship is the only one available to students at 35 of the

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partnering community colleges, typically located in remote, rural areas.

- A source to help facilitate timely transfer (community college/university) articulation specific to CSEM majors.
- A vehicle to encourage university counselors to assist with matriculation and transfer advising (joint advising).
- The S-STEM Scholarship and technical employment presentations remain one of the main incentive elements of the campus-based MCCP Scholarship and Transfer Banquets. The annual event is a forum to honor transfers in the presence of faculty, parents, peers and administration.
- A source for partners within the collaborative to promote CSEM opportunities to all community college students through office visits, email, newsletters and orientation course.
- By encouraging MESA counselors to distribute scholarship applications as well as guidance with application preparation. .
- Tracking S-STEM scholars' matriculation to graduate school and professional employment.

### **Activities which the Current Project Builds:**

A model of a successful collaboration among **MEP, MCCP, UC AGEP** and the **NSF funded Louis Stokes, AMP** programs and units. The consortium serves over **13,500 CSEM** students annually, with an interest in earning CSEM degrees (Undergraduate & Graduate) from one of California's institutions of higher learning (UC, CSU and independent). All of the participating students are from disadvantaged backgrounds and represent segments of our society, which are historically underrepresented in the CSEM disciplines. Approximately **90%** of the MCCP students transfer to four-year institutions and remain in math-based majors. The Consortium will continue to provide a rigorous program of academic excellence and academic support for those communities historically underrepresented in math-based fields.

Program priority is placed on ***Academic Plan Consultation and Review***: MCCP academic counselors and faculty work with transfer students to craft five-year academic plans and scholar's profiles that will foster a successful transition to meet the selected university's CSEM disciplines. The program provides course clustering and advising to help students avoid enrolling in non-related or non-transferable courses thereby minimizing the costly extension of their university enrollment.

Throughout their matriculation at the university the scholars will continue to participate in professional development events and activities that foster early exposure to graduate school and technical career opportunities. These include resume writing, essay development and interview-technique workshops, career fairs, research, internships and industry shadow experience.

Presently the Consortium has a sound foundation. With the 2006-10 S-STEM renewal, further success will be achieved through:

1. Increasing the number of disadvantaged students pursuing degrees in CSEM fields who are eligible to transfer to a four-year college or university;
2. Further reducing the time required for MCCP students to transfer to four-year colleges and universities.

3. Promoting continuous enrollment of MCCP students in CSEM Fields;
4. Improving the academic performance of MCCP students;
5. Increasing the leadership skills and raising the educational expectations of MCCP students;
6. Instituting newly established transfer patterns and resources linking community colleges with four-year institutions to ultimately improve the efficiency of existing transfer agreement;
7. Fostering forums to allow the MESA statewide and national alliance (university, community college and Pre K-12) by region to share “best practices” (*See Attachment F*).
8. Strengthening the relationships among community college educators, prospective employers in business and industry to support MCCP students;
9. Providing four-years awards totaling \$12,500each to 80 S-STEM scholars;
10. Further reducing each scholar’s average weekly work hours by an additional five hours per week. With this renewal the total average number of work hours will be reduced to 15 hours a week, increasing the students’ focus on academic studies and graduation;
11. Tracking and evaluating applicants, scholars, staff and infrastructure (i.e. academic advising, financial aid, and professional development);
12. Critiquing and revising scholarship eligibility criteria and student selection process;
13. Assignment of increased resources to assist field center staff with program enrichment, financial aid application and compliance, NSF S-STEM, UCOP, California Community College Chancellor’s Office (CCCCO), US GAO deliverable requests and ad hoc reports.
14. Continue the statewide graduate school preparation component with goals including:
  - Exposing 06-10 scholars to undergraduate research opportunities, faculty engagement, research paper development /support, GRE prep, and presentation of papers at national conferences.
  - Retaining the current **175** CSEM-related jobs while adding an additional **153** opportunities for 06-10 S-STEM cohort.
  - Enhancing the S-STEM Community College Transfer Orientation Course. This one-unit course is facilitated at 35 of the MCCP and 20 MEP centers.

With the renewal of the Consortium, further development and refinement of a student-support infrastructure continues. Newly instituted program enhancement goals would include the following:

Continued Development of the Student Support Infrastructure:

#### **Financial Aid Advising:**

To ensure the successful transfer of pending S-STEM scholars we have enlisted the university financial aid officers to facilitate financial aid workshops for qualifying pre- and post-transfer students. Providing timely financial aid/ advising workshops to MESA directors, support staff and students on policies at various universities helps ensure that transfer-ready scholars meet financial aid eligibility requirements. These workshops will continue to lead to a major improvement in the early financial aid preparedness and assessment of S-STEM scholars. The MESA S-STEM Coordinator also facilitates trainings on financial aid requirements and timelines at the statewide MEP/MCCP Directors meeting. The current collaboration between the MESA S-

STEM Coordinator, the MEP, M CCP and CAMP directors and the University Financial Aid Official has improved the turnaround time for applicants to receive early feedback on their financial aid status and pending S-STEM eligibility.

#### **Academic Advising and Counseling:**

Proprietary software allows for accurate transfer articulation between community colleges and UC and CSU programs and ensures that students with intensive majors and heavy course loads receive accurate transfer information. In addition, S-STEM scholars will be placed in academic cluster environments for upper-division major-related courses.

#### **Major Advising:**

MEP counselors and department faculty collaborate to advise and apply early intervention techniques to help transfer students make successful transitions to upper division work.

#### **Faculty Involvement:**

The existing level of faculty involvement with S-STEM is significant, with faculty members providing regular guidance in formal and informal ways. Students meet instructors periodically on a required basis to discuss their progress. A report on their work in critical courses is disseminated to them and, in some cases, to MEP staff to identify issues for resolution. Coordinate with faculty mentors active in the NSF BA-STAR to directly engage 60 S-STEM sophomores.

#### **Conclusion:**

The most important impact of Consortium results from its student-centered approach. Funded students have the opportunity to continue their studies as full-time students rather than as full-time employees. Awards provide the Consortium with the means to recognize scholars' efforts and provide substantial incentives to continue progress towards their career and academic goals. Moreover, the array of collaborations assembled under the Consortium provides scholars with meaningful internships where they can gain valuable applied experience to improve their CSEM skills, as well as experience workplace socialization.

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