

AWARD FOR INNOVATION IN HIGHER EDUCATION
Cover Page

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Application Abstract: In 2011, Santa Monica College initiated an institution-wide effort to increase the number of students pursuing bachelor degrees in Science, Technology, Engineering, and Mathematics (STEM), focusing specifically students traditionally underrepresented in STEM. Through professional development for faculty, program and course development, targeted support for underrepresented students, and greater alignment with the K-12 and university systems, the Science and Research Initiative will increase community college transfer rates in STEM and ultimately the number of students completing bachelor's degrees. This will be accomplished by 1) increasing student awareness of and interest in STEM degrees and careers; 2) improving student success in STEM coursework; and 3) strengthening student transfer to and program/course articulation with baccalaureate programs in STEM.

During 2014, the Initiative moved from a culture of remediation to a culture of success and revamped its structure and services so that all students were prepared to succeed, including a summer skills workshops, targeting math and science. The college also offered one of its most innovative components, a paid summer research experience at the University of California Los Angeles, that encapsulates the goals mentioned above. In preparation for success, SMC faculty worked with UCLA faculty to develop a new multi-disciplinary science, focusing on the principles and practices of applied research. Through the course and the summer experience, students raised their awareness of formal research, while obtaining the skills and resources they will need to complete their studies at SMC, successfully transfer to a university, and persist to bachelor's degree completion.

Assurance and Signature:

I assure that I have read and support this application for an award. I understand that if this application is chosen for an award, my institution will be required to submit, for approval by the Committee on Awards for Innovation in Higher Education, a report indicating proposed uses of the award funds and, as the fiscal agent, will be responsible for distributing funds to any other participating entities. I also understand that, if this application is selected for an award, my institution will be required to submit reports to the Director of Finance by January 1, 2018, and by January 1, 2020, evaluating the effectiveness of the changes described in this application.



Chui L. Tsang, Superintendent/President, Santa Monica College



Date

CONTEXT

1) Programmatic and Institutional Goals

In his keynote address at Santa Monica College's 2008 Commencement, Dr. Gene Block, Chancellor of the University of California, Los Angeles, confirmed what SMC has touted for many years – SMC was, and continues to be, the primary transfer institution to the University of California, Los Angeles. Not only do SMC students transfer in greater numbers, these graduates often outperform their peers who began as freshmen in the university system. However, even as these numbers were being shared, SMC's STEM faculty were assessing student success data for their programs and noticing great disparity in both student success and transfer rates for traditionally underrepresented minority students (URM).

For this reason, in 2008, SMC began its quest to strengthen the STEM degree and career pathway from high school to community college and ultimately to bachelor's degree completion. SMC's STEM faculty used local, regional, and national data and analysis to identify three primary challenges for URM students in STEM. First and foremost, URM students lack awareness of the possibilities that STEM offers. As first generation college students from low-income high schools and isolated communities, they have not had exposure to STEM careers, lack an understanding of what they can do as STEM professionals, and do not believe they have the skills to pursue STEM. Second, they have not achieved academic success in STEM-related coursework in the past and question their ability to succeed in STEM.

The third and final factor that hinders community college student success in the STEM disciplines is a lack of preparation and readiness for the university experience. Despite comprehensive articulation agreements with the university systems, the instructional programs at community colleges are often not aligned with the instructional programs at the universities. From course content and student support services to technology resources and hands-on learning experiences, the community colleges often do not offer the resources and opportunities that students may need to successfully transfer and complete the bachelor's degree. This poor alignment can impede the transition of all students, but particularly URM students.

This assessment of institutional, program, and student challenges led SMC faculty to identify three distinct goals to strengthen student success in STEM and increase the number of bachelor's degrees awarded in STEM, particularly among URM students. These goals include:

- 1) increase student awareness of and interest in STEM degrees and careers;
- 2) improve student success in STEM coursework; and
- 3) strengthen student transfer to and program/course articulation with baccalaureate programs in STEM.

These goals served as the basis for a successful start-up grant from the U.S. Department of Education in 2011 to fund SMC's Science and Research Initiative. The Science and Research Initiative will strengthen the STEM degree and career pathway by building upon and leveraging other institutional and community initiatives to support student success. By achieving the above mentioned goals, SMC will directly address the key factors that hinder student success, transfer, and degree completion in STEM, and "significantly increase the number of bachelor's degrees awarded," as articulated in the Budget Act of 2014.

2) Statistical Profile of Students Served and the Factors Impacting Success

Santa Monica Community College District is a single college district serving west Los Angeles County. Although Santa Monica College was established to serve the beach communities of Santa Monica and Malibu, today the college serves more than 30,000 students from throughout southern California, with only a small number of students coming from the Santa Monica and Malibu communities. This change is the result of many factors, including the high cost of living in the Santa Monica and Malibu zip codes and the availability of lower-income housing in other parts of west Los Angeles, including Mar Vista, Culver City and Venice. However, other significant factors include the college's reputation as one of the state's top transfer schools, particularly to UCLA, which is located within miles of the college, but outside Santa Monica.

Last, but certainly not least, at the turn of the century, SMC's then President, Dr. Piedad Robertson recognized a significant need to bring higher education options to the low-income, ethnically diverse communities of southern California. Dr. Robertson believed that education was a means to improving the overall well-being of students, families, and communities, and saw communities without access to higher education. As such, she allocated significant resources to SMC's Outreach Office and began a concerted effort to send SMC's outreach counselors into the region's low-income high schools. The response was positive, and SMC saw a significant increase in the number of low-income, traditionally underrepresented minority students. Santa Monica College is now recognized as both a Hispanic Serving Institution and Asian/Pacific Islander Serving Institution by the U.S. Department of Education. The following table provides additional demographic information:

	Fall 2009		Fall 2010		Fall 2011		Fall 2012		Fall 2013	
Total Count	32,327		31,138		29,977		30,260		30,000	
Ethnicity/Race	#	%								
Asian	5857	18.1	5664	18.2	5379	17.9	4549	15.0	4037	13.5
Pacific Islander	191	0.6	196	0.6	166	0.6	131	0.4	99	0.3
Black	3406	10.5	3047	9.8	2925	9.8	2914	9.6	2769	9.2
Hispanic	9250	28.6	9889	31.8	10096	33.7	10838	35.8	11221	37.4
White	10399	32.2	9710	31.2	9149	30.5	8504	28.1	7982	26.6
Multi-Ethnic	514	1.6	889	2.9	1041	3.5	1100	3.6	1163	3.9
Native Amer./ Alaska Native	110	0.3	83	0.3	74	0.2	79	0.3	66	0.2
Unknown/Other	2600	8.0	1660	5.3	1147	3.8	2145	7.1	2663	8.9
Gender	#	%								
Female	17831	55.2	17102	54.9	16195	54.0	16019	52.9	15694	52.3
Male	14496	44.8	14036	45.1	13782	46.0	14241	47.1	14306	47.7
Students w/ Disabilities	717	2.2	732	2.4	809	2.7	798	2.6	800	2.7
Low-Income Students	12147	37.6	13212	42.4	14430	48.1	15426	51.0	16457	54.9
Veterans	428	1.3	613	2.0	583	1.9	666	2.2	687	2.3
Foster Youth*	--	--	--	--	--	--	--	--	--	--

* SMC did not begin collecting foster youth data on its application until Fall 2014.

As this table demonstrates, SMC has seen significant increases in the number of students who are traditionally underrepresented in higher education. However, historically, underrepresented students are not enrolling in high growth/high demand fields, specifically STEM, at rates comparable to their peers. The Science and Research Initiative, which began raising awareness in Fall 2011 and enrolling students in Fall 2012, is working to address this. The following table provides demographic information for students pursuing STEM degrees at Santa Monica College, beginning in the baseline year of Fall 2010.

Percentage of Credit Students who Report a STEM Major by Ethnicity/Race												
Ethnicity/ Race	2010-2011			2011-2012			2012-2013			2013-2014		
	STEM Majors	Total	% STEM Majors									
Asian	779	8387	9.3%	804	7254	11.1%	778	6177	12.6%	733	6613	11.1%
Black	271	4654	5.8%	302	4277	7.1%	328	4158	7.9%	295	4127	7.1%
Hispanic	941	14131	6.7%	1075	13885	7.7%	1265	14421	8.8%	1315	15244	8.6%
Native American	3	121	2.5%	7	105	6.7%	7	100	7.0%	7	107	6.5%
Pacific Islander	26	279	9.3%	20	224	8.9%	15	178	8.4%	15	147	10.2%
Two or More Races	98	1473	6.7%	118	1528	7.7%	147	1586	9.3%	141	1653	8.5%
White	1170	15396	7.6%	1200	13435	8.9%	1240	12165	10.2%	1152	14934	7.7%
Other	154	2150	7.2%	179	2113	8.5%	331	3296	10.0%	375	3834	9.8%
Total	3442	46591	7.4%	3705	42821	8.7%	4111	42081	9.8%	4033	46659	8.6%

This data suggests that the Science and Research Initiative has already had an impact on the number of students interested in STEM degrees. However, work continues to support these students as they complete their studies at SMC, transfer to a baccalaureate program, and obtain a bachelor's degree. According to the American Association for the Advancement of Science, URM students do not pursue STEM degrees and careers for many of the same reasons that they do not graduate from college. In its 2001 report, AAAS stated that URM students at the undergraduate level are more likely to drop out of college due to financial difficulties, poor high school preparation, low faculty expectations, an inflexible curriculum, and poor college STEM teaching that often does not take into account multiple learning styles. The AAAS determined that URM students are more successful if they can access STEM academic support services and programs that are implemented with clear learning objectives and appropriate student participation.

While it is unlikely that SMC can address the economic challenges facing students, the college can implement changes to curriculum, develop clearer program and degree expectations and outcomes, and provide professional development to faculty. Likewise the college can work with its K-12 and university partners to create a seamless pathway from high school to college in support of the STEM professions. This is the foundation of the Science and Research Initiative.

INNOVATIONS

3) Activities, Successes, and Failures Prior to January 10, 2014

Santa Monica College's STEM faculty, representing Mathematics, Computer Science, Physical Science, Life Sciences, and Earth Sciences, collaborated with SMC's Counseling Department and the Transfer Center to develop the Science and Research Initiative (SRI) as a means for addressing the goals outlined in Item 1. The Initiative, which began in Fall 2011, is a multi-disciplinary effort to impact student success in STEM across disciplines, recognizing that the majority of students do not select their specific interest(s) in STEM until much later in their educational journey. It builds upon many of the college's successful student support programs, including the Counseling Department, Transfer Center, Career Services, and Scholars Program, by adding programming specifically for STEM majors who had not previously received targeted support. By integrating the Science and Research Initiative into the very fabric of the college community and bringing STEM into the transfer conversation, this project will have a lasting impact on student success in STEM.

The Science and Research Initiative has three primary components, including 1) outreach to students, families, and communities; 2) development of a STEM Scholars Program that provides direct support to students pursuing STEM degrees; and 3) greater coordination and collaboration with baccalaureate programs to create a seamless transfer pathway that both prepares students and supports them as they transfer. From Fall 2011 to January 9, 2014, the SRI team implemented the following practices, services, and policies, in support of these goals, as noted:

- The SRI Program organized professional development activities for all STEM faculty, focusing on the issues critical to the success of URM students;
- Each instructional program developed outreach materials specific to their programs of study that noted career/degree options, outlined common skills and interests of individuals in the field, and highlighted student/faculty stories;
- The STEM programs worked together to conduct college-wide outreach to new and returning students, as well as to high school seniors and their families;
- The college developed a STEM Scholars Program that mirrors SMC's successful Scholars Program (which does not serve STEM students) and provides comprehensive instructional and student support services to students pursuing STEM degrees, including counseling, educational plan development, and student success workshops (program brochure for the STEM Scholars Program is included in Appendix B);
- SMC expanded its successful Supplemental Instruction Program to include both gateway and advanced STEM courses, specifically those with poor success rates;
- SMC's Career Services Center developed two new career planning courses, specifically designed for STEM students, including Career Planning in STEM and Job and Internship Search Strategies for STEM (course outlines are included in Appendix B);
- To help struggling students catch up between semesters and prepare for the next semester, the SRI Program developed a STEM Skills Program that provides additional instruction and support for students in Math (Algebra-Calculus) and applied learning experiences in Chemistry, Biology, Earth Sciences, Physics, and Computer Sciences;
- The Center for Community College Partnerships at UCLA also established a peer mentoring program for STEM Scholars, pairing UCLA STEM students with SMC STEM students;

- SMC collaborated with UCLA's Center for Community College Partnerships to offer a Summer Bridge program for students in the STEM Scholars Program as a means of introducing students to university life and preparing them for transfer;
- With funding from the U.S. Department of Education, the STEM instructional programs updated their equipment and technology so as to facilitate student access to hands-on learning using equipment that students will use at the university;
- SMC STEM faculty met with UCLA STEM faculty to develop a community college classes to help prepare students for applied research experiences (course outline included in Appendix B).

In addition to these new courses, services, and programs, the STEM Scholars Program began enrolling students in Fall 2012, enrolling two cohorts of students prior to January 10, 2014, as well as a third cohort in Fall 2014. STEM Scholars are meeting or exceeding achievement points set by the program, including a successful course completion rate of 83.3% and a fall to fall persistence rate of 64% (which compare to institutional averages for all students of 68.3% and 62.5%, respectively, for all students). (Additional student enrollment, demographic, and success data is included in Tables 1, 2, and 3 in Appendix B.)

While the program is open to all students, as is true for all community college programs, the program targets low-income students who are traditionally underrepresented in higher education and STEM, including women and ethnic and racial minorities. Given the focus on transfer and baccalaureate degree completion, this program recruits students who are enrolled in or have successfully completed Math 20, Intermediate Algebra, which is the gateway course to college-level math. Many students struggle with math, and students who enter SMC at the lowest level math courses may need several years to complete the pre-college math sequence. Thus, to maximize resources and provide the best possible assistance to students, the STEM Scholars Program is designed to support students once they have completed their pre-college coursework.

However, math continues to be a challenge, particularly with regard to student access. SRI staff have noticed that many potential STEM students are not progressing from pre-college math to Math 20, and thus are not in a position to benefit from the program. In the first two years of the program, there was a large group of students who met program priorities, had completed Math 20, and responded positively to the program's outreach efforts to raise awareness and interest in STEM. However, as these students have entered the program, there are fewer eligible students in the pipeline. First, potential students are not successfully completing Math 31, the pre-requisite course to Math 20, and when they do, they are not migrating to Math 20 in a timely manner. This is problematic as the majority of students enrolled in Math 31 and other pre-college math courses represent groups traditionally underrepresented in STEM. As such, the program is struggling to recruit URM students interested in STEM. (Tables 4 and 5 in Appendix B provide additional data support.)

The past two years of activity has also illuminated the need to establish targeted programming for students interested in careers in Engineering. A large number of STEM Scholars are interested in Engineering. However, SMC does not offer an Engineering track that specifically recognizes and addresses the needs and concerns of pre-engineering students. These students are currently using the career planning courses as a means for obtaining the information they need to develop their educational and career goals.

4) Policies and Practices Initiated since January 10, 2014

During the past year, SMC's Science and Research Initiative has continued to implement program activities as initially proposed and outlined in the 2011 project plan (included in Appendix C) and in support of the goals identified in Item 1. In addition, the college addressed key challenges to student success and gaps in service delivery that have risen as the program has developed, as outlined in the Item 3.

Applied Research Experiences

One of the core activities of the Science and Research Initiative is the development and implementation of applied learning experiences that will provide community college students with opportunities to contextualize math and science and apply what they learn in class to real-world problems and concerns. Applied learning is critical to student success and cannot be limited to upper level coursework. The increased use of contextualized learning in development education nationwide illustrates the importance of making learning relevant to students, particularly low-income, first generation college students, who have many hurdles to overcome to enroll and persist in higher education. If learning does not seem relevant, those hurdles can become outright barriers.

STEM teaching and learning has always been a very applied experience with many science courses complemented by a lab course. While the lab courses provide context for students, they do not offer the depth and realism that applied learning in the field can offer. For this reason, over the years, many of SMC's STEM faculty have engaged students in their research activities outside the classroom. However, these experiences were often limited to motivated students who had the time and resources to find and participate in them. In addition, SMC established an ongoing relationship with Jet Propulsion Laboratory to engage small number of students in research at JPL. However, over the past decade, this program has served fewer than 10 students. As such, one of the goals of the Science and Research Initiative is to formalize the applied learning experience at SMC and expand student involvement so that all students may participate.

This participation will not only improve student retention and persistence, it will prepare students for STEM careers and strengthen student success in university coursework. In a recent report from the National Leadership Council for Liberal Education and America's Promise, business leaders reported that the most qualified students are those that have participated in a supervised internship or community based project. Representatives from UCLA's Undergraduate Research Center concur by stating that community college students who have participated in research experiences while at the community college are more likely to be admitted to UCLA than students who do not.

Based on this research and feedback, one of the most innovative components of the Science and Research Initiative is the Summer Research Experience at UCLA. This paid research experience engages low-income, community college students, many of who are underrepresented minority students, in formal research activities underway in at a Research 1 institution. This invaluable program offering is designed to provide SMC students the opportunity to experience STEM in action firsthand. In addition, students have the opportunity to network with UCLA students and faculty and develop relationships that may persist as students transfer.

In order to qualify for this experience, students had to be actively enrolled in the STEM Scholars Program, be making satisfactory academic progress, and be within a semester of completing their community college coursework. In addition, students also had to complete the newly developed applied research preparation course, Science 10: Principles and Practices of Scientific Research, which was offered twice in 2014, during the Winter and Spring sessions. This is a multi-disciplinary course developed in concert with and at the request of university research faculty who indicated that the primary challenge community college students faced when applying for formal research opportunities was a lack of familiarity of the principles and practices of scientific research. University researchers were reluctant to accept community college students into their labs due to this lack of experience.

As such the goal of Science 10 is to prepare students for this experience. SMC chose to offer a multidisciplinary course in order to ensure sufficient interest and enrollment each semester (thus addressing sustainability). In addition, since many of the same principles apply across STEM fields, this format allows students and faculty from diverse fields work together. This strategy has proven successful as demonstrated through the program's evaluation of this course. For both courses, students completed a pre- and post-assessment of their experiential research skills and knowledge. The vast majority of respondents *Agree* or *Strongly Agree* that they possessed knowledge in several areas related to being prepared for scientific research after completing Science 10. Scholars indicated having strong levels of knowledge in the scientific process, ethical considerations, and the general skills and knowledge required for success as a researcher. Additionally, nearly all students *Agree* or *Strongly Agree* (31 out of 34) that they had a positive experience in Science 10, although several offered suggestions for improving the class, which will be incorporated into future sections. (Additional evaluation data for the Science 10 class is included in Appendix C.)

One of the primary objectives for Science 10 is to prepare STEM Scholars for the Summer Research Experience at UCLA, which SMC and UCLA offered for the first time in Summer 2014. A total of 10 STEM Scholars participated in this first-ever experience. At the end of the experience, SRI staff worked with the program's external evaluator to assess the overall impact of this component of the Initiative. This assessment included focus groups with both STEM Scholars and their research mentors from UCLA. Scholars reported that the experience provided them with significant increases in familiarity with oral presentation/communication skills, writing a science abstract, and working in a laboratory. Eight out of ten reported that the research skills and experience were the most valuable program elements. Scholars also reported increased confidence in their research and academic abilities and greater awareness of what research is and the work required to carry out that research. One student summed up the overall benefit (and intent) of the experience by saying, "*This program helped me to decide what I want to do ... You can't just say you want to do research. You have to actually do it and then you know if you really want to do it or not.*"

By coordinating this research experience with a local Research 1 institution, SMC is providing its students with an opportunity that is not always available to a community college student. As explained by another student, "*I am coming here [to UCLA] in the fall and I feel like I am going to hit the ground running. This program has helped me immensely in boosting my confidence....This is the place for me to be and I am excited.*"

UCLA faculty who participated in the program as mentors or preceptors also reported satisfaction with the program. The majority indicated that they were given sufficient amount of information on the program's expectations, but also noted that they felt students needed further training beyond basic lab safety, particularly in the use of specialized lab equipment. However, despite these concerns, mentors praised SMC's STEM Scholars and expressed an interest to continue to work with them, thus acknowledging another desired outcome of this component that students develop relationships with university faculty and students while still at the community college so that they can build upon these relationships as they prepare to transfer. As one faculty member said, *"My mentee was extremely careful, thoughtful, and hard-working this summer, and we would be grateful to have her in the lab in the future."*

Overall the summer research experience was successful, and SRI staff and faculty, including their UCLA partners, will work to incorporate the suggestions of mentors and Scholars to improve the program, which include:

- More time spent on informal conversations so that Scholars can learn from each other;
- More communication and interaction with the labs about program expectations;
- Lengthen the duration of the program;
- Keep assignment deadlines consistent for planning purposes; and
- Encourage student communication with faculty leads.

Scholarship Support

Also new in 2014 was the availability of scholarship funding from the Edison Corporation. Working in partnership with the Santa Monica College Foundation, the Science and Research Initiative secured funding from Edison to support STEM Scholars. During 2014, 101 students participating in the Science and Research Initiative received financial support as a result of the Edison gift. Unlike many traditional scholarship programs where low-income students receive a relatively large sum of money simply for meeting program requirements, SRI staff and faculty tied this scholarship support to student participation in program activities. In essence it was an incentive to remain active in the program and make satisfactory progress toward program completion and transfer. As students completed each activity, ranging from successful math course completion to participation in the newly developed career planning and research preparation courses, they would receive scholarship support.

To supplement funding received from Edison, SMC is also pursuing additional funding to support STEM students, including a scholarship grant from the National Science Foundation. Although the outcome of the 2014 request is not yet know, this proposal built upon a 2013 request that was scored highly. The availability of additional scholarship support will greatly enhance the program and promote student success, including timely goal completion. The Santa Monica College Foundation, working with SMC's Grants Office, is also looking at other private options for STEM Scholars scholarship support.

Culture of Success

The distribution strategy for the Edison scholarships illustrates a significant change in overall program implementation. During the past year, the Science and Research Initiative has made a

significant philosophy shift in how students are served. The program was designed to serve all low-income students, particularly those traditionally underrepresented in STEM, who expressed interest and intent to pursue a baccalaureate degree in STEM. To support that, SMC developed a comprehensive program that offered a variety of services to facilitate student success. The services chosen for inclusion in the program, such as Supplemental Instruction, applied learning experiences, educational planning, and cohort services, are all recognized as effective practices for ensuring student success. SMC intentionally brought these practices together under one program to yield a coordinated plan of support aimed at facilitating student success. The philosophy was that students who participate in program services will be more successful and will be better prepared to transfer; however, there were no required activities. As students progressed through the program, SRI staff and faculty reached out to the ones that were struggling and provided additional support.

However, this is a reactive model that left students, faculty, and staff constantly in a state of catching up. Students would choose not to participate in supportive services and then find themselves struggling, and staff and faculty would develop interventions to support them. This is not a sustainable program model nor is it truly supportive of student success. For this reason, during the past year, the program implemented a Culture of Success for all students with the goal that all students will do well from their first day in the program. As part of this shift, staff identified mandatory activities in which all students must participate in order to participate in the program. The mandatory activities include college activities and services that have proven effective in supporting student success, such as Supplemental Instruction.

Modeled after the internationally recognized SI Program at the University of Missouri, Kansas City, SMC's Supplemental Instruction Program began in 2008 and supports many of the college's historically difficult classes. Classes with low success rates are targeted, and it is not surprising that nearly all of the pre-college and lower level gateway math courses are supported by SI. Supplemental Instruction sessions complement (supplement) course instruction and are offered either before or after class. Any student enrolled in the class may attend as often as they want. Program evaluation indicates that students who attend more than 5 times receive maximum benefit (2011 Research Brief is included in Appendix C). Based on this assessment, the SRI Program now requires students to attend SI a minimum of five times for each course they take that has SI support.

Another new shift in service delivery addresses a concern identified prior to January 2014 addressing student success in math. Prior to this year, the intent of the math component of the Science and Research Initiative was to help students remediate, learning skills and concepts that they struggled to learn the first time they took the course. Students who did not successfully complete their math course were invited to participate in a Winter or Summer Skills workshop that would strengthen their skills and prepare them as they retook the class. However, students had to fail first.

In Summer 2014, in accordance with the shift from a culture of catch-up to a culture of success, the Science and Research Initiative changed the focus of the Summer Skills Workshop from remediation to preparation. While this may not seem particularly innovative, many programs operate from a deficiency model that hinder student success and delay time to completion.

While popular opinion may suggest that students have the right to fail and will not participate in a program with too many requirements, it is not a sound operating model, and it is not supportive of student success.

SRI staff are still working with SMC's Office of Institutional Research and its external evaluator to collect and analyze data from the summer experience. However, preliminary data indicate that 71% of participants found the workshop to be very useful, as compared to only 54% of participants in Summer 2013. In addition, students reported that the most valuable aspect of the workshop was the math preparation and support component with students preparing for Math 20 indicating the greatest satisfaction. While there was no statistically significant gains in pre- and post-test scores for students preparing for Math 20, there were significant gains for students preparing for Math 7, Calculus 1, as well as for Biology. In addition to reporting satisfaction overall with the workshop, students provided feedback to improve the skills workshop, which SRI staff and faculty will incorporate into future workshops. (More information regarding the workshop's preliminary assessment findings are included in Appendix C.)

Other required activities for admittance to the STEM Scholars Program include participation in cohort activities and workshops, counseling, mentoring, Saturday Academies, Supplemental Instruction and/or Tutoring, and extracurricular activities in support of STEM degrees and careers. A flow chart of Mandatory Activities is included in Appendix C.

Anticipated Impact

Santa Monica College is currently mid-way through its third year of direct services to students through the Science and Research Initiative. Program staff and faculty continue to develop and strengthen the program based on its impact on student success as measured by completion, persistence, and transfer, as well as feedback from students, faculty, and program partners regarding program effectiveness and satisfaction. Many of the new and enhanced practices and policies described above were implemented in a manner that will have a positive impact on the success of all students, not just those participating in the STEM Scholars Program. SRI is institutionalizing a growth mindset within SMC's STEM departments that will engage all students and faculty and strengthen success. By combining math preparation with the development and practice of non-cognitive skills, such as help seeking behavior, utilization of SI and tutoring, meeting with faculty during office hours, and establishing a peer mentoring relationship with other STEM students, the Science and Research Initiative will build upon and expand the success it has achieved in its first 3 years.

One of these accomplishments is the successful transfer of 30 STEM Scholars from Cohorts 1 and 2. These Scholars transferred to a number of universities throughout California, including the University of California, Los Angeles; California State University, Long Beach; University of California, Berkeley; University of Southern California; University of California, Riverside; and University of California, Irvine.

Likewise, their areas of study are equally diverse, including Neuroscience, Engineering, Anthropology, Cognitive Science, Civil Engineering, Computer Engineering, Psychology/ Biology, Chemistry, Biology, and Physiological Science. While SMC does not have first year success data for these students, SRI staff will be working with their university partners to

monitor the success of SMC STEM Scholars as they pursue and complete their bachelor's degrees.

Given that the Science and Research Initiative is only three years old and that the STEM Scholars Program has only been enrolling students for two years, it is certain that the majority of these transfer students had already taken significant steps toward transfer prior to enrolling in the STEM Scholars Program. The impact of this program on students cannot merely be defined by grade point average, course success, persistence, and ultimately transfer and bachelor degree completion. The non-cognitive skills mentioned earlier are invaluable in helping students identify and achieve their educational and career goals regardless of where a student is in his/her educational journey.

During 2014, SMC's external evaluator, Cobblestone Applied Research and Evaluation, Inc., conducted focus group interview with STEM Scholars from Cohorts 1 and 2. During these focus groups, students reported overall satisfaction with the program. Specifically, students reported that the networking aspect of the program was most helpful. One student commented, "*I was lost when I first started. This program has helped guide me get more info and network with students who are alike.*" Students indicated that the program facilitated opportunities for them to network with their peers at both SMC and UCLA through the Saturday Academies. Students felt that meeting others within their same major helped them to build a support system.

Scholars also reported that of all the program components, the Counseling 12 and 15 courses were very helpful to their academic success. Students indicated that the courses facilitated the process of deciding on a specific career path. One student commented, "*With Counseling 12, I found it really helpful because there are a lot of people that are interested in the STEM field but don't really know a specific type of degree that they want. They [course faculty] really help you in deciding what you are really interested in.*" Students appreciated that the courses had them doing hands-on research in and explore their prospective fields. Overall, students commented that the design of the courses helped them to discover their ideal career match.

Scholars also found the collaboration between students to be helpful. One student commented that the cohort cohesiveness "*helped me a lot in the transition from high school to college*". Another student said that he had known only one student in his first year and believed that this had a negative impact on his academic performance. However, through the STEM Scholars Program, he is surrounded by peers and can study with any one of them. Students also viewed their relationship with their program counselor as helpful. One student commented, "*The counselor is a big help with anything. They are just for us; we build relationships and feel comfortable talking with them about anything.*" Moreover, students appreciated that they have one specific counselor to build a relationship with them. Additional feedback from students regarding their experiences and suggestions for improvement can be found in Appendix C.

This qualitative feedback provides an overview of the impact of this program that cannot be seen in numbers. Each component of the Science and Research Initiative/STEM Scholars Program is specifically designed to help students complete their studies at SMC, transfer to a university, and use the skills they have learned and the resources they have developed to complete the bachelor's degree. This will be the lasting impact of this project.

5) Implementation Efforts After January 9, 2015

In 2015, SMC will continue to implement the Science and Research Initiative, using evaluation results from each component to strengthen activities, make program improvements, and add new services as needed. First and foremost, in Summer 2016, the college will once again partner with UCLA to offer a Summer Research Experience for STEM Scholars. However, SMC will also continue to pursue new partnerships with other baccalaureate institutions, including University of California, Riverside, and California State University, Northridge, to strengthen program offerings in STEM for community college students, particularly with regard to applied research experiences in formal research settings. SRI staff recognize that UCLA has limited space, which may not be able to accommodate all of SMC's STEM students. This is a challenge that will only grow as student interest in this activity increases.

Each year, students participating in the Science and Research Initiative complete an annual student survey, providing feedback on the quality of the program. In its February 2014 evaluation report, SMC's evaluator noted that students requested 1) additional research or internship opportunities available to Scholars; 2) priority course registration and targeted STEM classes for STEM Scholars only, specifically in Physics, to support the creation of student study groups/teams within the cohorts; and 3) more diverse degree and career information addressing all of the STEM professions, not just the most popular ones, such as Biology.

As the program continues to develop, SMC will expand its partnerships with local and regional universities in order to increase the number of research experiences, as well as diversify those experiences. It is true that UCLA's Undergraduate Research Center is heavily focused on the life sciences, with significant funding coming from the National Institute for Health. However, many of SMC's students are interested in other fields, including engineering and its applications. As such, the SRI Program will look for opportunities to cultivate the interests of all students, such as its partnership with University of California, Riverside's School of Engineering, to offer career planning workshops at SMC for students interested in Engineering.

Programming and services in support of students interested in Engineering degrees and careers is one of the primary areas of focus as the SRI Program moves into year 4 and beyond. As noted, many of SMC's STEM Scholars are interested in Engineering. This is not surprising given the high need for engineers in California. However, in traditional Engineering programs, students complete their general education requirements in the first two years of study and then complete the engineering sequence in years three and four and beyond. This model leaves many community college students interested in Engineering with limited access to activities in support of their degree and career interests as the community colleges do not have formal programs in Engineering. This is problematic and can hinder student persistence and goal completion.

Unfortunately, SMC is no exception. While the college offers the general education requirements in support of Engineering transfer students, including higher level math and two required Physics classes, the college does not have an Engineering Department or faculty with whom students can meet to discuss degree and career planning. Likewise, the college's Counseling Department has limited expertise in Engineering. As such, students interested in engineering must carry out their own research and planning with little or no assistance from faculty and staff. However, the Science and Research Initiative is working to change this.

As noted, the SRI Program has revised two of its career planning courses to specifically target STEM careers, including Counseling 12, Career Planning for STEM, and Counseling 15, STEM Job and Internship Search Strategies. The Counseling 12 course provides STEM Scholars with information concerning possible STEM careers and is mandatory as of 2014. In a posttest survey distributed at the end of the courses, students reported that the course increased their knowledge of what is required to be successful in a STEM degree and career and how science applies to real-life experiences. In fact, students almost universally reported finding the course useful overall (Additional evaluation feedback for Counseling 12 and 15 is included in Appendix D). This is particularly true for Engineering students who used this course to explore the vast field of Engineering. Engineering students connected and bonded through this course and have continued to meet as a sub-cohort to further prepare for advanced study in Engineering.

However, the SRI Program recognizes that the college must do more for Engineering students. As the program moves into 2015 and beyond, SMC faculty with support from the SRI Program will explore and implement options for the development of a formal Engineering Program, focusing on both the instructional and student support components. One potential option is to build SMC's curriculum upon Project Lead the Way's Engineering curriculum. Project Lead the Way is the nation's leading provider of K-12 STEM programs, offering world-class curriculum and high quality professional development. The program has received national recognition for its role in strengthening the Engineering educational and career pathway at the high school level.

Two of SMC's primary feeder high schools are using this curriculum as a means for introducing students to Engineering. By working with the local high schools and regional universities, including several which are Project Lead the Way affiliates including CalPoly Pomona, San Diego State, and San Jose State, SMC is in a position to develop a seamless pathway from high school to community college to university in Engineering. This is a significant instructional endeavor that will require new faculty, partnership development, Curriculum Committee approval, and long-term institutional support. The anticipated completion date is Fall 2016. More information about Project Lead the Way is included in Appendix D.

Other new initiatives, based on evaluative feedback from previous years, will include the expansion of the Winter and Summer Skills Workshops to include Math 31, Elementary Algebra. As noted in Item 3, STEM Scholars must be enrolled in Math 20 to participate in the program. However, many students must first complete Math 31 before enrolling in Math 20. Unfortunately, low-income students, particularly underrepresented minority students, are having the most difficulty in Math 31. By offering math preparation courses for Math 31, the SRI Program will help maintain a pipeline of students into Math 20 and ultimately STEM degrees and careers. The first Math 31 preparation course will be offered Summer 2015.

Lastly, the Science and Research Initiative will expand outreach to high schools and middle schools in order to engage students early in STEM study. As with other program components, the focus will be to increase awareness, support student success, and facilitate transition from K-12 to higher education. Program activities will adhere to a culture of success and preparation and support K-12 teachers as they work with students and families to build foundational skills in math and science. A formal outreach plan will be established by Fall 2015 for implementation during the 2015-2016 academic year.

6) Impacts on the Average Cost of Bachelor's Degree

The overall goal of this initiative is to increase the number of low-income students who are traditionally underrepresented in STEM and higher education in general successfully pursuing baccalaureate degrees in STEM. This will be accomplished by promoting a culture of success where students succeed from the start. Not only will students be more aware of their career interests, options, and goals, they will be better prepared to pursue those goals. In doing so, students will reduce their time to completion because 1) they are more focused and have established a plan for achieving their goals; 2) they are better prepared to successfully complete their coursework on the first try; and 3) they are more motivated to maintain forward momentum because they can see the benefits of their efforts on real-life experiences.

SMC sets its transfer goals according to the nationally recognized standard for community college transfer of six years. Based on this, roughly 50% of SMC's students will transfer to a baccalaureate program within that timeframe. This rate includes both full-time and part-time students, and while the college does not break out the data due to the nuances of doing so among a commuter population, it is expected that students who attend full-time will transfer sooner. However, the college does disaggregate the data by ethnicity and therein lies a significant disparity between the rates for White and Asian students and Black and Hispanic students. In fact, nearly twice as many more White and Asian students will transfer within 6 years than Black and Hispanic students.

The Science and Research Initiative is specifically designed to address this gap, focusing on the STEM fields. The transfer goal of the Science and Research Initiative factors in these institutional averages and considers the challenges of STEM study. Overall, the goal is that 35 percent of STEM Scholars will transfer to a baccalaureate program within three years, which is ten percentage points higher than the institutional average for three years (25%). This is clearly ambitious; however, the college believes that the additional focus and support provided from the start will help facilitate this outcome, particularly for URM students. In addition, this measure intentionally begins after students are enrolled in Math 20, which will reduce the time to completion. As such the financial impact of this project will be seen in:

- a decrease in the number of course repeats
- an increase in student persistence
- an increase in student motivation
- an increase in student readiness and preparation to transfer

Each of these outcomes will reduce the time to completion, which in turn will reduce the overall cost of the baccalaureate degree. These outcomes will be accomplished in part by requiring students to take additional community college courses, which will increase the overall cost. However, SMC is addressing this increase in cost by offering scholarship support. Likewise, the summer research experiences are paid, which will help offset the loss of summer job income. Lastly, it should be noted that community college study is significantly less expensive than university study. SMC is designing a STEM program that will seamlessly articulate to regional baccalaureate programs, thus allowing students to spend less in the first few years, while still making satisfactory progress toward the baccalaureate degree. This will not only decrease costs, but support a student population that often struggles to complete the baccalaureate degree.

7) Risks, Tradeoffs and Unintended Consequences

The Science and Research Initiative has been designed intentionally to increase the number of students traditionally underrepresented in STEM and higher education who successfully complete a baccalaureate degree in STEM. For this reason, Santa Monica College does not anticipate any adverse effects on students groups that are underrepresented in higher education. The struggle continues to assure that underrepresented students have access to the program, and as potential barriers are identified, the SRI Program has been working with other groups both on and off campus to address them. One such example is the proposed development of math preparation workshops for students prior to entering the program.

One potential challenge that the program had to address early in its development and continues to address through its programs and services is the impact of its focus on underrepresented students on other students who are not from underrepresented minority groups. When the college launched the program, there was great interest in the program from all student groups, including White and Asian students, as well as the college's large international student population. Many of these students met program requirements and were in fact outperforming their peers. Given that the first cohort was limited to 100 to 125 students, the selection committee had to be conscientious of many factors as they selected students to participate.

While the committee could have limited to participation strictly to students underrepresented in STEM, there was agreement that this was not a sustainable, nor desirable, model, particularly for an instructional support program that was closely linked to the curriculum. It is easier to develop targeted student support programs because the services provided to students in those programs are exclusive to students in that program. However, the Science and Research Initiative is integrated throughout the five STEM departments with services offered both in and out of the classroom. Limiting participation based on socio-economic factors could have a negative impact on the overall classroom environment.

Likewise, if SMC had developed this project as a boutique program serving only a specific population and funded by a time-limited grant, it was almost certain to fail in the long-term. Grant funding is essential to most successful start-up projects, but these projects must be developed in a manner that they can be institutionalized and incorporated into existing services and programs. While it is all too common to "shoot for the moon," when money is not an obstacle, responsible program planning and development will consider the long-term sustainability of boutique programs that are part of existing funding streams.

For this reason, Santa Monica College developed the Science and Research Initiative as an integrated component of the college's STEM curriculum and programming. Although the initiative includes a targeted student support program for students traditionally underrepresented in STEM, it also has taken steps to impact the STEM programs in general. Departmental impacts include professional development for all faculty which directly strengthen the teaching and learning environment for all students, equipment and technology improvements for use by all faculty and students, Supplemental Instruction available for all students, STEM-focused speakers and workshops, and STEM Career Days in the Quad. On the other hand, the STEM Scholars Program is designed to address the unique needs of the target population by providing

intrusive counseling and advising, mentoring, cohort group meetings, summer bridge programming, and summer research experiences (although research experiences at Jet Propulsion Laboratory and those offered by faculty are open to all students.). Through this design, the Science and Research Initiative is yielding change and impact at all levels, institutional, departmental, and student/faculty, while not excluding any specific group.

Similarly, in designing this project, SMC had to choose the STEM disciplines it would target. Of course there was concern that if only one or two departments were selected to participate, that the other departments would feel excluded and could possibly undermine the success of the project as a whole. Also, by limiting the instructional programs participating, the college would be limiting student participation, and this is problematic given that many students at the community college level have not yet specified their major, much less their specialization within that major. However, designing a comprehensive instructional and student support program to serve five very diverse departments with very unique needs and concerns would be challenging. Santa Monica College's executive administration, with support from all five departments, decided to include all STEM programs at the risk of developing a program that did not serve any one department particularly well. Three years later, the risk was worth it. The college mitigated the potential for failure by:

- establishing a leadership team that included all five departments;
- offering financial support to all five departments, in the form of faculty stipend/release time, new equipment and technology, and professional development;
- ensuring that all decisions were made collectively and that communication was as open and transparent as possible; and
- providing services to students in all departments as equitably as possible (an example is that as SMC expanded Supplemental Instruction to include STEM that each department was allowed to identify the same number of classes for SI support.).

As the Science and Research Initiative has moved from start-up to maintenance, there is much less concern now among faculty about departmental equity and more focus on student success, meaning that if there are identified needs in one area, but not another, it is expected that the program will receive support, even if it is beyond what other programs are receiving.

The inclusion of all five STEM departments, which include Physics, Chemistry, Biology, Zoology, Math, Computer Science, Physical Anthropology, Geology, Physical Geography, Engineering, and Astronomy, has been particularly beneficial for both students and faculty. The STEM professions once relied on an operational structure that resembled a silo. Each discipline worked alone in isolation from the other disciplines and there was little or no communication and integration. However, with technological advancements, societal needs, and limited resources, it is no longer effective to work in silos. The STEM professions are bringing their individual and collective resources together to solve today's complex problems. Students looking to enter the field must have the skills to do that. SMC's SRI Program provides opportunities for students and faculty to work with each other and to build upon each other's strengths. Examples include sharing lab space, conducting outreach together, and developing team-focused applied learning activities. This interdisciplinary collaboration is one of the program's most significant accomplishments to date.

SUSTAINABILITY

8) Leadership, Innovation, and Partnership

The vision of Santa Monica College is to be “a leader and innovator in learning and achievement. As a community committed to open dialog and the free exchange of ideas, the college incorporates an array of core values into everything that it does, including knowledge, intellectual inquiry, research-based planning and evaluation, academic integrity, ethical behavior, democratic processes, communication and collegiality, global awareness, and sustainability. Using these values as its foundation, SMC strives to change lives in the global community through excellence in education. In doing so, students who graduate from SMC will:

1. Acquire the self-confidence and self-discipline to pursue their intellectual curiosities with integrity in both their personal and professional lives.
2. Obtain the knowledge and academic skills necessary to access, evaluate, and interpret ideas, images, and information critically in order to communicate effectively, reach conclusions, and solve problems.
3. Respect the inter-relatedness of the global environment, engage with diverse peoples, and acknowledge the significance of their daily actions relative to broader issues and events.
4. Take responsibility for their impact on the earth by living a sustainable and ethical life style.
5. Demonstrate a level of authentic engagement in the subject matter that enables and motivates the integration of acquired knowledge and skills beyond the classroom.

The college’s commitment to innovation and student success has helped the college develop an international reputation as a leading provider of higher education, not only in southern California, but throughout the state and nation. The college is recognized for its ability to identify and address problems in a quick and effective manner, often planning as it goes, but with the dedication of a top notch faculty and staff that is as flexible as the needs of students demand. This willingness to move forward into uncharted waters helped SMC develop one of the first study abroad programs among community colleges in the United States. Likewise, SMC was reaching out into the region’s low-income high schools long before other community colleges considered the needs of these communities. In the past few years, SMC became one of the first colleges to offer comprehensive programming for veterans (developing a program that later received federal funding as a Center of Excellence for Veteran Student Success) and foster youth. On the instructional side, the college was at the forefront of conversations to include global citizenship as a worthwhile goal of a community college education. These are but a few examples of the college’s culture of innovation and adaptability.

The Science and Research Initiative is the direct result of this commitment to innovation. Initiated by Santa Monica College, the Science and Research Initiative is an innovative new initiative serving community college students that incorporates nationally and internationally recognized best practices for promoting student success in STEM, particularly for students traditionally underrepresented in STEM. SMC developed this program in close collaboration with the University of California, Los Angeles, although SRI staff and faculty are the first to

acknowledge that the majority of program graduates will not transfer to UCLA. However, the benefits of developing this program with UCLA as a primary partner are numerous:

- As a Research 1 institution, UCLA is a great role model for students interested in STEM degrees and careers;
- UCLA is located within five miles of the Santa Monica College campus, which eases the burden of transportation and travel in one of the country's most congested areas;
- SMC is the primary transfer institution to UCLA, and many students enroll at SMC with the goal of transferring to UCLA;
- SMC and UCLA have a long history of partnering with each other on an array of projects in support of student success; and
- UCLA offers a number of programs that are complementary to SMC's goals and objectives and upon which SMC can build its Initiative, including the Center for Community College Partnership's Summer Bridge program and the Undergraduate Research Center's summer research experiences.

However, as noted throughout this application, SMC is working with other community partners to develop and implement this program, including the STEM industry, other four year colleges/universities, and K-12 school districts. In addition to UCLA, primary partners include the Jet Propulsion Laboratory and the University of California, Riverside. In addition, as the K-12 component grows, the Science and Research Initiative will expand its relationship with the Santa Monica-Malibu Unified School District and other nearby high schools, including Venice High School, which was recently identified as a STEM Magnet and is located less than 5 miles from SMC. Other partners include those in a position to provide scholarship support to students, such as the Edison Corporation. Program success is dependent on the successful integration of this program with these other services and activities so as to reduce duplication of effort and maximize use of available resources.

Fortunately, this is a strength of Santa Monica College. The college has a long history of sustaining programs and services that demonstrate effectiveness in promoting student success. The college has one of the largest counseling programs among community colleges in the state that includes targeted programs for Hispanic and African American students. The Latino Center and Black Collegians Program are fully funded by the college and serve more than 2,000 students each year. Likewise, the college used federal funding to develop its Welcome Center, but is now maintaining the program with institutional funds. SMC's Superintendent/President set aside institutional funds to launch the Global Citizenship Initiative and has continued to support this initiative, while initiating a new effort targeting non-cognitive skills.

Granted some programs have not been sustained with the decision to sustain based on impact, viability, and effectiveness. Sustainability begins with good planning and integration and continues with ongoing program evaluation and quality improvement. The SRI Program has had the support of the executive administration from its inception, so much so that the college hired a permanent program director to develop this program, rather than a temporary grant-funded project manager. This initial commitment indicated to the college community and its external partners that the STEM Initiative was being developed with the intent that it would remain. This has helped generate support and investment by external partners that will continue to be fostered.

9) Strategies for Stakeholder Engagement

The Science and Research Initiative enjoys the support and buy-in of a number of groups both on and off campus. This support was thoughtfully sought out and developed as faculty and staff planned the program prior to January 2014. Internal support is fostered and maintained through a program leadership team that includes representatives from all groups on campus impacted by the program, including each of the five STEM departments, the Counseling Department (and specifically the Latino and Black Collegian centers), the Scholars Program, the Transfer Center, Career Services Center, and the Student Equity Taskforce (this is particularly important given that the disparity in transfer between White/Asian students and Latino/Black students is the largest equity gap at the college.) This group meets monthly to discuss program activities, student success, and gaps or challenges to program success.

The SRI Program Director facilitates a program retreat once a year during which the external evaluator shares the results of the prior year assessment and makes suggestions for program improvement. All interested STEM faculty may attend this retreat. UCLA representatives from the Undergraduate Research Center and the Center for Community College Partnerships are also encouraged to attend the annual retreat, as well as the monthly meetings.

With regard to other stakeholders who are not actively engaged in the day to day delivery of program services, such as JPL, Venice High School, University of California, Riverside, and the Edison Corporation, SRI faculty and staff maintain regular contact with them through formal and informal communications. They are invited to attend program events, including the annual retreat, if relevant to the agenda. For some partners, like the Edison Corporation and the U.S. Department of Education, SRI staff keep them informed through project progress reports.

In the coming year, as outlined in Item 5, SMC will expand its outreach to K-12 schools and develop a formal program in Engineering. This will require regular conversations with SMC's external partners in these areas. To facilitate this, SRI staff will develop workgroups addressing each outcome that include staff and faculty from SMC, as well as representatives from these external partners. These groups will meet as needed.

With regard to students and their families, SRI staff and faculty will continue to carry out a comprehensive on campus outreach campaign that raises the awareness of students of the opportunities and benefits of a STEM degree and career. Outreach to students occurs in the classroom, during Cool Careers workshops, STEM Career Days in the Quad, and evening workshops for high school students preparing to graduate and transfer to higher education. These evening workshops include a parent component, so as to raise awareness and generate support for STEM study among the student's primary support team. Parent workshops are also offered by the Latino and Black Collegian centers during student orientation.

Lastly, to keep students informed, the Science and Research Initiative established a STEM Student Club that works to keep students informed, as well as engaged in program activities, while building leadership and networking skills. It is student driven and maintained and can be found on Facebook at <https://www.facebook.com/groups/smcstemclub>. Program information can also be found at www.smc.edu/stem.

10) Program Sustainability

SMC initiated the Science and Research Initiative with funding from the U.S. Department of Education's Title III HSI STEM and Articulation Program. This five year award, which began in Fall 2011, will provide program funding through Summer 2016. As such, sustainability has been a consideration from the start. However, the college designed this program as an institutional change initiative, meaning that its goal is to change how the college, and more specifically the STEM departments, encourage and support student success. While SRI includes its own student support program, the STEM Scholars Program, to support underrepresented students in STEM, many aspects of the Initiative have been integrated into the college's operating structure and will be available to all STEM students long after initial funding ends, including Supplemental Instruction and the STEM Skills Workshops. These services work to reduce course repeat rates and improve student success and thus the benefit outweighs the cost.

Because the STEM Scholars Program targets a specific population, it requires new funding from the college or reallocation of existing funds. However, SMC is committed to sustaining this program as a complementary resource to the existing Scholars Program, which is supported by the college. SMC made a strong commitment to this sustainability when they hired a permanent director to oversee the development of SRI and the STEM Scholars Program. The college recognizes that STEM will be a priority program for the foreseeable future, and that it will take considerable time to reduce the equity gaps in STEM. This position is necessary to move SMC in a positive direction. In this role, the Director will continue to oversee SRI and the STEM Scholars Program and will work with the college to identify resources to support essential services. Potential strategies for supporting these services are outlined below:

Essential Services	Source of Ongoing Support
Dedicated STEM Counselor	SMC receives state funding to provide counseling services. A portion of this funding will be reallocated to maintain this position.
Summer Bridge Program at SMC	UCLA offers several summer bridge programs each year that any student may attend on a first come, first serve basis. SRI staff will work with UCLA staff to ensure that SMC students have access to this experience. Staff will also work with the SMC Foundation to identify private resources to help low-income students participate in this program.
Applied Learning Experiences, including Summer Research Experiences	STEM is a priority focus for nearly all federal and state agencies, and as such there is substantial money available to support student success in STEM, and specifically applied learning. Nearly all of the universities receive funding to support student/faculty research. SRI staff will work with local universities to help SMC students obtain access to formal research opportunities. The new research preparation course, as well as SMC's success with UCLA, will strengthen the interest of other universities to include SMC students. Other opportunities through JPL and with SMC faculty will continue.

Lastly, SMC will continue to work with its partners to identify other grant opportunities to support student success in STEM, such as a TRIO/Student Support Services grant for STEM students from the U.S. Department of Education in 2015 and a second STEM grant from the U.S. Department of Education in 2016.

EVALUATION

11) Quantitative and Qualitative Evaluation, including Performance Measures

Santa Monica College has contracted with an external evaluator for the past two years to help evaluate the effectiveness of the Science and Research Initiative in meeting its three primary goals of greater student awareness of STEM careers, improved student success in STEM coursework, and increased student transfer to baccalaureate programs in STEM. Cobblestone Applied Research and Evaluation, Inc., will continue to serve as the external evaluator for this program through 2018-2019, with funding provided by the college to support this cost after grant funding ends in 2016. Cobblestone conducts an annual formative and summative evaluation to help guide program implementation, focusing primarily on qualitative evaluation. In this capacity, the organization has helped SRI staff develop and implement a number of survey tools in an effort to:

- establish baseline attitudes about STEM (Pretest Survey);
- assess feedback about program activities (STEM Skills Workshop Survey; Science 10 Posttest; Counseling 12 and 15 Posttest; Transfer-pa-looza Survey; Equipment and Technology Upgrade Survey);
- assess STEM awareness and interest (Latino Center and Black Collegian Survey; STEM Cool Careers Day Survey; STEM Day Survey); and
- assess Scholars' attitudes about STEM following one year of program participation (Annual SRI Scholars Survey).

The results of these surveys have provided invaluable feedback regarding student satisfaction and areas in need of improvement. These surveys have also helped identify gaps in service delivery, which are then addressed in subsequent semesters.

SMC's Office of Institutional Research is working with the SRI Program Director to provide quantitative data to assess the following performance measures:

- 1) Increase the number of students pursuing degrees in STEM as reported on the SMC college application, particularly among URM students;
- 2) Increase the percent of students successfully completing their math courses the first time they take them, thus reducing the number of course repeats;
- 3) Increase fall to fall persistence rates for students participating in the STEM Scholars Program;
- 4) Increase the percent of STEM Scholars who graduate and/or transfer within 3 years of entry into the program; and
- 5) Increase the percent of SMC transfer students who successfully complete their first year of baccalaureate study and persist to the following academic year.

These measures are supported by other program outputs and milestones that will help staff monitor student progress, such as completion of STEM educational plan, participation in program activities, number of SI sessions attended, and enrollment in Science 10 and Counseling 12 and 15 courses. By tracking student achievement of these milestones, SRI staff and faculty will be able to intervene before students fail to progress and achieve the performance measures outlined above.

12) Performance Targets

The table on the next page outlines the target outcomes for each of the five performance measures identified in Item 11. With the exception of Performance Measure #5, each of these measures is consistent with performance measures outlined in SMC's grant agreement with the U.S. Department of Education. The addition of the fifth performance measure acknowledges the importance of a successful student transition from community college to university in increasing the number of bachelor's degrees awarded in a timely manner. This is a new outcome for the program and will require that SRI staff work closely with SMC's Office of Institutional Research to collect student persistence data from each of the transfer institutions. SMC will begin developing these relationships as students identify their transfer institutions. All of the other data sets are available through SMC's Management Information System and/or through data collected by the SRI Program.

As noted, SMC began enrolling students in the STEM Scholars Program in Fall 2012. As such, the baseline year for this program is 2011-2012. By using this baseline, SMC can assess the full impact of the Science and Research Initiative on student success beginning with the first cohort. Given that the program is new, the baseline for each outcome is the institutional average for each measure during the 2011-2012 academic year. This baseline data was prepared by SMC's Office of Institutional Research, using student success data collected by the college each semester.

With regard to target outcomes, the long-term intent for this program is to promote student equity among all student groups regardless of socio-economic status and life experiences. SMC believes that this can be accomplished through the STEM Scholars Program by developing services that promote success for all students and address factors that may hinder student success. As such, with the exception of Performance Measure #1, SMC expects that all students participating in program services will achieve at an equal rate. Performance Measure #1 is based on actual numbers with the intent to not only increase student interest in STEM among all groups, but to specifically increase the number of students interested in STEM from traditionally underrepresented groups. Given fluctuations in enrollment based on economic and societal factors, these are estimated numbers, assuming a 5% interest in STEM among all groups. This will be accomplished through focused outreach efforts, including expanded outreach to the K-12 system.

With regard to Performance Measure #4, SMC enrolled its first cohort of STEM Scholars in 2012-2013 and thus, while 30 students transferred by the end of the 2013-2014 academic year, this data is skewed and includes students who had only one or two years of study remaining at SMC. Thus the first full year of data collection is 2014-2015 at which time STEM Scholars will begin transferring at rates equal to or higher than the institutional average.

With regard to Performance Measure #5, the STEM Scholars Program transferred its first group of students in 2013-2014. As such first year persistence data in the baccalaureate program will not be available until the end of the 2014-2015 academic year.

The following table outlines the target outcomes for each measure by year:

Performance Measure #1: Increase the number of students pursuing degrees in STEM as reported on the SMC college application, particularly among URM students								
Ethnicity	2011-2012 (baseline)	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Asian	804	778	733	740	780	815	855	900
Black	302	328	295	300	315	330	350	365
Hispanic	1075	1265	1315	1380	1450	1520	1600	1675
Native American	7	7	7	7	7	7	7	7
Pacific Islander	20	15	15	15	15	15	15	15
Two or More Races	118	147	141	145	150	155	160	165
White	1200	1240	1152	1175	1235	1295	1360	1425
Other	179	331	375	380	400	420	440	460
Total	3705	4111	4033	4142	4352	4557	4787	5012
Performance Measure #2: Increase the percent of STEM Scholars who successfully complete their STEM courses the first time they take them, thus reducing the number of course repeats, over a 2011-2012 baseline for all students of 62%								
Ethnicity	2011-2012 (baseline)	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Average All Students	62%	83%	85%	87%	88%	90%	90%	90%
Performance Measure #3: Increase the fall to fall persistence rate for students participating in the STEM Scholars Program over a 2011-2012 institutional baseline for all students of 56%								
Ethnicity	2011-2012 (baseline)	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Average All Students	56%	64%	65%	67%	70%	72%	75%	80%
Performance Measure #4: Increase the percent of STEM Scholars who graduate and/or transfer within 3 years of entry into the program over a 2011-2012 institutional baseline for all students of 25%								
Ethnicity	2011-2012 (baseline)	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Average All Students	25%	*	15%*	25%	28%	30%	32%	35%
Performance Measure #5: Increase the percent of STEM Scholars who transfer to a baccalaureate program and who successfully complete their first year of baccalaureate study and persist to the following academic year								
Ethnicity	2011-2012 (baseline)	2012-2013	2013-2014	2014-2015 (baseline)	2015-2016	2016-2017	2017-2018	2018-2019
Average All Students	**	**	**	65%	70%	75%	80%	85%

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Appendix B

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STUDENT ENROLLMENT AND SUCCESS DATA

Table 1: STEM Scholars Program Student Enrollment and Demographics by Cohort Year

COHORT YEAR	Cohort One (2012-2013)		Cohort Two (2013-2014)		Cohort Three (2014-2015)		Total	
Total Number Students	114		124		153		391	
Ethnicity	#	%	#	%	#	%	#	%
White	13	11.4	29	23.4	48	31.4	90	23.0
Hispanic or Latino	77	67.5	62	50.0	49	32.0	188	48.1
Black or African American	7	6.1	7	5.6	7	4.6	21	5.4
Asian	15	13.2	11	8.9	32	20.9	58	14.8
American Indian/Alaska Native	0	0	1	1.0	0	0	1	0.3
Native Hawaiian or other Pacific Islander	0	0	0	0	1	1.0	1	0.3
Two or More	2	1.8	5	4.0	5	3.3	12	30.7
Unknown/Other	0	0	4	3.2	11	7.2	15	3.8
Gender								
Male	49	43.0	67	54.0	96	62.7	212	54.2
Female	65	57.0	52	41.9	57	37.3	174	44.5
Current/Former Foster Youth	*	*	*	*	*	*	*	*
Students with Disabilities	*	*	*	*	*	*	*	*
Low-Income Students	68	59.6	73	58.9	72	47.1	213	54.8
Veterans	5	4.4	1	1.0	1	1.0	7	1.8

*This data is not currently available for this program.

Table 2: STEM Course Success Rates for STEM Scholars, Cohort 1, Academic Year 2012-2013

Course	# Students		% Passing	
	Fall 12	Spring 13	Fall 12	Spring 13
Anthro	9	11	100.0%	100.0%
Biology	8	8	100.0%	100.0%
Chem 10	15	22	73.3%	81.8%
Chem 11	10	17	100.0%	76.5%
Chem 12	6	8	100.0%	87.5%
Chem 21/22/23	2	5	100.0%	80.0%
Math 2	13	14	92.3%	71.4%
Math 7	7	7	85.7%	85.7%
Math 8	5	7	83.3%	85.7%
Math 10/11/1315	2	5	0.5	100.0%
Math 20	13	7	92.3%	85.7%
Math 54	5	5	80.0%	100.0%
Math 32	11	5	54.5%	80.0%
Math 26*	2		0.0%	
Total			79.4%	87.3%
AY 2012/13	83.3%			

Table 3: Course Success Rates for All Students by STEM Discipline, Fall 2012

STEM Discipline	Students Attempted	Students Successful	Percent
Computer Science	3,232	2,241	69.3
Earth Science	3,077	2,115	68.7
Life Science	3,665	2,476	67.6
Mathematics	9,348	4,519	48.3
Physical Science	2,551	1,642	64.4
Total STEM	21,873	12,993	59.4

Table 4: Course Success Rates by Ethnicity in Math 31, Elementary Algebra

Ethnicity/ Race	2011-2012			2012-2013			2013-2014		
	Success	Total	% Success	Success	Total	% Success	Success	Total	% Success
Asian	133	225	59.1%	88	165	53.3%	102	181	56.4%
Black	111	325	34.2%	117	323	36.2%	105	317	33.1%
Hispanic	656	1,430	45.9%	643	1477	43.5%	673	1633	41.2%
Native American	1	4	25.0%	4	12	33.3%	4	5	80.0%
Pacific Islander	8	14	57.1%	3	7	42.9%	3	7	42.9%
Two or More Races	32	81	39.5%	37	89	41.6%	35	106	33.0%
White	376	633	59.4%	312	527	59.2%	259	475	54.5%
Unreported	32	71	45.1%	79	129	61.2%	82	124	66.1%
Total	1,349	2,783	48.5%	1283	2729	47.0%	1263	2848	44.3%

Table 5: Course Migration Rates from Math 31 to Math 20 by Ethnicity within One Year

Ethnicity/Race	2011-2012			2012-2013		
	Progressed	Total	% Progressed	Progressed	Total	% Progressed
Asian	63	167	37.7%	44	115	38.3%
Black	45	212	21.2%	36	213	16.9%
Hispanic	297	1019	29.1%	279	1043	26.7%
Native American	1	2	50.0%	1	7	14.3%
Pacific Islander	3	10	30.0%		4	0.0%
Two or More Races	16	65	24.6%	15	60	25.0%
White	179	517	34.6%	131	400	32.8%
Unreported	17	48	35.4%	41	109	37.6%
Total	621	2040	30.4%	547	1951	28.0%

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Science and Research Initiative

- Do you want to discover new cures for diseases?
- Do you like to take things apart and see how they work?
- Do you want to be part of solving today's environmental challenges?
- Do you want to discover what is beneath the ground you walk on and who has walked on it before you?
- If you answered yes to any of the above questions, a major in STEM might be right for you. Find out what the SMC/UCLA Science and Research Initiative has to offer you!

Photo by Christine Miller-Richter

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Is STEM the right major for you?

Science and Research Initiative

SMC/UCLA

WHAT IS STEM?

STEM stands for science, technology, engineering and mathematics. There are a variety of majors and careers that fall into STEM such as chemistry, biology, mathematics, civil engineering and physics. Mathematics is at the core of all STEM majors.

SMC offers high quality programs of study with dedicated faculty:

- | | | | |
|-------------------------|----------------------|--------------------------|-------------------------|
| Earth Sciences | Life Sciences | Physical Sciences | Computer Science |
| • Physical Anthropology | • Biology | • Chemistry | |
| • Astronomy | • Botany | • Engineering | |
| • Physical Geography | • Field Biology | • Physics | |
| • Geology | • Zoology | | |

WHY SHOULD I MAJOR IN STEM?

- **Maximize your possibilities.** STEM majors may attend graduate school, work in a laboratory, teach, become part of the government sector, design buildings, conduct research in foreign countries, and pursue countless other career opportunities.
- **Have an impact on your community and the world!** Have an impact on your community and the world! STEM professionals are constantly making contributions to the world – almost every area of our lives is affected by STEM advancements.
- **Increased job security.** Increased job security. Many of the growing employment opportunities are in STEM related fields. In 2011, the U.S. Department of Commerce projected that between 2008 and 2018, STEM occupations will grow 17% (compared to 9.8% for non-STEM fields).
- **Challenge yourself!** Be innovative and explore areas that are undiscovered and constantly changing. If you enjoy solving complex problems, thinking outside of the box, learning how things are built, a major in STEM might be right for you.
- **Career satisfaction.** If you are passionate about a STEM field, take classes at SMC to work toward your major and begin your path toward a field you love!

Income earnings for STEM professionals:

	Entry	Experienced
Biomedical Engineer	\$63,000	\$95,000
Computer Programmer	\$47,800	\$124,900
Environmental Scientist	\$75,000	\$108,000
Mathematician	\$63,000	\$102,000

Source: www.bls.gov



Photo by SMC, JMC, Student Program



Photo by SMC, JMC, Student Program



Photo by SMC, JMC, Student Program



Dr. Shirley Ann Jackson was born in Washington D.C. In 1964, she attended the Massachusetts Institute of Technology (MIT) for her undergraduate education and studied theoretical physics. She then obtained her doctorate degree at MIT in elementary particle theory. Dr. Jackson was the first African American woman to receive a doctorate from MIT. In 2009, President Barack Obama appointed Dr. Jackson to the President's Council of Advisors on Science and Technology.



Dr. Siavash Kurditsami is a biochemist born in Iran who came to the U.S. as a refugee when he was a teenager. He attended Santa Monica College and transferred to UCLA where he graduated with a bachelor's degree in biochemistry. He then attended medical school at Harvard where he graduated with honors in molecular biology. Mr. Kurditsami is an Assistant Professor in the Department of Biological Chemistry with joint appointments in the Department of Pathology and Laboratory Medicine at UCLA. He is also a member of the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research. His research focuses on the role of epigenetic processes in biology and medicine.

WHAT IS THE SMC/UCLA SCIENCE AND RESEARCH INITIATIVE?

SMC's Science Research Initiative (SRI) is an academic support program designed to assist traditionally underrepresented students interested in pursuing Science, Technology, Engineering, or Mathematics majors/careers. The SRI program is designed to help students successfully complete their studies at SMC, transfer to ANY baccalaureate program, and enter the STEM workforce by providing the following:

- Specialized courses
- Applied learning experiences, including research opportunities
- STEM Transfer counseling
- Student Success workshops and training
- Supplemental Instruction and tutoring resources
- Exposure to careers in STEM fields

Additionally, SMC has partnered with UCLA's Center for Community College Partnerships (CCCCP) and the Undergraduate Research Center (URC) to offer active program participants the following:

- Designated UCLA Peer Mentors
- Saturday Transfer Academies at UCLA (CCCCP)
- Summer Bridge Programming at UCLA (CCCCP's SITE programs) and Summer Research Opportunities (URC)

PROGRAM REQUIREMENTS

- Completion of Math 20 (with a "B" or higher) or eligibility for a higher level math course
- Fewer than 30 completed college units
- Minimum 2.8 cumulative GPA
- Commitment to participate in program services

HOW TO APPLY:

You can obtain an interest card from the Latino Center or directly from STEM counselors in the counseling complex. By joining the interest list, you will receive information about completing an application online.

For More Information Please Contact: STEM@smc.edu or Visit: <http://www.smc.edu/AcademicPrograms/Counseling/STEM/Pages/default.aspx>

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Photo provided by UCLA Undergraduate Research Center



Photo by UCLA URC



Photo provided by UCLA Undergraduate Research Center



Dr. Alfredo Quiñones-Hinojosa is a neurosurgeon and neuroscientist born in Mexico. Dr. Quiñones-Hinojosa came to the U.S. at the age of 19 as an undocumented farm worker. He attended San Joaquin Delta College in Stockton, CA, and transferred to UC Berkeley where he obtained a bachelor's degree in psychology. He went on to attend medical school at Harvard where he graduated with honors. Dr. Quiñones-Hinojosa is a professor at Johns Hopkins and also leads the Brain Tumor Stem Cell Laboratory.



Adriana C. Ozampo is a planetary geologist who was raised in Argentina and moved to the U.S. with her family in high school. She attended Pasadena City College and transferred to California State University, Los Angeles where she obtained her bachelor's degree in Geology with an emphasis in Planetary Science. She then completed her master's degree in Geology at California State University, Northridge. Ms. Ozampo is presently the Science Program Manager at NASA Headquarters Science Mission Directorate where she is responsible for the New Frontiers Program.

Notable Scientists



COUNSELING 12: Career Planning

Fall 2012

Instructor: Katrina Davy, M.A., Ed.M.

Course Details: Fridays, 8:45-10:50 AM | HSS 263

Contact Information: Davy_Katrina@smc.edu or (310) 434-8936

CATALOG DESCRIPTION:

This course is designed to inform and assist students in making appropriate and satisfying career choices. Using self-evaluation instruments, students identify interests, abilities, values, and goals. Skills necessary for future career investigation and decision-making are included. This section of Counseling 12 has a specific focus on Science, Technology, Engineering and Mathematics (S.T.E.M.) careers.

REQUIRED MATERIALS:

The **Counseling 12 Text Packet** containing the career assessments (Myers-Briggs Type Indicator and Strong Interest Inventory) will be provided at the first class.

The **Counseling 12 STEM Course Packet** will be provided during the first class.

COURSE FORMAT:

- Lecture
- Large and small group discussions and activity completion
- Discussions in dyads

GRADING AND EXPECTATIONS:

Grading for this course will be based on students' completion of reading and reflective assignments, class meetings, and active discussions. Students are expected to be on time, attend each class, and actively participate. They are also expected to respect others with views that are different than theirs and to be courteous to the individual nature of the career development process.

Honor Code: General principles guiding the Honor Code and Honor Council include the following:

- Honesty:** means fairness and straightforwardness of conduct; implies a refusal to lie, steal, or deceive in any way.
- Integrity:** implies that one is true to a trust; one adheres to a code of moral values.
- Social Responsibility:** is demonstrated by adherence to policies of the institution, departments, labs, libraries and individual classes.
- Respect and Civility:** implies that one will conduct oneself in a courteous and respectful manner in our communications and actions toward members of the campus community.

Americans with Disabilities Act: Santa Monica College makes every effort to make its campus fully accessible to students with disabilities. The College's Center for Students with Disabilities offers guidance and counseling on admissions requirements and procedures, as well as a number of special programs to help students with their academic, vocational, and career planning goals. In addition, the Center offers services such as tutoring, specialized equipment, test proctoring, among many other accommodations for students who are eligible. For more information, please call (310) 434-4265 or (310) 434-4273 (TDD)

COURSE OBJECTIVES:

1. Students will learn and integrate the various theoretical underpinnings relative to career decision-making and life planning, with a specialized focus on Science, Mathematics, Engineering, and Technology.
2. Students will learn a life-long career development process and career-decision making model that they can apply toward their development as an emerging STEM professional.
3. Students will use standardized career assessment inventories and self-reflection exercises to explore their values, skills, interests and personality traits as they relate to their careers options.
4. Students will learn how to research current print, web, and labor market trends with an emphasis on the fields of Engineering, Mathematics, Science, and Technology.
5. Students will learn about the various resources and services available to help them clarify and make career and major-related decisions.
6. Through classroom discussions, students will be able to verbalize their career paths and create a plan to achieve these goals and receive feedback from their classmates and instructor.

COURSE POLICIES:

1. Please be on time. Late arrivals are disruptive and keep you from getting the most out of this course.
2. Each absence will result in a 3-point reduction.
3. All assignments must be typed and turned in at the beginning of each class.
4. Failure to complete the MBTI and Strong Interest Inventory by the second class will result in you being dropped from the course.
5. No assignments will be accepted after the due date – no exceptions.
6. Please turn cell phones off during class. Please no texting during class.

COURSE REQUIREMENTS:

There following are the requirements for this course: class participation and attendance, career assessments, journal reflection papers, informational interview report, and a final Career Research Project.

Class Participation and Attendance: Students are expected to complete all reading assignments on the date which they are assigned and come to class prepared to discuss them. To get the most out of this interactive course, it is important that students show up on time. Attendance is essential in order to truly learn and apply the concepts of career decision-making. It is the student's responsibility to inform the instructor prior to class absence. **Use of laptops and cell phones during class is prohibited.**

Reflection Journals: Journal reflection papers are designed to help students think critically about specific career development experiences, course activities and readings, and their journey towards a S.T.E.M. career. Reflection Journals should be typed in 12-point font double-spaced and one to two pages long. An expanded description of the assignments with due dates are listed below:

Reflection Journal # 1: "Personality"

Based on your MBTI results, explore how your personality relates to various aspects of your life. Read the description of your type on: <http://www.personalitypage.com/html/portraits.html>. How well do your results describe you? What did you learn about yourself? How do your results relate to the S.T.E.M. fields discussed in class? How does this relate to your career planning? **Due November 9.**



COUNSELING 15: Job Search Techniques

Winter 2014

Instructor: Katrina Davy, M.A., Ed.M.

Course Details: Tuesdays, 8:00 – 11:05A, Drescher 115

Contact Information: Davy_Katrina@smc.edu or (310) 434-8936

CATALOG DESCRIPTION:

The objective of this course is to teach skills necessary for successful job hunting by students. Skills identification, interviewing techniques, researching the job market, and resume writing are explored. This section of Counseling 15 has a specific focus on job search strategies and careers for Science, Technology, Engineering and Mathematics (S.T.E.M.) fields.

Prerequisite: Counseling 12

REQUIRED MATERIALS:

The **Counseling 15 STEM Course Packet** will be provided during the first class.

COURSE FORMAT:

- Lecture
- Large and small group discussions and activity completion
- Discussions in dyads

GRADING AND EXPECTATIONS:

Grading for this course will be based on students' completion of reading and reflective assignments, class meetings, and active discussions. Students are expected to be on time, attend each class and actively participate. They are also expected to respect others with views that are different than theirs and to be courteous to the individual nature of the career development process.

Honor Code: General principles guiding the Honor Code and Honor Council include the following:

- Honesty:** means fairness and straightforwardness of conduct; implies a refusal to lie, steal, or deceive in any way.
- Integrity:** implies that one is true to a trust; one adheres to a code of moral values.
- Social Responsibility:** is demonstrated by adherence to policies of the institution, departments, labs, libraries and individual classes.
- Respect and Civility:** implies that one will conduct oneself in a courteous and respectful manner in our communications and actions toward members of the campus community.

Americans with Disabilities Act: Santa Monica College makes every effort to make its campus fully accessible to students with disabilities. The College's Center for Students with Disabilities offers guidance and counseling on admissions requirements and procedures, as well as a number of special programs to help students with their academic, vocational, and career planning goals. In addition, the Center offers services such as tutoring, specialized equipment, test proctoring, among many other accommodations for students who are eligible. For more information, please call (310) 434-4265 or (310) 434-4273 (TDD)

COURSE OBJECTIVES:

1. Students will learn and integrate the various theoretical underpinnings relative to career decision-making and job search strategies, with a specialized focus on Science, Mathematics, Engineering, and Technology.
2. Students will learn networking and job search strategies that they can apply toward their development as an emerging STEM professional.
3. Students will learn how to research and leverage current print, web, and labor market trends to discover internship and job opportunities in the fields of Engineering, Mathematics, Science, and Technology.
4. Students will learn about the various resources and services available to help them take action to meet their career goals.
5. Through classroom discussions and assignments, students will create a plan to achieve these goals while receiving feedback from their classmates and instructor.

COURSE POLICIES:

1. Please be on time. Late arrivals are disruptive and keep you from getting the most out of this course.
2. Each absence will result in a 5-point reduction. Each late arrival (arriving once class has begun) will result in a 2-point reduction.
3. All assignments must be typed and turned in at the beginning of each class.
4. Assignments will not be accepted after the due date – no exceptions.
5. Please turn cell phones off during class. Please no texting or internet searching during class.

COURSE REQUIREMENTS:

There following are the requirements for this course: class participation and attendance, career assessments, journal reflection papers, informational interview report, and a final project.

Class Participation and Attendance: Students are expected to complete all reading assignments on the date which they are assigned and come to class prepared to discuss them. To get the most out of this interactive course, it is important that students show up on time. Attendance is essential in order to truly learn and apply the concepts of effective job search strategies. It is the student's responsibility to inform the instructor prior to class absence. **Use of laptops for non-class related activities and cell phones during class are prohibited.**

Career Exercises: The career exercises listed below are designed to help students think critically about specific career development experiences, course activities and readings, and their journey towards a S.T.E.M. career. An expanded description of the assignments with due dates are listed below:

"Career Goals" – Choose either the Reflection Journal OR Vision Board. Due Week 2

1. Reflection Journal

What are your current career goals? What steps did you take to reach this conclusion? What steps do you plan to take to meet your current career goals? Take time to reflect on the things you hope to accomplish over the course of this class. This journal should be typed in 12-point font double-spaced and one to two pages long.

2. Career Goal/Vision Board

The Career Goal/Vision Board provides an opportunity to select images and words that will serve as your motivation. Possible examples include magazine cutouts, goal cards or a goal timeline. Additional instructions and materials will be provided in class.

SCIENCE 10: Principles and Practice of Scientific Research
Drescher Hall 136 M-Th 3-4:30, Fri 8:30-2:30

Dr. Mary Colavito	Dr. Roman Ferede	Dr. Catherine Haradon
Life Sciences	Physical Sciences	Earth Sciences
Office: SCI 276	Office: SCI 278	Office: Drescher Hall 314P
(310) 434-4710	(310) 434-4973	(310) 434-4085
Laboratory: SCI 124	Laboratory: SCI 332	Laboratory: DH 136
colavito_mary@smc.edu	ferede_roman@smc.edu	haradon_catherine@smc.edu

Prerequisites: Math 20 and any UC-transferable science lab class

Skills Advisory: English 21 B

For the Chemistry Research Project, completion of Chemistry 10 is recommended.

Course Description: This course explores the modern practice of science. The course focuses on the use of the scientific method; the history of science; how, why and where research is conducted; the ethical protocol in the scientific process; how peer review works; and how to formulate scientifically testable hypotheses and design/perform experiments to test the hypotheses. Students will apply the scientific method in inquiry-based laboratory projects and will communicate research design, data collection, and data interpretation in conventional scientific formats.

Course Objectives:

Upon completing this course, students will have learned how to:

1. Trace the progression of modern scientific research projects from proposals through funding, experimentation, and dissemination.
2. Demonstrate the ability to generate and analyze scientific data.
3. Explain ethical conduct required in doing science.
4. Formulate a scientifically testable hypothesis.
5. Design and conduct experiments that will effectively test a scientific hypothesis.
6. Collect scientific data with safety and accuracy.
7. Employ appropriate statistical methods to evaluate collected data.
8. Critique peer-reviewed scientific articles.
9. Use oral and written communication methods to present findings in formats recognized by the scientific community, including journal articles and poster presentations.

Student Learning Outcomes:

Upon completing this course, students are expected to be able to:

1. Demonstrate the ability to formulate a scientifically testable hypothesis and design experiments to test the hypothesis.
2. Demonstrate the ability to generate and analyze scientific data.
3. Describe how modern scientific research is conducted, reviewed, disseminated, and accepted.
4. Distinguish between ethical and unethical behavior in experimental design, data collection, and presentation of scientific results.
5. Demonstrate the ability to communicate scientific work effectively.

Evaluation

Item	Due Dates (see schedule for details)	Points Possible
Participation		10
Group Discussions		5
Scientific Method Online Assignment	1/6	10
Writing Assignments: Answers to Guided Questions on Research Articles (3 @ 5 points each)	1/7, 1/8, 1/9	15
Laboratory Notebook and Safe and Responsible Work Habits	1/17, 1/24, 1/31	30
Summary/Flow Chart of Experimental Design	1/17	10
Writing Assignments: Sections of a Scientific Report (5 @ 4 points each)	1/14, 1/21, 1/28, 2/4, 2/6	20
Group Poster and Oral Presentation	2/12	25
Scientific Literature Evaluation	1/16, 1/31	15
Case Studies (2 @ 5 points each)	2/3, 2/5	10
Total Points Possible		150

Percentage of Total Points	Number of Points	Grade Earned
90-100%	135-150	A
80-89%	120-134	B
65-79%	98-119	C
50-64%	75-97	D
Below 50%	Below 75	F

Textbooks:

- *Research Methods for Science*. 2011. Marder, Michael P. Cambridge University Press, New York. 978-0-521-14584-8. Will be provided as a loaned copy.
- *On Being a Scientist: A Guide to Responsible Conduct in Research*, 3rd Edition, 2009. Engineering, and Public Policy Committee on Science, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, National Academies Press, Washington, D.C. ISBN: 0309119707 Will be provided as a printout in the course packet and posted as a PDF file.

Appendix C

- Science and Research Initiative Project Work Plan
- Science 10, Evaluation Findings
- Supplemental Instruction, Research Brief
- STEM Skills Workshops Summary
- Overview of SRI/STEM Scholars Mandatory Activities
- STEM Scholars Program, Student Feedback

Science and Research Initiative Project Work Plan

Goal: Improve Hispanic and other low-income underrepresented student enrollment, success, and transfer in STEM programming

Focus Area/Outcome	Proposed Strategies by Year				
	Year 1 (2011-2012)	Year 2 (2012-2013)	Year 3 (2013-2014)	Year 4 (2014-2015)	Year 5 (2015-2016)
Student Awareness: Increase Hispanic student awareness of STEM careers	Development of Outreach Materials Targeted Outreach Summer STEM Orientation Sustainable Crews	Targeted Outreach Summer STEM Orientation Sustainable Crews	Targeted Outreach Summer STEM Orientation Sustainable Crews	Target Outreach Summer STEM Orientation Sustainable Crews	Targeted Outreach Summer STEM Orientation Sustainable Crews
Student Success: Foster Hispanic student self-confidence/belief in their own abilities in achieving educational and career success	Develop STEM Scholars Program	Counseling Cohort Activities Student Success Workshops Mentoring			
Improve faculty awareness of and use of effective teaching and learning practices	On Course Workshop HACU Annual Conf	Use of Technology HACU Conf	Use of Data for Program Improvement HACU Conf	Strategies for Integrating Applied Research HACU Conf.	HACU Conf
Strengthen instructional support in the sciences	Develop SI Program Update existing labs for relevancy	SI in STEM Expand use of effective practices	SI in STEM courses Expand use of effective practices	SI in STEM Expand use of effective Practices	SI in STEM courses
Student Transfer: Increase Hispanic student transfer to 4-yr programming in STEM	Assist with Outreach Development of Supportive Services	Summer Bridge at UCLA Mentors			
Expand community college student involvement in research	Develop Intro. to Research and Research Techniques courses	Expand applied learning in the classroom and at CEUS	Summer Research Experience at UCLA	Summer Research Exp. at UCLA & other locations	Summer Research Exp. at UCLA & other locations

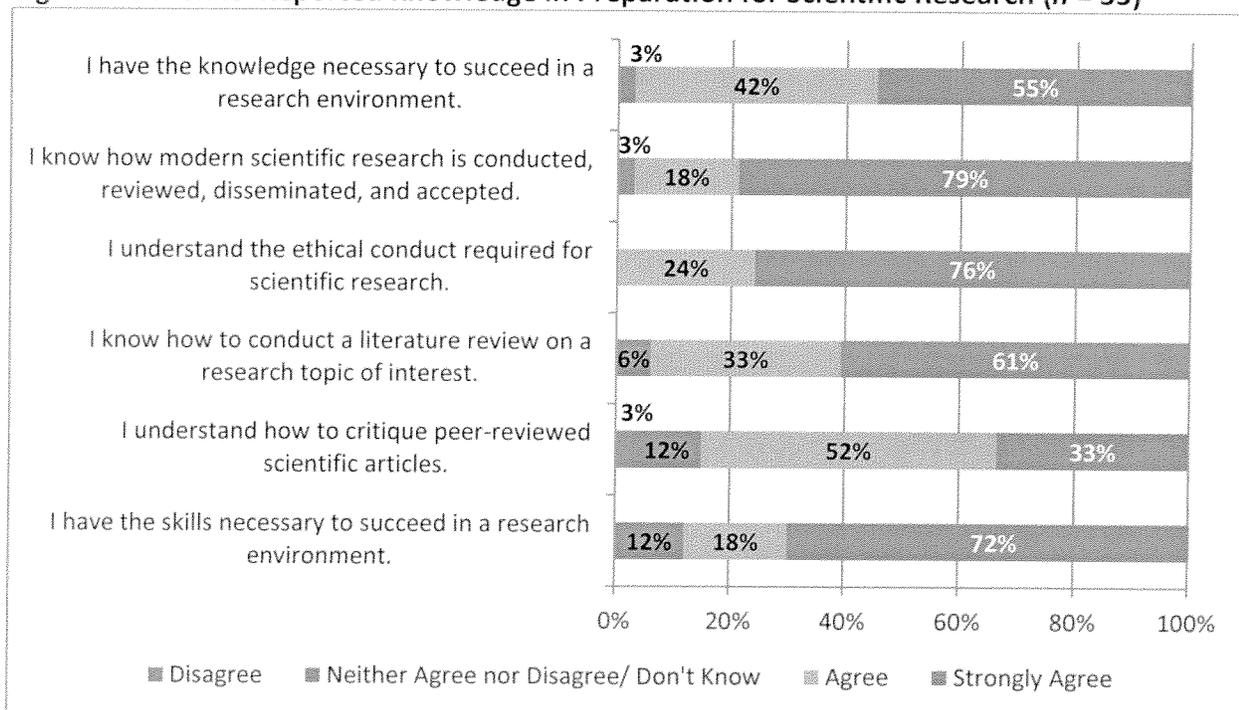
Excerpt from “Santa Monica College/University of California, Los Angeles: *Science and Research Initiative*, Quarterly Update – July 2014,” Rebecca M. Eddy, Ph.D., Monique H. Matelski, M.A., Ashley Hunt, M.A., & Amy Goldman, COBBLESTONE APPLIED RESEARCH & EVALUATION, INC., July 31, 2014

Science 10 Retrospective Posttest

SRI has thus far developed one interdisciplinary course, Science 10: Principles and Practices of Scientific Research first offered in winter 2014 and offered again in spring 2014. The Science 10 course provides students with experience in designing and conducting experimental research, and collecting, analyzing, reporting, and presenting data. This course is structured with whole-class lectures on various topics related to the scientific method and lab sections dividing students into the three areas of Life, Physical, and Earth Sciences. A posttest was developed and administered in winter 2014 and spring 2014 to assess students’ knowledge and skill in a number of areas related to experimental research competence. Since students’ responses were similar in both terms, survey results were combined for winter 2014 and spring 2014.

Thirty-four students (26 from winter 2014, 8 from spring 2014) responded to a survey administered at the end of the Science 10 course in February 2014 and June 2014. As **Figure 2** illustrates, the vast majority of respondents *Agree* or *Strongly Agree* that they possessed knowledge in several areas related to being prepared for scientific research after completing Science 10. Scholars indicated having strong levels of knowledge in the scientific process, ethical considerations, and the general skills and knowledge required for success as a researcher. Additionally, nearly all students *Agree* or *Strongly Agree* (31 out of 34) that they had a positive experience in Science 10.

Figure 1. Scholars’ Reported Knowledge in Preparation for Scientific Research (n = 33)



Scholars were also asked to rate their skill levels in eight key areas both *at the beginning* of Science 10, and *upon completion* of the course. Paired samples t-tests were conducted to compare the difference between retrospective pretest and posttest responses. Data indicate that after completing Science 10, Scholars experienced statistically significant improvement in all eight research skill areas (see **Table 1**). The largest gain made was in students' skill for *analyzing data*; a skill in which they felt fairly strong at the beginning of the course and strongest at the end of the course. On the other hand, Scholars reported relatively lower levels of skill both before and after the course in the area of *presenting experimental findings*, where the least gain was reported. Overall, the course seems most effective at boosting skill levels for areas in which students begin with a fairly high level of competence. Though all gains were statistically significant, the course might be improved by concentrating a bit more on the areas in which students are least confident, such as presenting their findings.

Scholars also rated the value of various class assignments for building their skills and knowledge on a 5-point Likert scale where 1 = *Not Valuable* and 5 = *Very Valuable* (See **Table 2**). The most valuable assignment according to students was the *group poster assignment* ($M = 4.61, SD = .70$) and the least valuable assignments were *textbook reading assignments* ($M = 3.39, SD = 1.32$).

Table 1. Mean Student Gains for Experimental Research Skills ($n = 33$)

Survey Items	Pretest Mean (SD)	Posttest Mean (SD)	Mean Gain	df	t test
Analyzing data	3.09 (1.16)	4.48 (.67)	1.39 (.90)	32	8.90***
Designing experiments	2.75(1.16)	4.19 (.86)	1.44 (.98)	31	8.28***
Interpreting data	3.27 (1.04)	4.39 (.75)	1.12 (.82)	32	7.86***
Writing a report on experimental findings	2.79 (1.08)	4.24 (.75)	1.46 (1.06)	32	7.86***
Conducting experiments	3.21 (1.17)	4.52 (.57)	1.30 (.98)	32	7.61***
Generating data	2.91 (1.18)	4.45 (.56)	1.55 (1.18)	32	7.56***
Formulating testable hypotheses	3.09 (1.18)	4.30 (.81)	1.21 (1.02)	32	6.80***
Presenting experimental findings	2.67 (1.22)	3.88 (1.08)	1.21(1.32)	32	5.29***

Scale: 1 = *Poor* to 5 = *Excellent*; *** = $p < .001$

Table 2. Mean Student Ratings for Value of Assignments ($n = 33$)

Survey Items	Mean	SD
Group Poster	4.61	.70
Scientific Literature Evaluation	4.39	.79
Oral Poster Presentations	4.33	.99
Individual Writing Sections of a Lab Report	4.33	.99
Flow Chart of Experimental Design	4.21	.86
Guided Question Handouts (research articles in each area)	4.21	.93
Lab Notebook	4.06	.90
Case Studies	3.97	1.12
Scientific Method Online Assignment	3.94	1.05
Textbook Reading	3.39	1.32

Scale: 1 = *Not Valuable* to 5 = *Very Valuable*

Course lectures and activities were similarly rated by Scholars (see **Table 3**). Scholars most valued the *statistical analysis* ($M = 4.69, SD = .59$) and the *understanding research methods and experimental design* ($M = 4.61, SD = .56$) components. The least valuable components, according to the respondents, were the *group ethics/case study discussions* ($M = 3.91, SD = 1.07$) and *library orientation/lit searches* ($M=3.94, SD=1.05$).

Table 3. Mean Student Ratings for Value of Assignments ($n = 33$)

Survey Items	Mean	SD
Statistical Analysis	4.69	.59
Understanding Research Methods and Experimental Design	4.61	.56
Scientific Knowledge and Methods	4.31	.78
Experimental Flow Chart	4.21	.89
Science Publication, Funding, and Collaboration	4.12	.93
History of Science	4.09	.91
Library Orientation/Lit Searches	3.94	1.05
Group Ethics/Case Study Discussions	3.91	1.07

Scale: 1 = *Not Valuable* to 5 = *Very Valuable*

Scholars provided feedback on what aspects of the course they found especially valuable to their learning experience (see **Appendix A**). Most students mentioned the hands-on experience gained through designing, conducting, and analyzing experiments as the most valuable aspect of Science 10. Respondents also highly valued the ability to discuss their individual research findings and interpret results with their peers. Collaboration and group work was highly valued, with most students enjoying the poster presentation and appreciating the small group sizes. Other valued aspects include the mentoring and one-on-one support Scholars received from professors and the information provided on research funding sources.

“The research process itself and failing and trying again. I learned the most when making mistakes and getting help.”

Scholars ($n = 29$) also provided suggestions for improving the course (see **Appendix B**). Several students from winter 2014 found some of the *lectures and activities* unhelpful, such as those on library research and the scientific method, feeling that the content was not new. Suggestions were to make certain lectures optional, or convert the lectures into activities and discussion to better engage the students. Several students expressed a desire for *more support and guidance*, especially in the areas of public speaking, hypothesis generation, data analysis, and write up of findings. A few students wanted more feedback and discussion with peers about their experiments. There was a call for “*clearer instructions and expectations*” for assignments and some students suggested that assignments be better “*structured to build naturally*” over the course of the semester, increasing in difficulty over time and more time allowed for each assignment. Some students felt that there was an excess amount of work and they needed more time to complete the assignments, especially more time “*to get the most out of each assignment.*”

Several students from spring 2014, commented that the pace of the class was too fast and that there was too much material to learn in the quarter. Some of those students suggested having the class more days in the week, rather than just once a week. A number of students expressed a desire for more flexibility and options in "*choosing and designing their experiments*". At least one student would have liked to conduct experiments in more than one field, while some students suggested providing extra packets and handouts for students who were unable to conduct research on their preferred topic or dividing the class by interest.

There were several suggestions offered to improve the *group work and poster presentation*. Several students thought it would be beneficial to structure the assignment to better reflect "conference style" poster presentations. Suggestions included writing a full report and then pulling out key elements for the poster; and moving to a larger presentation space.

SMC RESEARCH BRIEF

Impact of Supplemental Instruction on Math and English Success

Background

Supplemental Instruction (SI) is an academic assistance program that uses peer-assisted collaborative learning strategies in group sessions to help students be successful in specific courses. SI sessions are regularly scheduled, informal review sessions in which students engage in interactive study groups, discuss course content, learn and integrate study skills, participate in learning activities, and take mock exams. Funded by the Title V grant, the SI program at Santa Monica College was launched in fall 2008 to support classroom learning in basic skills courses; however, reliable data is not available prior to the winter 2009 term. SI-supported courses are those sections of selected basic skills courses in math (MATH 81, Basic Arithmetic; MATH 84, Pre-Algebra; MATH 31, Elementary Algebra; MATH 20, Intermediate Algebra; and, MATH 18, Intermediate Algebra for Statistics and Finite Mathematics) and English (ENGL 81A, Paragraph; ENGL 84W, Basic College Essay; ENGL 21A, English Fundamentals I; and, ENGL 21B, English Fundamentals 2) that are assigned SI leaders who are familiar with the content (lectures, assignments, exams, etc.) of that specific section. Although other sections and courses may not be SI-supported, students from these sections are still accommodated. However, because SI leaders are not familiar with the specific content of these students' classes, they would not receive the maximum benefit of the program.

The current document provides preliminary analyses of the impact of supplemental instruction on student success in math and English courses. In addition, SI participation rates and a demographic profile of SI participants are provided.

The following bullet points provide a summary of the findings of the study:

- Between 19 and 25 math sections and 6 to 10 English sections offer SI support in the main terms (spring/fall). However, the program also serves students in many non-SI supported classes.
- The data reveal that participation in the SI program is higher in math classes than English classes:
 - A little less than half of students who are enrolled in an SI-supported class attended at least one SI session. The SI participation rate is higher in math (47.2%) than English (41.8%).
 - The SI program recommends that students attend at least five SI sessions to get the most benefit from the program. Approximately one in five students enrolled in SI-supported classes attended a minimum of five SI sessions. The SI participation rate (with five session threshold) is higher in math (20.8%) than English (12.9%).
- Overall, the largest proportion of students enrolled in SI-supported English and math sections are Hispanic (53%).
- Students who attended the recommended the five or more SI sessions were older when compared with non-participants and those who had minimal participation (one to four sessions).

- Overall, the course success rates of students who participated in at least one SI session were significantly higher (59.2%) than the rates of non-participants (41.0%).
- The number of SI sessions attended seemed to positively influence course success; students who attended at least five sessions succeeded at much higher rates (69.4%) when compared with non-participants (41%) and those who attended fewer SI sessions (52.2%).
- Overall, Hispanic students, both SI and non-SI participants, succeeded in math courses at lower rates than non-Hispanic

SMC/UCLA Science and Research Initiative (SRI)

STEM Skills Workshops Summary

Rebecca Eddy, Ph.D. &
Monique Matelski, M.A.
November 3, 2014

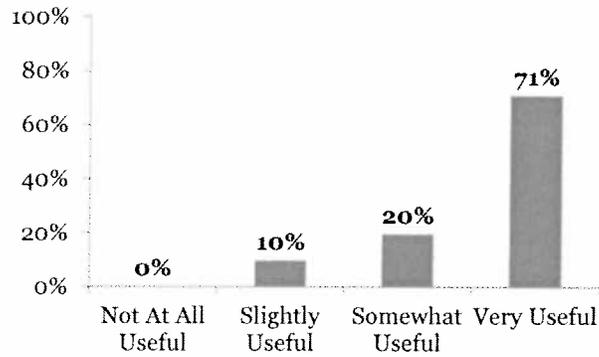


SRI Summer STEM Skills Workshop Series

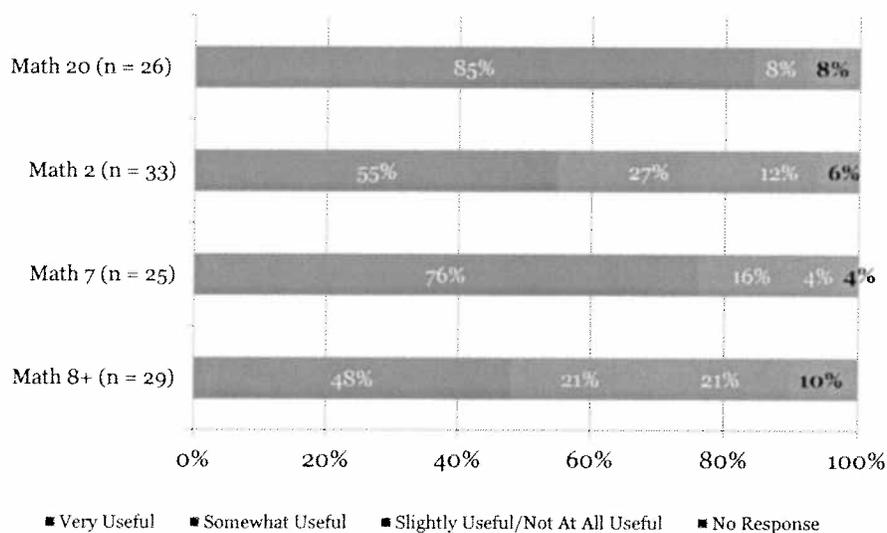
- Workshops provided to Cohort 3 Scholars Aug. 2014
- Posttest survey administered ($n = 114$)
 - Usefulness & value of workshops
 - STEM readiness
 - Pre/Posttest for content knowledge
 - Suggestions for improvements

STEM Skills Posttest Survey Results

- Overall, students found the workshops very useful



Usefulness of Math Workshops



Summer STEM Skills Content Assessments

Subject	Average Pretest Score	Average Posttest Score	Average Gain	Significant
Math 20	52%	60%	8%	No
Math 2	62%	Not given	N.A.	N.A.
Math 7	47%	65%	18%	Yes
Math 8+	Not given	Not given	N.A.	N.A.
Earth Science	78%	75%	-3%	No
Biology	46%	73%	27%	Yes
Chemistry	70%	47%	-23%	Yes
Physics	Not given	23%	N.A.	N.A.

Summer 2013 vs. Summer 2014

Summer 2013	Summer 2014
Cohort 2 completed posttest n=43	Cohort 3 completed posttest n = 114
54% found workshops very useful	71% found workshops very useful
Most Valuable Aspect: <ul style="list-style-type: none"> • Meeting & working with peers • UCR speakers/ Presentations <ul style="list-style-type: none"> • Excel skills 	Most Valuable Aspect: <ul style="list-style-type: none"> • Math workshop • Meeting & working with peers • Preparing for school
Area for Improvement: <ul style="list-style-type: none"> • More peer interaction • Dividing students into groups according to interest • More hands-on experience 	Area for Improvement: <ul style="list-style-type: none"> • More info. on internships & employment opportunities • More hands-on experience • Dividing students into groups according to skill level

Most Valuable Aspects of Workshops

- Students ($n = 108$) responded to an open-ended question in which they reported the *most valuable aspects of the workshops*

Category	Number of Responses
Math workshops	33
Meeting/working with peers	16
Preparation for classes/study skills	14
Counseling workshop	11
Real-world applications	10
Science workshop	9
STEM preparation/appreciation	7
Research/working with data	7

Areas for Improvement

- Suggestions for *areas of improvement & additional topics that they would have liked to cover*

Suggestions for Improvement

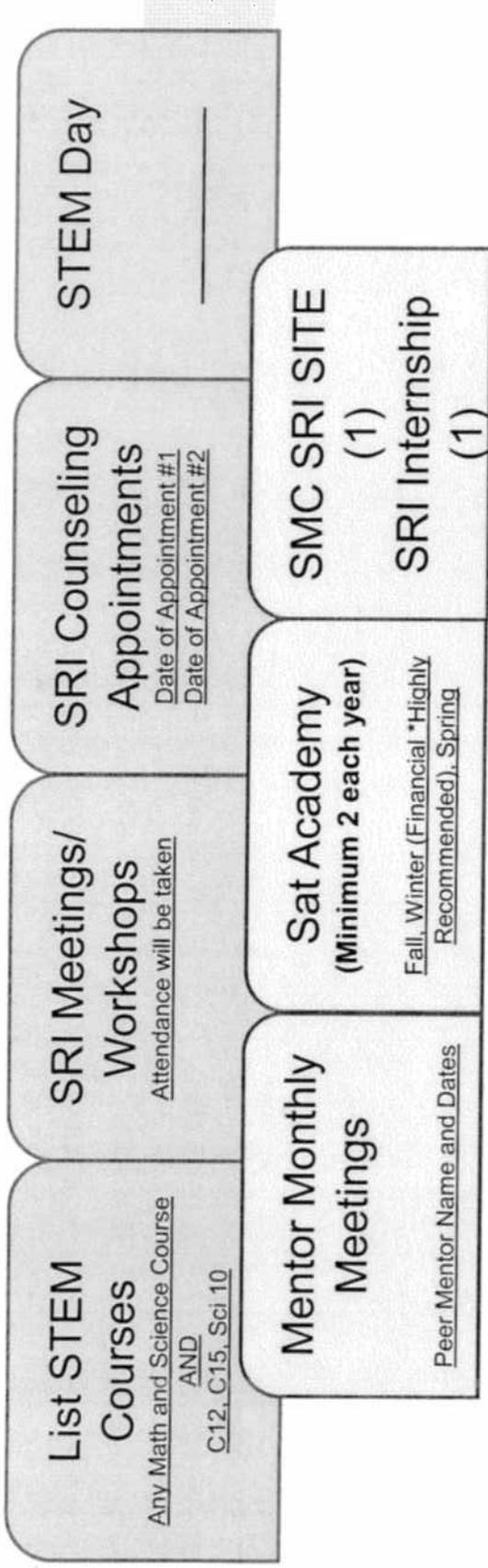
More hands-on experience and labs that are relevant to specific majors (Physics)

Separate workshops for varying science-skill levels

Additional workshop topics:
 Pursuing internships
 Employment opportunities
 Computer science and programming
 Engineering
 Research writing

SMC/UCLA SRI Mandatory Activities:

The SRI Office will run activity reports based on your participation in:

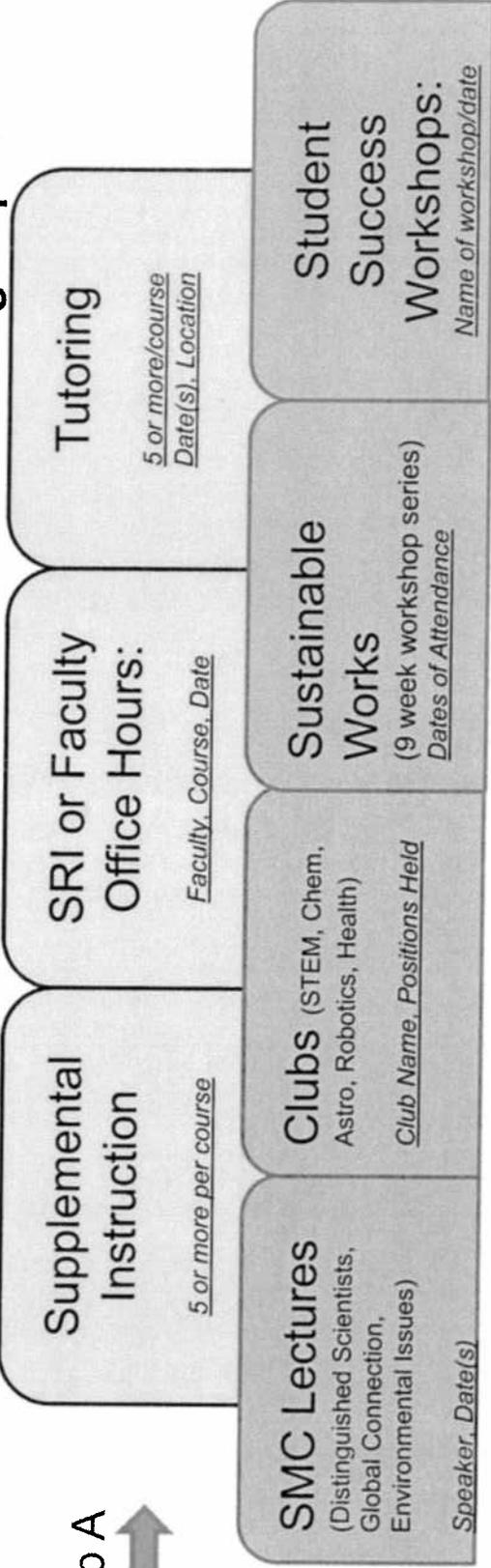


SRI Academic Requirements: Select one from each group

If you are below a 2.8 GPA you must select **2 activities from group A.**

Group A 

Group B 



Santa Monica College/University of California, Los Angeles: *Science and Research Initiative*

Quarterly Update – July 2014

Submitted by:

Rebecca M. Eddy, Ph.D.

Monique H. Matelski, M.A., Ashley Hunt, M.A., & Amy Goldman

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July 31, 2014



Formative Evaluation Question #2: What are the experiences of students, specifically SRI Scholars, participating in the program activities?

Overall, Scholars reported positive experiences in the SRI program. Most notably the following:

- The majority of Scholars who completed Counseling 15 reported increased understanding of STEM job and internship search strategies and planned to use their Career Portfolio to apply for a STEM job, internship, or research program.
- Data indicate that after completing Science 10, Scholars experienced statistically significant improvement in research related skills (e.g., analyzing data, generating data, writing up experimental findings).
- Most students mentioned the hands-on experience gained through designing, conducting, and analyzing experiments as the most valuable aspect of Science 10.
- Collaboration and group work was highly valued across Counseling 15 and Science 10.
- SRI Scholars were most satisfied with SRI connecting them with other students who share their interest in STEM (the networking aspect of the program).
- The program activities rated most beneficial by the most students were Counseling 12, Peer Mentoring and Academic Support.
- Cohort 1 Scholars found the Saturday Academies and the SRI site experience helpful because they provided them with the opportunity to “get submerged in the student life”.
- Cohort 2 Scholars found Counseling 12 and 15 helpful to their academic success by providing them with an opportunity to explore their respective fields and discover their ideal career match.

Formative Evaluation Question #3: What are the strengths of the program and where are areas for program improvement?

Feedback from Scholars collected in in the previously summarized surveys highlights some of the strengths and areas of improvement for the SRI program, answering this evaluation question.

Program Strengths

- The vast majority of Scholars found the Counseling 15 and Science 10 courses helpful.
- Scholars appreciated the hands-on experience (e.g., designing and conducting experiments) and real-world knowledge and strategies (e.g., creating and tailoring resumes and cover letters) gained through these courses.

- Scholars appreciated the opportunity to meet, discuss, and work with their peers who share their interests in STEM.
- The majority of faculty members who attended STEM PD, indicated that they were *Likely* or *Very Likely* to apply what they learned during the seminar(s) into their teaching practices.

Program Improvement

Most of the suggestions for program improvement come from Scholars' feedback of program activities. Student feedback includes the following suggestions:

- Counseling 15
 - Include more interactive activities such as mock interviews
- Science 10
 - Exclude repetitive (already known) content such as library research and information on the scientific method
 - More support and guidance especially in the area of public speaking, writing up findings, and data analysis
 - Clearer instructions and expectations for assignments
 - Slow down the pace of the class (too much material to learn in a quarter)
- Saturday Academies
 - Improve logistical issues such as high parking costs and scheduling conflicts
 - Make this activity optional for second year students as they find the information repetitive or tailor the Academies to meet the needs of different cohorts of students
- CCCP mentor program
 - Mentors should better coordinate their schedules with mentees to allow for in-person meetings rather than email correspondence.
- General program improvements
 - More opportunities to connect STEM education to real-life experiences
 - More opportunities for STEM research and activities to connect Scholars with their peers
 - Make certain program activities optional for second/third year students as information can be repetitive.

Appendix D

- Counseling 12, Evaluation Findings
- Counseling 15, Evaluation Findings
- Overview of Project Lead the Way

Santa Monica College/University of California, Los Angeles: *Science and Research Initiative*

Quarterly Update – February 2014

Submitted by:

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February 28, 2014



- More forward-looking focus for presentations on emerging/advanced topics in the field and future career opportunities
- Having working professionals as speakers to discuss lesser-known career options (e.g., careers related to degrees in medicine other than doctors and nurses)
- More detailed strategies for pursuing internships, lab experience, and employment opportunities
- More information about program requirements and deadlines

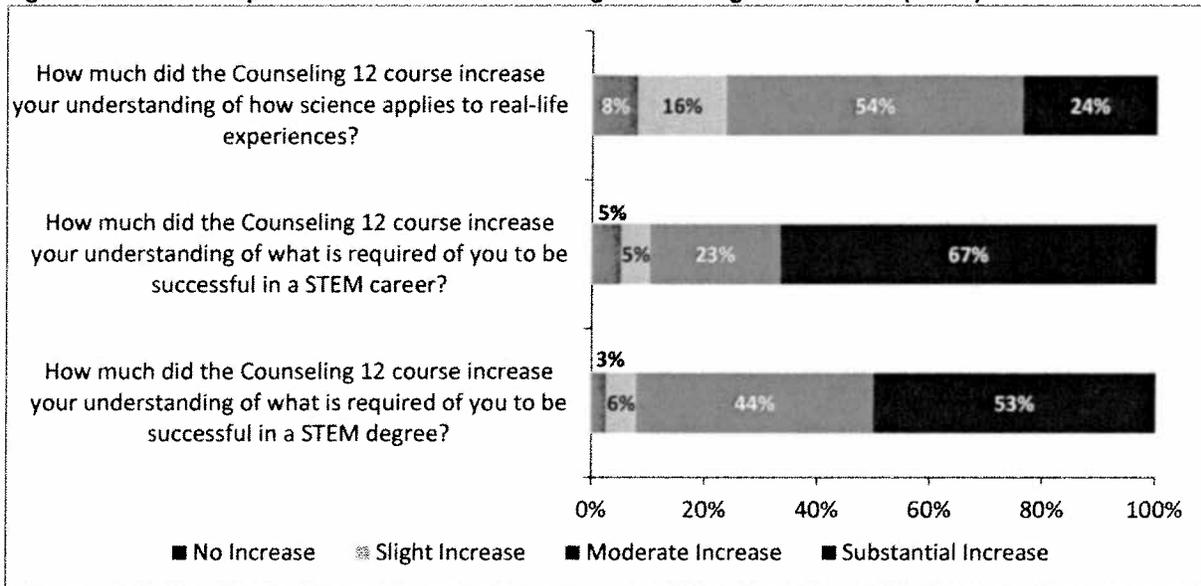
Overall, Scholars indicated that they found the STEM Skills Workshop very useful. They reported that the workshop increased their understanding of science application and the skills and knowledge necessary to be successful in a STEM education and career. Scholars indicated that in the future they would like to have more peer interaction and hands-on experience with material specific to their STEM interests. SRI program staff will use findings from student feedback to improve the STEM Skills Workshop to be held in Summer 2014.

Counseling 12 Posttest

The Counseling 12 course was established according to the grant to provide students with information concerning possible STEM careers and was mandatory for Cohort 1 SRI Scholars who had not previously taken the non-STEM Counseling 12 course. A posttest survey was created to assess Scholars' increase in knowledge in a number of areas related to career planning after completing Counseling 12. Thirty-nine Scholars' responded to the posttest that was administered at the end of Counseling 12 course in November 2013. The vast majority of respondents believed that the course increased their knowledge of what is required to be successful in a STEM degree and career and how science applies to real-life experiences (see **Figure 13**). Students almost universally reported finding the course useful overall (62% *Very Useful*, 33% *Somewhat Useful*, and 5% *Not at all Useful*).

Scholars were asked to report on the aspects of the Counseling 12 that were especially good. Nearly all respondents had positive remarks about the course overall, such as, "I felt the whole class in general was really good and well designed. I liked how the class focused on the individual student." The personality test was frequently mentioned as a particularly good aspect of the course. As one student commented, "I found the informational interview to be particularly helpful in helping me get a realistic understanding of the field I am interested in. I also thought the personality test helped me learn more about myself and aid me in making better decisions." Many students found value in the way career options were presented and explored, for instance, "The fact that you are exposed to other potential careers and have more of a self-evaluation for your career plan." Students also found the assignments helpful in researching their chosen fields and reaching out to people in those fields.

Figure 13. Scholars' Reported Increase in Understanding of STEM Degrees & Careers (n = 39)



Students also provided feedback in the form of suggestions for improving the course. Many comments centered on a desire for more specific or personalized guidance about each of the majors, for instance, "Add info about the different degrees and requirements for each and explain what they could lead to---maybe a one-on-one with students halfway through the class to talk about themselves and the assignment." Several students expressed a desire for a different focus of course assignments and content for those who are already certain about their chosen educational and career path, as one said, "Don't make the entire class about figuring out what we want to do." Additional suggestions included more about how science applies to real-life experiences, more interaction with peers, a greater emphasis on how to effectively network, more guest speakers, more information about internships and scholarships, and a day devoted to applications. Several students also mentioned there were not enough breaks.

The Counseling 12 posttest will be administered quarterly throughout the duration of the program. Cobblestone modified the Counseling 12 posttest to better align with course objectives in Winter 2013. It is expected that Counseling 12 course instructors will modify the course if necessary to address students' needs reported in survey results.

Transfer-pa-looza Survey

SRI hosted Transfer-pa-looza, an event held on the SMC campus intended to provide students interested in transferring to a 4-year university information on the transfer process. A survey was developed to assess student satisfaction with knowledge gained from this event. Twenty-nine students responded to a survey administered at the close of the Transfer-pa-Looza event on November 6, 2013. As Figure 14 illustrates, the vast majority of respondents were

Santa Monica College/University of California, Los Angeles: *Science and Research Initiative*

Quarterly Update – July 2014

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July 31, 2014

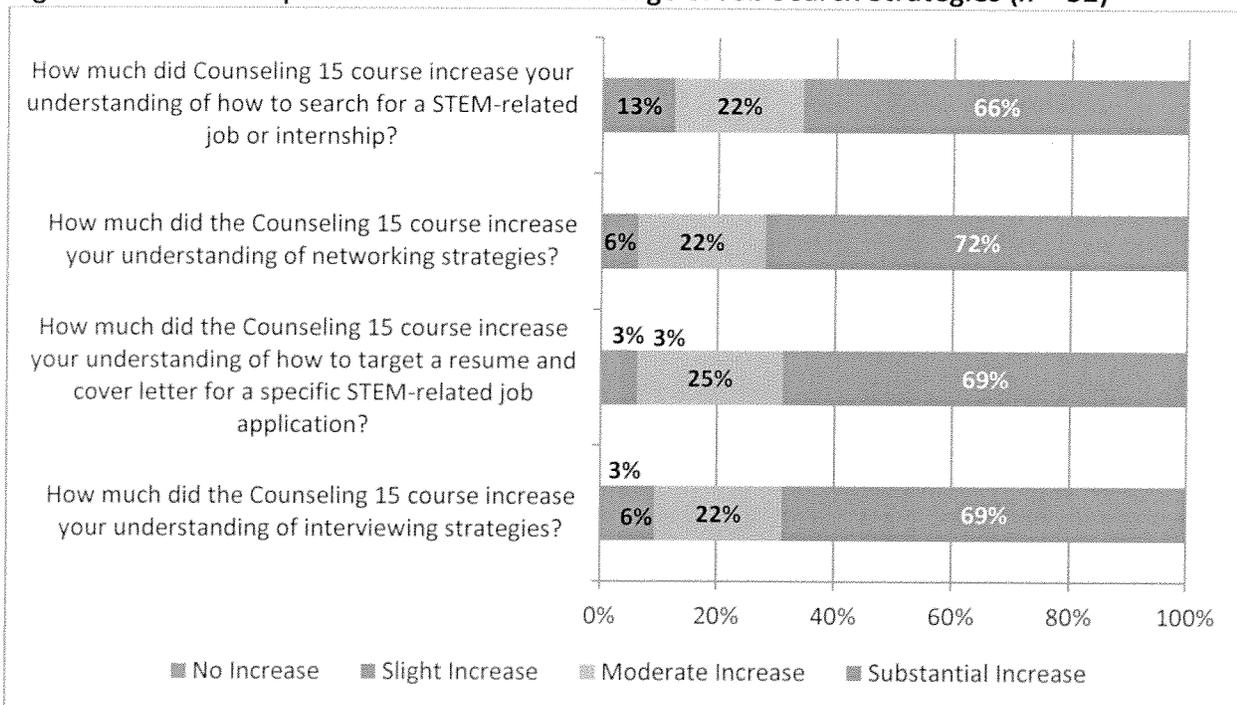


Counseling 15 Posttest

The Counseling 15 course was established in accordance with grant objectives to provide students with information concerning STEM job and internship search strategies. This course provides Scholars with information on how to develop curriculum vitae, write a personal statement, obtain strong letters of recommendation, and interviewing skills. Counseling 15 is mandatory for all SRI Scholars. The course was first offered in fall 2013. A posttest was developed and administered in winter 2014 and spring 2014 to assess Scholars' increase in knowledge in a number of areas related to finding and acquiring STEM internships and careers. Since students' responses were similar in winter 2014 and spring 2014, survey data was combined to reflect students' attitudes towards Counseling 15.

Thirty-two students (20 in winter 2014, 12 in spring 2014) responded to a survey administered at the end of the Counseling 15 course in February 2014 and June 2014. As **Figure 1** illustrates, the vast majority of respondents believed that the course increased their understanding of all the job search strategies covered in the course (e.g., networking strategies). The majority of students also reported finding the course useful overall (84% *Very Useful*, 3% *Somewhat Useful*, 3% *Slightly Useful*, 6% *Not at all Useful*, and 3% *did not respond to this question*).

Figure 1. Scholars Reported Increase in Knowledge of Job Search Strategies (n = 32)



After completing the Counseling 15 course, 29 students (91%) *Agree or Strongly Agree* that they had a “clear idea of [their] STEM career goals” while 30 (94%) *Agree or Strongly Agree* that they knew “the steps required to achieve” those goals. A total of 24 students (75%) reported that it was *Extremely Likely* that they would use the Career Portfolio they developed in class to apply for a job, internship, or research program; only 1 student (3%) reported that they were *Not At All Likely* to use the Career Portfolio. Twenty-five students (78%) reported having identified at least one specific opportunity for which they would apply, using their Career Portfolio. Students planned to use the portfolio for a range of opportunities including internships at NASA’s Jet Propulsion Laboratory, Core Extenders, Polytek Engineering, Teledyne Technologies, The Aerospace Corporation, LEED, and the Los Angeles Department of Animal Sciences Volunteer Program. Of those students, 12 planned to use their portfolio to apply to the SRI Summer Scholars Research Program at UCLA.

All but two respondents provided feedback in the form of what aspects of the course they found “especially good”. The components reported most often were the help they received in creating and tailoring resumes and cover letters; and interviewing and networking strategies. Students also greatly valued the guest speakers and several suggested adding more as a way to improve the course. They also appreciated the general organization and information of the class. One student commented, “*The class was very short but packed with important information that will come into good use.*”

Further suggestions for improving the course included more time on resumes, group work, and public speaking, and adding help with writing personal statements. Several students mentioned a desire for more interactive activities; for example, mock interview practice in small groups and applying to or reaching out to one of the selected interview places. There were also a few students who requested a stronger focus on STEM, including more STEM guest speakers and a greater tailoring of activities for STEM students. Overall, less than half of the students offered suggestions for improvement, and the majority of students enjoyed the course and found it worthwhile.

“It was overall really good. I especially liked the resume and cover letter because I had not made one before and it was extremely helpful for me.”



Our Impact

MAKING A DIFFERENCE TODAY AND TOMORROW

Over the last several years, numerous reports and external organizations have validated Project Lead The Way's success in engaging the hearts and minds of students through science, technology, engineering, and math (STEM) education. We are proud to highlight several of the most recent studies and honors.

Research and Results

Among other significant findings, independent research studies reveal that PLTW students outperform their peers in school, are better prepared for post-secondary studies, and are more likely to consider careers as scientists, technology experts, engineers, mathematicians, healthcare providers, and researchers compared to their non-PLTW peers.

Researchers at the Center for Urban and Multicultural Education at the Indiana University School of Education at Indiana University-Purdue University-Indianapolis analyzed data for more than 56,000 Indiana high school graduates. Major findings:

- High school graduates who participated in PLTW were nearly three times as likely to major in STEM, and 3 to 4 times more likely to study engineering, versus non-PLTW graduates.
- Students who took three or more PLTW courses while in high school were six times more likely to study STEM, and eight times more likely to study engineering, in college than their peers who had not taken PLTW while in high school.
- PLTW participation was significantly related to persistence into the second year of college, especially for those students who had taken three or more PLTW courses.

Pike, Gary and Kirsten Robbins (2014). Using Propensity Scores to Evaluate Education Programs. Indiana University-Purdue University-Indianapolis.

A Texas State University researcher collected and analyzed six years of longitudinally-linked student data to compare thousands of PLTW students to their non-PLTW peers. Major findings:

- PLTW enrollment in Texas has increased by over 400% over the last five years - Hispanic by over 500%; females nearly 600%; and low-income students by 650%
- PLTW students are more prepared for and attended Texas higher education institutions at a higher rate
- PLTW students scored higher on the state's mathematics assessment
- For those students who did not enroll in college, the median wage for PLTW students was 13.6% higher

Van Overschelde, James P. (Spring 2013) Project Lead The Way Students More Prepared For Higher Education. Texas State University. *American Journal of Engineering Education*, 4(1).

A researcher from the University of Virginia, Dr. Robert Tai, and his team collected and analyzed over 30 research studies and reports on PLTW. Key insights:

- PLTW contributes to a strong, positive impact on mathematics and science achievement
- PLTW has a positive influence on students' career interest and likelihood to continue their education
- PLTW offers a pathway to prepare and motivate students to enter careers in science and engineering
- A clear strength of the PLTW program is the intensive teacher professional development program

[Tai, Robert H. \(2012\). An Examination of Research Literature on PLTW. University of Virginia. Publication by PLTW. \(/sites/default/files/PLTW%20DR.TAI%20-%20brochure_pages.pdf\)](https://sites/default/files/PLTW%20DR.TAI%20-%20brochure_pages.pdf)

According to a survey of PLTW students at the end of their senior year, 70% indicated that they intend to study engineering, technology, computer science, or another applied science, and 93% intend to pursue at least a two-year or four-year degree after high school.

True Outcomes Analysis of End-of-Course Evaluations for PLTW, 2009.

In addition, many post-secondary institutions across the country actively recruit PLTW students and provide recognition opportunities such as preferred admissions, scholarships, and course credit. Several prestigious engineering universities report high and increasing levels of PLTW student enrollment. For example:

- 60% of the 2013 incoming freshman class at the University of South Carolina College of Engineering and Computing took PLTW in high school.
- PLTW alumni account for over 45% of the students who were admitted in 2013 to the University of Minnesota's College of Engineering.
- 38% of the Milwaukee School of Engineering's 2013 freshman class previously took PLTW courses.

Recent Honors and Recognitions

- In January 2014, PLTW was accepted as a 100Kin10 partner. As a partner, PLTW will train 27,602 teachers by 2018 to teach interdisciplinary STEM courses, with typical teachers seeking certification in two or more courses.
- In October 2013, Change the Equation selected PLTW as one of four high-quality STEM programs in the U.S.—and the only in-school curriculum provider—ready for significant national scale-up.
- The Social Impact Exchange placed PLTW on the S&I 100 Index in 2012 as one of the top 100 high-impact nonprofits in the United States.
- The PLTW Gateway program was selected as one of nine Iowa STEM Scale-Up Programs by the Iowa Governor's STEM Council for 2013–2014.
- PLTW was one of seven programs to receive the @Scale endorsement from the Massachusetts Governor's STEM Advisory Council.

[Approach \(/about-us/our-approach\)](/about-us/our-approach)

[Our Impact \(/about-us/our-impact\)](/about-us/our-impact)