CASE STUDY: MT. SAN ANTONIO COLLEGE

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In lean times, colleges and universities have to deal with diminishing budgets and increasing demands for facilities. This can create problems, but the limitations of the budget often create identifiable structures from which to prioritize expenditures (Barr & McClellan, 2011; Goldstein, 2005). What is often a more difficult task is when times suddenly become flush and higher education institutions are endowed with facilities that are underutilized by staff and the students, as well as the surrounding community. Mt. San Antonio College has such a problem. They have an underutilized math and science facility. The following analysis explains the specifics of the situation and offers some suggestions for coordinating the existing facilities, the projected facilities, the personnel involved and, of course, the new money.

Problem Statement

Mt. San Antonio College has been given funds to develop a STEM Center. Within their existing Science Complex, the STEM Center will be on the third floor, a three-room space currently in used by the Robotics Club. In addition to the established space, there is also a small study room located to the right of the elevators. The plan is to convert both spaces into a general use STEM Center. Dr. Scroggins, President/CEO and Matt Judd, Interim Dean of the Natural Sciences division want to best maximize their money, their space, and the opportunity to bring more student and staff utilization to the STEM building. They need to find a way to incorporate the use of the STEM Center into the overall function of the Science Complex, maximizing the use of the Center by other instructional areas, including those programs not directly associated with math and science. They need to find ways to more utilize the resources that they have to create a focal point for the college, as well as creating inclusion and equity across campus. They also need instructional material to incorporate use the natural wildlife museum beyond biology

and art. The College has the funding, the purpose, the space, and the leadership, but they have no plan.

Questions:

How do we embody all of these elements to create a focal point for the college?

How do we obtain buy-in from various departments, faculty, and staff on campus?

How do we obtain buy-in from other institutions that will either feed into or be fed by Mt. SAC?

How can we obtain buy-in from the local community?

Purpose Statement

The purpose of this presentation is to offer suggestions to incorporate the various aspects of the math and science facilities already existent in the Science Complex, as well as the newly constructed STEM Center and other math and science departments on campus to draw staff, students, and the community to this area in order to maximize its utilization and to create meaning and identity for the STEM Center and for Mt. SAC. To that end, our proposal will offer suggestions for incorporating the various entities of the college, including staff, students, and faculty, as well as elements of the community, K-12 partners, and the local university, to create a "cradle-to-grave" STEM program that will foster success, equity, and inclusion for a greater number of people (N. Doffoney, personal communication, March 23, 2015).

Background of Mt. San Antonio College

Mt. San Antonio College was founded in 1945 and was initially named Eastern Los Angeles County Community College. The college opened in the fall of 1946 with an enrollment of 635 students (http://www.mtsac.edu/about/history.html). The college is located in the city of Walnut and serves nearly 20 communities and a million residents in the San Gabriel Valley. Its boundaries include the cities of Baldwin Park, Bassett, Charter Oak, Covina, Diamond Bar,

portions of Glendora, Hacienda Heights, City of Industry, Irwindale, La Puente, La Verne, Pomona, Rowland Heights, San Dimas, Valinda, Walnut, and West Covina (http://www.mtsac.edu/about/history.html). With an annual enrollment of over 60,000 students, Mt. SAC is the largest, single-campus community college district in California. It is a leader in education not only in the San Gabriel Valley, but also in the state of California. The college offers more than 200 degree and certificate programs, including a Bachelor's of Arts in Aviation Technology and a Bachelor of Science in Fire Technology. With the addition of the new STEM Center, the college plans to further the mission of the institution by providing a facility that will support and encourage student success.

The STEM Center falls within the purview of the Dean of Natural Sciences and will be under his direct supervision. The Natural Science division consists of nine departments: agricultural sciences, astronomy, biological sciences, chemistry, computer science, earth sciences, engineering, mathematics, and physics. In addition to an Arboretum across Temple Avenue, the existing Science Exploration Center features the Meek Natural History Animal Collection, Geology Exploratorium, and the OmniGlobe Earth and Space Projection System. The Mt. San Antonio College Observatory, constructed on the rooftop of one of the buildings, can also be found within complex. A cadaver lab used by the Biological Science Department is housed in this area as well. In the building where the new STEM Center will be housed are the Math Activities Resource Center (MARC) and Transfer-Math Activities Resource Center (T-MARC), both of which are located on the first floor. Both facilities have a computer lab and provide tutoring and instructional support to a large number of students.

Recommendations

We are proposing a wide-ranging utilization of the new STEM Center, which will

enhance the college's reputation both as a learning institution within academia, as well as an important, inclusive member of the local community. This facility will act as a central hub for interacting with local K-12 schools and universities to foster and support STEM activities and STEM enrollment and success.

1. Convert small back room into conference room with conference table, video screens, and high-tech computers. Software would include training videos and information about the STEM Center.
2. Increase partnership opportunities with local businesses in STEM related enterprises, creating mentorships, internships, and other industry contacts.
3. Offer facility training to all faculty on campus, including curriculum-building exercises to incorporate STEM facilities into classroom instruction in all subject areas.
4. Provide professional development opportunities that promote cross-discipline collaboration and student co-curricular engagement.
5. Partner with K-12 schools in the district, offering tours, presentations, and mentoring to foster interest in STEM related subjects.
6. Partner with California State University, Pomona, specifically the STEM based K-12 program, as well as all STEM related majors. Cal Poly students would act as mentors and docents to beginning STEM students at Mt. SAC, as well as to local K-12 visitors.

While the furniture and general design of the STEM Center are already established, some specific features should be available. One is a small conference room, suggested for the smallest of the three-compartmented rooms in the new STEM Center, in which faculty and other experts can gather to hold meetings and conference concerning utilization of STEM resources, as well as planning for STEM based events. Local community, business, and technology leaders can be

invited to share their expertise and offer potential services or other contributions to the educational process at Mt. San Antonio College.

Through flex and convocation activities, the faculty, in large and small workgroups, can be introduced to the technology and resources offered in the center, while also receiving training and support for creating and developing curricula that would incorporate these various STEM elements into their classroom instruction. The Wildlife Sanctuary on Temple Avenue is a long-underutilized facility, as are the Science Exploration Center and Meek Natural History Animal Collection. Once the STEM Center has been completed, a plan for in-service training for faculty across campus as to the offerings at the Center, and in the Science Complex generally, can be utilized not only in the core STEM academic circles, but also across the curriculum, creating an inclusive environment. That means, for example, the Meek Natural History Animal Collection can be used not just as a science resource, but also as an art resource. Business and advertising programs will find the access to businesses a valuable experience for their students. By including the use of these facilities across the curriculum, the school itself will become more aware of the Center and its offerings and create a practical need for these facilities, as well as creating a familiarity and a comfort level for the students to utilize these resources beyond what is assigned in the classroom.

While campus support and utilization of this facility is important, a broader base is needed. To support the development of student utilization of the STEM Center as well as student interest in the STEM field in general, a partnership is being proposed to connect the existent STEM-Centered K-12 and other science and technology-based programs at Cal Poly Pomona to programs, departments, and courses on the Mt. SAC campus, communicating and connecting the Center’s vision to the neighborhood educational community. Cal Poly's interest in STEM and its

dedication to its principles are well established. "Using the program's STEM-Centered, K-12 curriculum, [Cal Poly] has trained nearly 700 teachers over the past six years. Those teachers inspire thousands of students to pursue higher education" (Lance, 2014, para. 2). Inclusive partnerships, including internships and mentorships, can be established to offer the Cal Poly University graduate students experience and course credit for sharing their knowledge and their interest to prospective STEM students at Mt. SAC.

Tying in the use of the Wildlife Sanctuary to the other facilities will be an opportunity to consolidate and build on the gains from the cooperation between the college and Cal Poly. Acting as docents, STEM students would offer tours and guided walks through the facility for the local K-12 students, offering a service to the community, in addition to exciting young people about the possibilities of STEM subjects. Furthermore, young students will also find the Randall Planetarium to be an interesting and exciting experience, furthering their interest in science, technology, and engineering, another victory to further the project's vision. These facilities do not merely hold interest for the young. Older community members will find many of the elements of these facilities to be interesting, and offering tours and access to members of the community, including retirees, will foster goodwill and support for college activities and services, as well as giving back to a segment of the community that has been financially supporting the college for many years, creating an inclusive and equitable environment for the entire community.

Ultimately, the community college is not just a learning facility that focuses on the enrolled student. The *community* aspect is an important element of the college and finding a way to connect to the community to foster learning and knowledge, especially in the much needed STEM categories, can be an identifying mission for Mt. SAC that will solidify its place as an

inclusive educational leader in southern California.

Analysis and Literature Review

When analyzing this proposal through the lens of Kotter's eight steps to success, it becomes clear that the proposal covers all eight steps. Kotter's (2012) first step, a sense of urgency, has been established in that the facilities in the Science Complex already exist. The money has already been allocated to the creation of a STEM Center. The daily upkeep of the building and its utilities are elements of the budget, yet the utilization of these facilities makes these expenditures an unnecessary expense. It is imperative that these valuable resources show some kind of return. Kotter's second step has been established as the school already has an established committee in place for organizing and governing the use of the space. Once we move to the next steps in Kotter's design, there are some gaps that need to be addressed. "Getting things done in an organization involves working through complex network of individuals and groups" (Bolman & Deal, 2013, p.198). To that end, the training of all faculty in the services available at the STEM Center and opportunities to develop curricula that will incorporate those facilities across the curriculum will create that complex network that is so important. "Our college of the future must embrace . . .research and teaching and. . .service in our local. . .contexts that transcend disciplines . . ." (Bailey, 2009. p. 232). Furthermore, new voices and interests will be added to the conversation, adding equity to the dialog. Creating and communicating this new "effective vision" (Kotter, 2012, p. 71) will increase utilization of the facility as well as creating inclusion across campus.

Connecting STEM and other science and technology-based programs at Cal Poly Pomona to courses, programs, and departments on the Mt. SAC campus will "communicate[s] a simple vision" (Kotter, 2012, p. 79) between neighboring educational institutions. Thus, the inclusive

vision is reinforced and supported, while also acting as a practical connection to the next step in the educational journey for Mt. SAC students. Community outreach is important, and communicating the Center's vision to the neighborhood community is another iteration of Kotter's fourth step. The STEM facilities available at Mt. SAC offer opportunities for the community to find an interest in education generally, and STEM specifically, especially for the largely minority populations in the surrounding neighborhoods. According to U. S. Census Bureau (2015a; 2015b; 2015c; 2015d) data, the surrounding cities of Covina, Pomona and La Puente are 52%, 70% and 85% Latino, respectively, twice the state-wide average, while Walnut is nearly 50% immigrant, nearly two times the state average. The students are empowered to act, to be agents of change for younger members of the community, Kotter's fifth step.

Furthermore, young students furthering their interest in science, technology and engineering is another short-term victory to further the project's vision. Students who are exposed to the college campus at an early age are more likely to be interested in college and are better able to acclimate themselves to the college experience once they get there (Nora, 2004). The benefit of this partnership is twofold. For the Cal Poly student, it is an opportunity to practice interaction with students as part of their teaching training. For the Mt. SAC students and visitors, these mentors will be aiding in the spreading of STEM as a necessary and vital part of America's future, but also as a viable and valid major to pursue to the university level. Students on the Mt. SAC campus who are involved in these programs will also, for their part, be given inroads to the STEM facilities and culture on Cal Poly's campus, creating more interest in STEM as well as creating a pathway from the community college to the university. The pathways will not only create a stronger STEM program for both institutions, they will provide the university students opportunities for research and experience in becoming educators themselves, as the Cal

Poly STEM program is a teaching model (https://www.cpp.edu/~sci/cemast/about.shtml).

All of these gains will create enthusiasm for the Center and the associated programs. Moreover, what was once an isolated, underutilized facility used by a narrow portion of the college has now become an inclusive hub of activity, not only for the college itself, but also for the surrounding educational and social community as Mt. SAC consolidates and builds on its gains (Kotter, 2012) in developing this facility. By creating lasting, institutionalized partnerships with the local schools and the local university, the success of the program will generate interest in the college and its facilities, fulfilling Kotter's eighth step. This connection between educational powerhouses is an important final step to establish the STEM Center as an important member of an inclusive coalition in the district.

Political Frame

Bolman and Deal (2013) explain that there are basic skills that managers need from a political perspective, "develop an agenda, map the environment, manage relationships with both allies and enemies, negotiate compacts . . .and alliances" (p. 232). In creating the STEM Center, the agenda has been set. As they map the environment, Mt. SAC will see that there are opportunities to create equitable and inclusive relationships with the various constituencies both within and outside the college and negotiate alliances that will validate the existence of the Center while rewarding the college and others involved in these coalitions. Within the college, the broad appeal and use of the center will ensure its funding, as all constituencies have a stake in this valuable resource. Furthermore, from a political standpoint, creating these ownerships and correlations creates a powerful consortium for ideas about innovation and opportunities for expansion and growth, as well as, creating opportunities for investment from the outside community, who will be vying for a stake in this valuable commodity. There is clearly a benefit

in having a community college and a state university work hand-in-hand to a common end, each serving the other and being benefited by that service. Buy-in from the community creates a powerful support network, especially when times once again become lean and the college is in need of financial assistance. Should that be the case, the community will be more supportive of bond issues and other efforts by the college to build on its successes, another powerful alliance.

Symbolic Frame

This proposal is an opportunity to open the doors and welcome people from all departments across campus to share in the facilities, to find usefulness in the facilities, and to even make the facilities their own. Symbolically, this facility, once a symbol of isolation and abandonment, will become an image of the college's inclusiveness as a valuable resource to be proudly shared by all in the community. "Multidisciplinarity in academia is actually a reflection of reality . . .An opportunity for each of us to live lives that are acknowledging, respectful . . ." (Bailey, 2009. p. 232). Ceremonies that involve these various coalition factors from both within and without the college are going to be important symbolic unifying images that can be used to elevate the reputations of all involved (Bolman & Deal, 2013). Beginning with a convocation day ceremony, the various departments will be invited to tour and become users of the facility. This creates a stronger sense of community, while also having the practical result of creating more foot traffic and, later, more broad-based support when it comes to discussing funding and other budgetary concerns.

Furthermore, by engaging both neighborhood businesses and other educational institutions, this facility will create a shared vision, "that shared sense of a desirable future can help motivate and coordinate the kinds of actions that create transformations" (Kotter, 2012, p. 87). Offering Cal Poly a stake in this facility reduces the historic tension and rivalry between the

two colleges (N. Doffoney, personal communication, March 23, 2015) and sends a public message that the systems work together to better the community at large through education and research. Further, the gesture of offering an opportunity for industry to participate not only engenders inclusion but also offers businesses opportunity to support the nonprofit cause of education and to see themselves as a valuable and valued member of this community. "These connections can enhance a company's reputation, which increases its appeal among customers and investors alike" (Spillett, 2009. p. 222). Even if there is not much financial gain, "what is most important is not what happens but what it means" (Bolman & Deal, 2013, p. 248).

Likewise, just as libraries, study rooms, and common areas become meeting places for students, symbols of equity and inclusion, this Center can also become a meeting place, supported by the interest in the exhibits and labs. The symbolic implications of this are clear: a shared facility, such as this, becomes OURS in the mind of any student or faculty member on the campus, as well as the surrounding community. Symbolically, the community needs to know that the college is PART of the community, not just placed within it.

Human Resource Frame

The heart of any organization is its people and its people perform at their highest levels when they are in an environment that meets their basic hierarchy of needs (Bolman & Deal, 2013; Maslow, 1943). For Mt. SAC, determining what those needs are in relation to the implementation of a new STEM Center will be the fundamental challenge and is critical to preparing the climate for acceptance and buy-in of its people. Involving its people, soliciting input, and building a team or committee, are all human resource frame strategies that also align with Kotter's first three steps of change: urgency, coalition, and vision (Bowman & Deal, 2013; Kotter, 2012). Analysis of Mt. SAC's current state demonstrates positive accomplishments from

a human resource lens as evidenced by their student equity assessment, and faculty, student, and administrator vision meeting (see Appendices A and B).

While preparation of the climate has been achieved, the next tasks, using a human resource frame, are for Mt. SAC to commit to frequent and consistent communication, empowerment, and development of the faculty and staff within the Natural Sciences division. These human resource tasks will support step four, five, and six of Kotter's change model (2012). This can be accomplished through social media updates, e-Newsletters, college Website news, and by providing training opportunities pre-opening of the STEM Center to facilitate enhancement of programmatic development. This effort of investment of the current talent of faculty, staff, and students will serve as a way to create short-term wins. External training opportunities should focus on improving STEM student retention, programming design examples, bridging opportunities to tie in the local high schools and community, and providing emerging trends for advising interactions that data demonstrates positively impact student success. Sending a team to these types of opportunities can serve as a catalyst for creative action plans for comprehensive programming. One such opportunity provided by Academic Impressions is specifically designed for STEM teams to develop and implement new initiatives that promote student success and persistence.

Further analysis through this frame would point to the importance of sustaining and creating new ways to support and empower the collective STEM team by means of creating a culture of broad support and contribution. This can be done by ensuring that once the STEM Center is open and operational a team is dedicated to focus on communicating accomplishments, nurturing the relationships with internal and external constituents, and by ensuring that caring ways of meeting the needs of the STEM Center team are being heard and met. Doing so will

support the encouragement of its people's heart and their own leadership legacies through the STEM Center (Kouzes & Posner, 2003).

Structural Frame

From the structural frame perspective, Mt. SAC has a vertical authoritarian structure (Bolman & Deal, 2013). Throughout the interview, it was clear that the decision making and project planning process is made and controlled by the authorities, in this case, President Scroggins and Dean Judd, with input from the Vice President of Academic Affairs. Bolman & Deal (2013) has clarified that the authorities—executives, managers, and supervisors—are officially charged with keeping action aligned with goals and objectives in the vertical coordination structure. In this proposal, the goal and objective of maximizing the utilizing of STEM Center and other facilities will both increase the interaction and connection among the academic departments and divisions internally and externally, while also increasing the interaction and cooperation with other K-12 schools and the community. This means the STEM Center project is increasing the internal and external complexity of the organizational environment. The lateral coordination structure should be applied to and designed for this new STEM Center, as "the uncertainty and turbulence press for new roles and more elaborate, flexible approaches to vertical and lateral coordination" (Bolman & Deal, 2013, p. 65).

In the lateral coordination, the *task forces* and *coordinating roles* can be applied for internal cooperation within the college, while *matrix structures* can be applied for external cooperation with other schools and community (Bolman & Deal, 2013). The task forces or project team can be set up in order to facilitate cooperation among the departments, develop the cross-disciplinary curricula, and increase the usage of the STEM Center. The coordinating roles or units can use persuasion and negotiation to help integrate the resources and contributions from

divisions and departments and organize and schedule the usage of the STEM Center. The matrix structure can be set up with K-12 schools, Cal Poly Pomona (and other 4-year colleges), and the community, on the one hand, increasing the usage and beneficiaries of the STEM Center, while on the other hand, developing collaboration within the STEM fields among the varying institutions while expanding the power of influence.

Bolman & Deal (2008) argue that formal roles and responsibilities within an organization will maximize proficiency and increase work performance while minimizing personal distractions and conflict. Specialized roles and responsibilities that make sense are most effective in encouraging the collective to direct their efforts toward a common goal or objective. Key to the overall success of an organization is the assignment of appropriate roles and relationships while simultaneously providing sufficient coordination and control (Bolman & Deal, 2008). Important to completing the objectives of the organization is finding a balance between too much order in the form of rules, regulations, and policies that restrict performance and too much chaos in the form of dysfunctional relationships that creates performance deficiencies (Bolman & Deal, 2008).

In this proposal, the responsibilities of those tasked with the creation of the STEM Center have been clearly defined through the assignment of specialized roles within a hierarchical structure. Administrators will manage the process, provide the instructional space and funding to complete and support the project, and the time and opportunity for others to develop a proposal for the project. Staff and mid-level managers will develop a proposal with assistance from outside agencies and community partners. Faculty will be responsible for including STEM Center usage into the curricula, instructional materials, and resources utilized by the science, technology, and math departments as well as the larger campus. Students provided input

regarding the design and purpose of the new STEM Center. It is through a rational analysis of the development and implementation of specialized roles with appropriate coordination of and integration of each group into the larger process that will allow Mt. SAC to create a STEM Center that is impactful and purposeful to the college and surrounding community.

As our proposal includes significant involvement from the community, K-12 partners, and the local university in the overall design of the STEM Center, it is important those tasked with managing the process are strategic in aligning resources, both functional and human, with the agencies involved in the creation of the new center. The role of management is to align the strategies and structures of the organization with the external environment through the assignment of appropriate roles and responsibilities (Bolman & Deal, 2008). Ideally, those tasked with creating partnerships that will maximize and encourage the use of the STEM Center should be faculty and staff who find value and purpose in developing a center that is both useful and functional. By matching specialized skill sets and personalities with the appropriate tasks and assignments, Bolman & Deal (2008) argue that the resulting work performance and completion of tasks will increase. It is when these relationships and assignment of tasks, not strongly supported through existing organizational structures, are misaligned that problems will arise. In this case, appropriate personnel should be assigned the task of developing and strengthening partnerships and facilitating dialogue with external agencies. By maintaining and aligning the structure of the organization with the current circumstance, the process of creating a STEM Center that will serve as a focal point for the institution is more apt to be successful.

Communication and decision-making based on logic and data are key tenets of the structural frame. The structural frame emphasizes a decision-making process based on a rational sequence of reasoning based on data in order to produce the right decision for the organization

(Bolman & Deal, 2008). It is through the communication of said data, or the transmittal of facts to those involved in the completion of the established goals and objectives, that an organization is able to make the best decision. In this case, Mt. SAC used data collected from a number of sources to determine the direction and purpose of its planning process for the new STEM Center:

- Conducted a student survey, which included feedback from visits to STEM Centers at two community colleges to determine the strengths and weaknesses of each design (see Appendix C)
- Created a STEM Center Planning Timeline (see Appendix D)
- Created a STEM Center Budget (see Appendix E)
- Commissioned the design of possible floor plan designs for the new STEM Center Floor (see Appendix F)
- Outlined the purpose and function of the STEM Center in the Student Equity Plan (see Appendix A)
- Identified recommendations and needs for the STEM Center from faculty during Flex Day activities (see Appendix B)

By creating a logical and sequential process for gathering the data and disseminating the findings to the individuals and groups assigned to the task of creating a useful and purposeful learning resource center for students and visitors, Mt. SAC has effectively communicated the purpose and objective of the project. Critical to the successfully integration of the STEM Center into the larger campus is the effective dissemination of facts and data that reflects the significant impact the STEM Center will have on the institution and the community.

With a unified purpose, a centralized focus on the task, and specialized roles and responsibilities assigned to targeted staff and faculty, the college can work within and be

supported by the organizational structure of the institution. If controlled and coordinated effectively, working within the structural frame will encourage active participation and collaboration among individuals and groups, which can lead to increased work performance and the successful completion of the project.

Conclusion

The development of the new STEM Center as the central hub for the college and its surrounding environment is a positive move for Mt. San Antonio College. Successful integration of the college's science, technology and math programs, the existing facilities in the Science Complex, and the larger campus and community will create a positive and effective learning environment for all, not just those identified as STEM majors. Through programs and services developed with K-12 partners, the community, and the neighboring state university, Mt. SAC and its partners will create an inclusive and equitable feeder system, which once institutionalized, will be a model for other institutions of higher learning. The integration of the STEM Center into the larger campus, coupled with effective collaborations with outside agencies and neighboring learning institutions will allow Mt. SAC to provide valuable opportunities and resources for students while also providing the public with a unifying purpose and sense of value in their community college.

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Appendix A
Student Equity Plan - STEM Center

STEM Center	**What productivity measurements are you expected to use?**	**What research information do you need?**	**What will you need from the next round of funding?**	**Gaps**
Resources: Faculty reassigned time Student workers Tutors Adjunct Counseling Faculty Stipends	Track attendance in STEM • Did students come in for tutoring? • Did students complete Ed Plan related to STEM major? • Did students meet with faculty mentor? • Did students come in to collaborate with other students? (not for tutoring or to use services but to work with other students) • How many hours per week are students attending STEM center? Increase number of students declaring STEM majors in general, and student populations who are under-represented in particular Increase number of students transferring as STEM majors in general, and student populations who are under-represented in particular Increase success and retention in STEM courses for students attending STEM Center activities in general, and student populations who are under-represented in particular Increase the number of students advancing to upper level math, science, and engineering courses in general, and student populations who are under-represented in particular • Increased demand for advanced courses • Increased number of students promoting from basic skills courses to advanced level courses Track student attendance at intervention/success workshops • Who attended? • Evaluate workshop for relevance, value, impact	Assistance in creating student surveys Correlation of students attending STEM activities and: 1. Success and retention in STEM courses 2. Increase students declaring STEM majors 3. Increase in students transferring as STEM majors 4. Increase in demand for upper level math, science, and engineering courses	Expand hours of operation to include evenings and weekends Expand faculty stipends to increase the number of faculty mentors Expand faculty stipends to include long range student projects (recommended by PTK students as a result of their project) Create engineering construction space for students to participate in long range projects such as launch of weather balloon, robotics, construction of solar vehicle; increase awareness and interest in engineering majors through student participation in long range projects	Resources requested are in the Student Equity Budget Scenario 2 The PLAN includes creation of a STEM Center under Development of New Services

Appendix B
Facilities Planning & Management Minutes for Meeting (2/4/15)

MT. SAC
Mt. San Antonio College

Facilities Planning & Management
1100 North Grand Avenue • Walnut, CA 91789
909-274-4850 • www.mtsac.edu

MEETING REPORT

Updated 06/19/14 mk

Meeting #: 01 **Meeting Date** February 4, 2015

Project Name: **STEM Center Kick-Off (Building 61)** **Project #** TBD

Attendance: Attendance **(A)** Partial Attendance **(P)** Carbon Copy **(CC)**

	Company	Name	Title
A	Mt. SAC	Martin Arteaga	Student Representative
A	Mt. SAC	Priscilla Arteaga	Student Representative
A	Mt. SAC	Noreen Chrysilla	Student Representative
A	Mt. SAC	Javier Estrada	Student Representative
A	Mt. SAC	Ashley Gallegos	Construction Specialist (Notes) FP+M
A	Mt. SAC	Karelyn Hoover	Associate Dean, Natural Sciences
A	Mt. SAC	Anil Jethani	Student Representative
A	Mt. SAC	Heather Jones	Supervisor, Natural Sciences
A	Mt. SAC	Kenji Karuhaka	Student Representative
A	Mt. SAC	Mika Klein	Sr. Facilities Planner, FP+M
A	Mt. SAC	Anthony Lopez	Student Representative
A	Mt. SAC	Paige Macias	Student Representative
A	Mt. SAC	Carol Minning	Project Manager, FP+M
A	Mt. SAC	Carlos Munot	Student Representative
A	Mt. SAC	Matt Munro	Professor, Math&Computer Sciences
A	Mt. SAC	Matthew Naas	Professor, Counseling
A	Mt. SAC	Adaeze "Dez" Nebedum	Student Representative
A	Mt. SAC	Michael Onyiah	Student Representative
A	Mt. SAC	Mike Pryor	Student Representative
A	Mt. SAC	Naomi Velarde-Jang	Lab Tech II, Biological Sciences
A	Mt. SAC	Tommy Wong	Student Representative
A	Mt. SAC	Whitney Wujko	Student Representative
A	Mt. SAC	Xong Xiam He	Student Representative
A	Mt. SAC		
A	PAL id studio	Tevy Pal	Principal
CC	Mt. SAC	Matt Judd	Dean, Natural Science Division
CC	Mt.SAC	Gary Nellesen	Director, FP+M
CC	Mt. SAC	Chris Rodriquez	Technician, Technical Services
CC	Mt. SAC	Joe Vasquez	Network Administrator, IT

From: Carol Mining, Construction Project Manager

Distribution By Facilities Planning & Management

Legend: *Blue italicized text* *Refer to attachment*

Red text Revisions to original conversation at the time of this report

Purple italicized text *Action items*

3-4-15 STEM Center Meeting Report1_2015-02-04.docx

SUMMARY OF DISCUSSION:

I. Introductions: After introductions, Karelyn Hoover, Dean of Natural Sciences, stated that the purpose of this kick off meeting is to seek input from the student user group in regards to the use and function of the space. Group feedback will be incorporated into the planning and design of the new STEM Center.

II. Purpose: The purpose of the STEM Center is to provide a space with collaboration areas and quiet areas for individual study, group study, tutoring, and access to Text Books, Computers/Laptops, and examples of study materials for student use to enhance their education and student experience in the STEM disciplines.

A. Visioning: Mika presented videos from various different STEM Centers:
- CSU Channel Island
- Palomar College
- Mission College
- Steelcase GSVU

B. Based on these videos, the group provided feedback for what they liked and what additional items they would like to see at Mt. SAC. Recommendations included:
- Organization of the Center by learning discipline.
- Environment and equipment for students to work alone or in groups. (noise cancelling headphones were suggested).
- Tutoring services, specifically for STEM advanced classes.
- One (1) dedicated counseling office.
- Environment and equipment for students to work alone or in groups. (noise cancelling headphones were suggested).
- Tackable Walls.
- Multiple mobile marker boards. (various sizes).
- Dedicated Wi-Fi, and computers installed with STEM specific drives and software such as: Linux and Chemdraw.
- Internship opportunities and conference recourses made available.
- Providing class specific tutor training videos.
- Charging Stations/USB Ports.
- Large tables to provide ample layout work space.
- Bulletin Board networking/announcements. The ability to subscribe to a STEM social media or email group.

C. Mika asked the group to list what resources STEM students should be provided:
- Display Models
- Textbooks
- Laptops/Tablets
- Graphic Calculators
- O-Chem Model Kits
- Microwave/Coffee

D. Lastly, Mika asked the group to describe what qualities they would like to see in the Center:
- A welcoming and comfortable space where students will want to spend time.
- A space that will allow for flexibility and transformation.
- Modern, clean, and bright. Balanced use of color and natural lighting.

III. The existing space is Room 61-3316. This will be the home of the new Natural Sciences Division STEM Center. The space includes Rooms 3314, 3317, 3320, and the interior rooms inside the space.

A. The adjectives used to describe the STEM Center were discussed and noted as follows:

- Welcoming
- Flexible - Transformable
- Comfortable
- Color-balanced
- Natural Light, with glare control
- Modern
- Good Audio
- Clean, Warm, bright
- High tech, high touch
- Tackable surfaces
- Marker Boards for discussions and "thinking"
- Cord management + clutter management
- Allow food + drinks

B. The goals of this STEM Center space were defined by the team as the following:
   1. The space wants to be **inviting and welcoming** to encourage students to come in and take advantage of the opportunities provided.
   2. The space will be remodeled to provide **different functional zones** for specific study: (1) including an area for team collaboration; (2) an area for quiet study; (3) and an area for counseling, checking out materials and laptops, as well as refreshments. The students want to be able to have food and drinks while studying.
   3. The **reception area** should have a counter so the staff member can **check out laptops, text books, and materials** for student/tutor use. This Staff position can be supplemented with club members during the extended hours.
   4. The laptops or flash drives need to be loaded with e-text books, reference material and study guides, and LINUX, with Chemdraw software. The computers need to connect to the Computer Science "J" Drive.
   5. Space should be provided for an enclosed **office for a counselor**.
   6. The **collaboration area** requires **flexible furniture** to allow for different furniture configurations for team or individual study. The students want to be able to use laptops, ipads, and phones and a space to spread out their materials, bags, books, water, and food. Phone and computer charging stations will be necessary. This space should provide options for **interactive digital team collaboration, flexible seating, mobile white boards, a large table** to spread out study material, a very **large white board wall** for interactive study, and seating for individual reading.
   7. **Flexible hours of operation**, including hours after regular classroom hours and weekends. It was suggested that 7 am to midnight be the operating hours.
   8. **STEM Tutoring** should be provided.
   9. A group study room could be used on a reservation basis.
   10. The space should have a **Wi-Fi** dedicated service.
   11. To extend the networking of students, a **newsletter** could be included in the scope, along with message boards (physical board in the room and on-line) for announcements.

C. Space Modifications:
   1. The group agreed it will be desirable to replace some of the hallway wall with storefront window glass to allow for an open and inviting look to the Center. To achieve this option, one or two of the existing offices will need to be removed, and the entry and exit doors will need to be replaced.
   2. The removal of the two offices will allow more space for the flexible collaboration area. In this area, students can configure furniture for study groups using mobile white boards and mobile furniture. Students can also use large tables for laying out reference materials. The space can also accommodate smaller work/study areas.
   3. The Quiet zone will have individual work stations, and comfortable seating. The students will also use laptops, ipads, and phones (with recharging stations) and they need space for their bags, books, water, and food.

4. The renovation scope will include new flooring, paint, lighting, power, data, AV, and signage. New furniture and instructional equipment will be used to create work and collaboration spaces.
5. Lighting and glare control (windows) will be addressed.

IV. Schedule

This will be a DSA permitted project due to the extent of modifications to the hallway. As a result, we will recommend that we break the project schedule into two parts and procure the furniture, fixtures, and equipment (FF+E) to capture the available funds, and use the space as is with some of the new furniture until such time as the construction can start. When all permits are obtained and the project construction is bid and awarded, the second phase will start with the physical modifications to the walls, floor and ceiling.

V. Next Steps

1. Mika and Carol will meet with the architect and define the building modification scope.
2. Tevy will prepare some cut sheets/presentation boards to show the team the possibilities for furniture that will be applicable for the above goals and objectives.
3. We will need to meet again to define the space plan, then it will be necessary to prepare a portion of the furniture order in order to encumber the available funds for part of the FF&E scope.
4. Carol to prepare a timeline for project activities.

These concepts will be combined by PAL id who will create a conceptual design. This design will be presented at the next meeting. Project scope and schedule to be determined by Facilities Planning and Management.

Future Meeting: March 5, 2015 in Conference Room 61-3316 at 3:00 p.m.

Appendix C
Phi Theta Kappa Stem Center Report

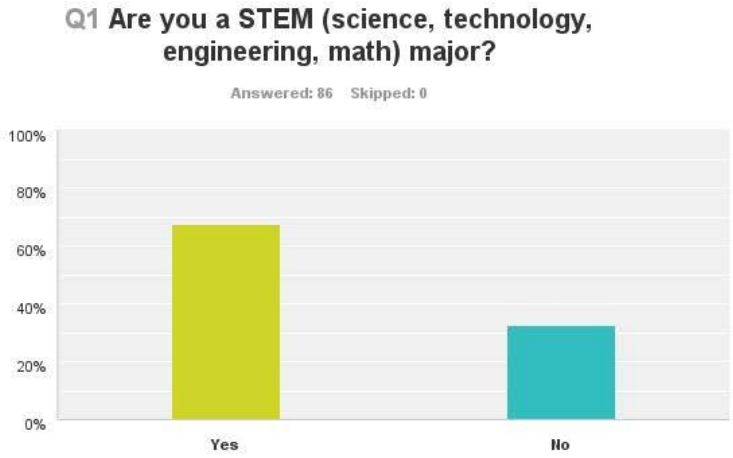
STEM Center Report

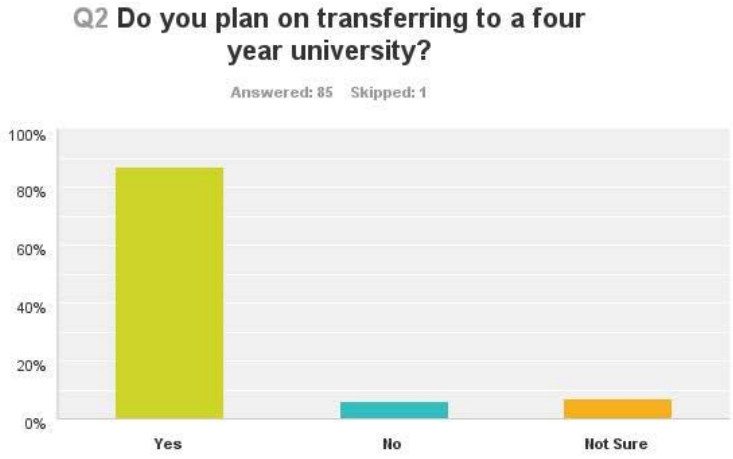
Introduction

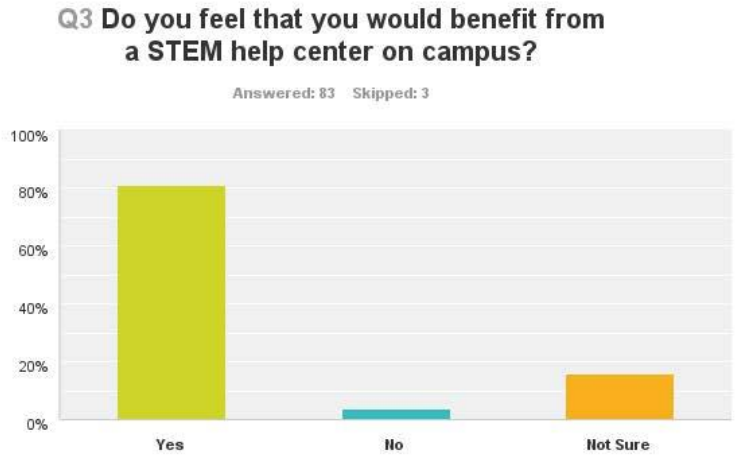
Phi Theta Kappa is an international honors society for community college students. Every year each chapter participates in a service project on their campus as an opportunity to engage and give back to the student body. We were excited by the opportunity to provide student feedback to the administrators about the planned STEM center on campus. Our officers span a wide variety of majors from computer science to biology to graphic design to engineering, and as such we recognize what an excellent resource this center has the potential to be for future students. In order to be able to give an informed recommendation to administration, we decided to find out how already established STEM centers were run before approaching Mt. SAC's student body. We visited two community college campuses with already established STEM centers and interviewed the staff about their successes and challenges. Next we used that information to create a survey we distributed to students on our campus to discover what they were most interested in having in a STEM center.

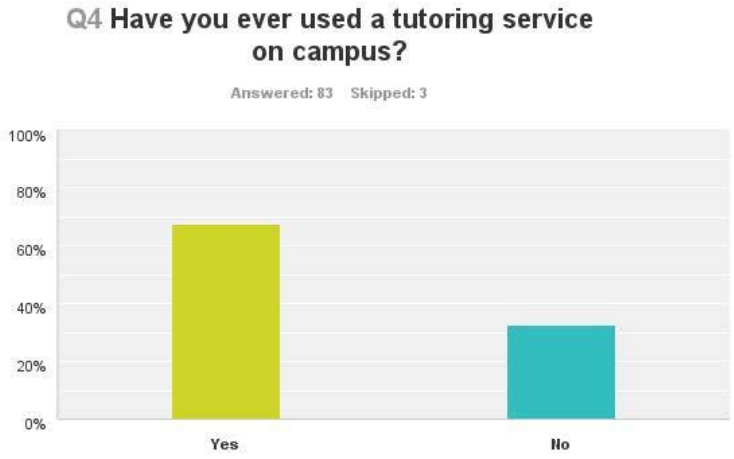
STEM Center Survey Results

- **Method**
  - Used Survey Monkey
  - Created 10 focused questions
  - Sent out to:
    - Honors Students via email by Sue Ceja
    - Emailed the link to all the clubs on campus (Natural Science department, Caduceus Club, Math and Engineering Club, etc.),
    - Shared on the PTK Facebook page
    - Online school newspaper
- **Results**
  - 84 responses


Q1 Are you a STEM (science, technology, engineering, math) major?
Answered: 86 Skipped: 0
100%
80%
60%
40%
20%
0%
Yes
No

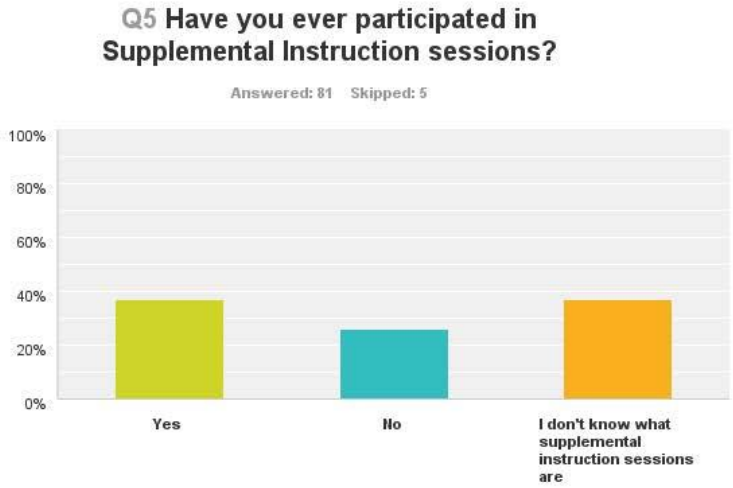

Q2 Do you plan on transferring to a four year university?
Answered: 85 Skipped: 1
100%
80%
60%
40%
20%
0%
Yes
No
Not Sure

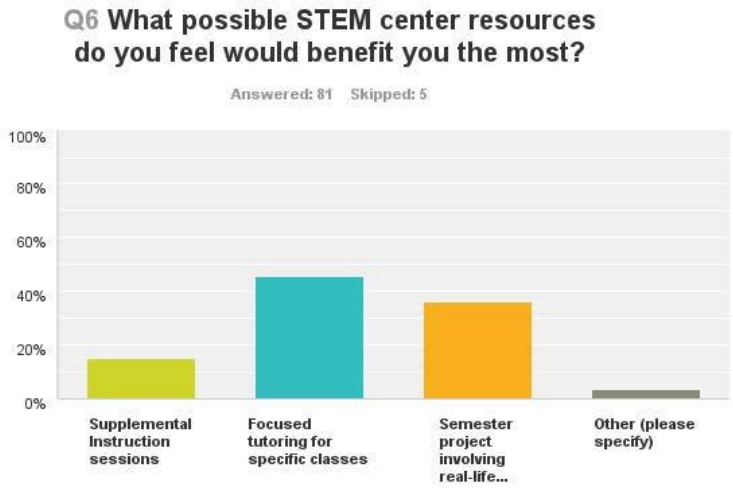

Q3 Do you feel that you would benefit from a STEM help center on campus?
Answered: 83 Skipped: 3
100%
80%
60%
40%
20%
0%
Yes
No
Not Sure



Student individual response examples (asked for at bottom of question, 44 total)

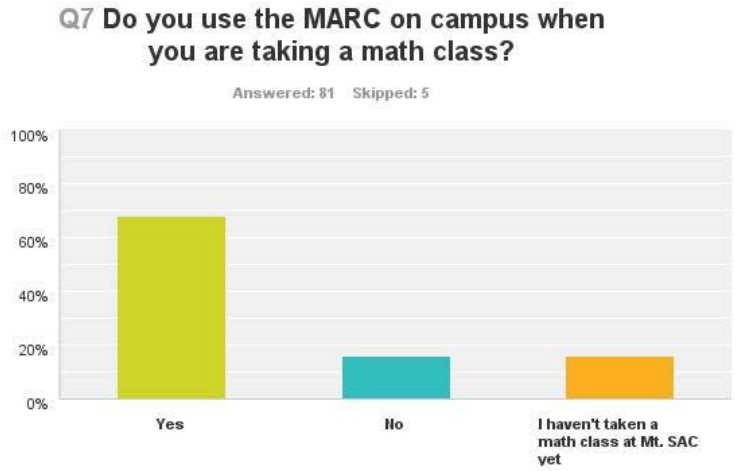
- Yes it's helpful to a point, I think some students should be in a close room because like me as example sometime I feel dumb to ask questions around people, but when I'm in a room my mind is not thinking about what people think.
- Yes, there are students that have the same teachers that I do. They help me understand the topics or ideas that the teachers present in class that I don't understand, but they do.
- Not really, because they do not know how the professors want it done. They only know how to teach it their way.
- I usually have tutor on grammar in English class and it helps me a lot. However, one time I have question in physic class, I met two tutor there but they could not help me to solve that problem.
- Didn't know that it was available
- Yes, personally, I need to sit down with a tutor and go over that week's material to truly learn. Class goes too fast for me to process the information.





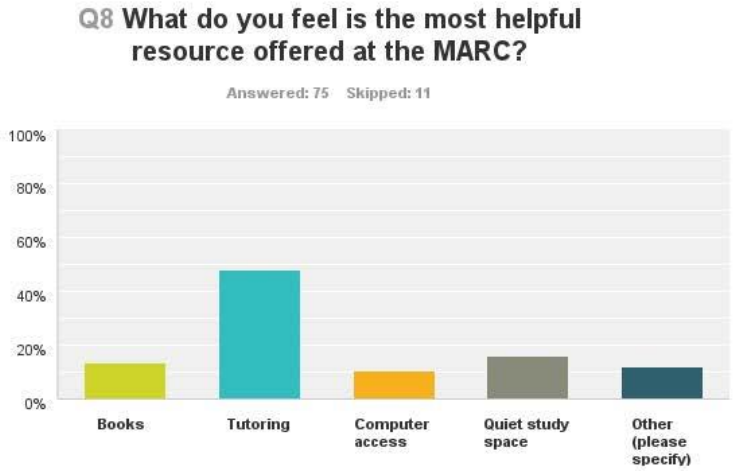
Other Responses:

- all three above
- Hands on experience building robots in a competitive environment
- all of the above



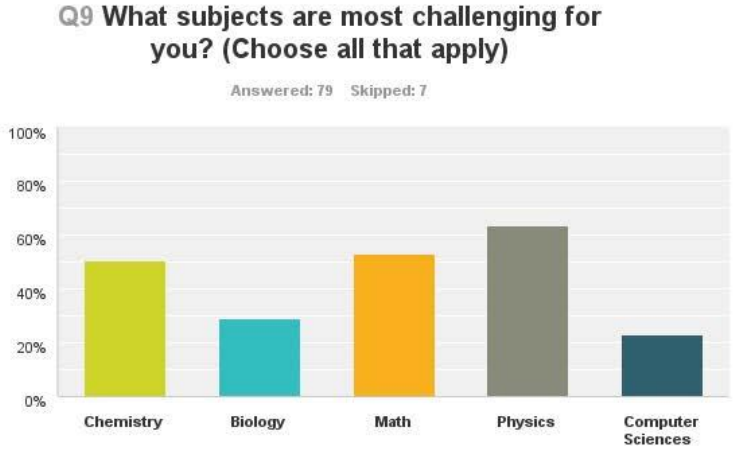
Student Individual Response Examples (17 total):

- When I took calculus class, I came there to get help in maple project, they are really good to explain problem and helped me a lot
- didn't know they were available.
- It's a great place to get help whenever we're stuck in a math problem. All the tutors are really good in explaining the concepts.
- Mainly because I can use the books there without having to buy my own. Also, it makes a good environment for studying, and the tutors are very helpful
- Yes, I use it mainly because they have the most math tutors to assist me. Also I must do my required hours for my math class.
- It's wonderful are you kidding me? You can use the textbooks and do your homework and all the tutors are right there and people are there to shut up and do math i love it
- For lab projects
- Too shy



Other Responses:

- never used
- All of the options above are the most helpful resources in the MARC and TMARC
- Calculator



Answers to Question "Have you ever taken a class that made you rethink your major? What was it and why?" (19 total, 8 examples shown)

- My Math 160 class has made me rethink my major of going into BioChemistry because of all the intense math and science classes I have to take. I don't think that I'm smart or willing enough to get through the classes with a B or better.
- Yes, General Chemistry class there was a lot of unnecessary work and professor was so strict and take off a lot of points and no tutors to help improve in the subject. Professor asked to purchase mastering chemistry and made it mandatory which was very expensive and a waste of time with little benefit.
- Bio 2- plant and animal bio! I thought, 'maybe i'm not cut out to be a scientific person
- No
- I used to love chemistry, until I took Chem 51. That class is really hard. I struggled throughout the semester because the concepts were very hard to understand. I tried to go get some tutoring at the tutorial services center, but there was a lot of students there that needed help and there was only one tutor for Chem 51 and the other chemistry classes, so he didn't have much time to patiently explain the material until I understood it. I really wish we had an SI for that class.
- Math 181 and Physics 4A. Those classes require a great amount of comprehension, time and even then the results can be discouraging. These classes made me second guess my engineering major, making me feel incompetent. I especially wished there was a physics tutoring center similar to the Tmark so I would be able to ask questions on homework problems.
- I considered changing my major to philosophy or literature when I took critical writing philosophy. I have also taken two literature courses over the span of two semesters. I enjoyed taking classes pertaining to the humanities.
- yes, it was math that made me switch from medicine to nursing. I was not doing well at first so I thought that would not make me a good doctor.

Question 10, Additional Comments:

- We need better math tutors.
- Science subjects are very interesting, but the work required is way more than the credit units of the class, with little help offered by professors and tutors if any. Need supplemental materials and books available at STEM centers.
- I think SI section is really helpful that help me understand more lessons in class and prepare better for exams.
- more info needs to be made public about this program
- I think that there should be more tutors as well as SIs for every science course, since they tend to be very challenging for most students. Tutors and SIs really make a difference in the grades of those students who attend the sessions.
- I only ask that this center provided more resources for these fields of study, but also more study areas for students. Depending on the location it would be greatly appreciated if this center had many more study rooms or areas for us students. We mainly need more study rooms, tables, and plug outlets for out educational needs. If you can provide these basic resources, you would be greatly assisting all Mt. SAC students. Also depending on the location, it would also be appreciated if there was another food place (NOT like the W.O.W. Cafe) or coffee shop (specifically like Prime Stop). You can never have enough food places on campus.
- This center should be big enough to offer students not just tutoring for specific courses but also mentoring specific to the field they are interested in.
- I highly recommend SI sessions for STEM students. I used to be an SI instructor for organic chemistry and cell biology and found the students significantly benefited from it when compared to students who did not attend SI sessions. Most students who participated in SI sessions credit their SI sessions and instructors for passing their courses successfully.
- It would just be amazing to have a place with textbooks and quietness to get work done.
- I would definitely like to see projects being done for STEM majors
- I think the STEM center's computers could use software needed for students to complete their courses. For example, certain engineering software programs for students who cannot afford the software to complete their homework.
- I think the STEM Center is an awesome concept!

Conclusion

Students who utilize the MARC and TMARC are generally happy with the resources available to them, and many students would like to see similar resources available in a STEM center. Many responders listed tutors or SI sessions as a desired resource, so we would recommend expanding these programs in the new STEM center.

Campus Visits

The following table is a comparison between Citrus College and El Camino College's established STEM centers. We placed them side by side to compare because while the centers themselves are both very successful in their own right, they are both completely different in operation and allocation of resources.

	Citrus	**El Camino**

Accessibility	• Open to everyone
	• Computer science not supported
		• Restricted to STEM majors
		• Requires membership
		  ○ Can more effectively serve students
		  ○ Provides sense of community
		  ○ Students feel more responsible to care for the resources available

Interior	• Smaller space/more crowded • Similar square footage to Mt. SAC'S proposed center • Divided with partitions • No food or drinks	• Very large, well laid out space • 4 small closed study rooms • 1 large multipurpose hall that could be divided into multiple rooms • 21 state of the art computers • Patio where students can eat or drink • Aesthetically pleasing • Space not optimized
Staff	• Normally has 5 part time STEM specific counselors, down to three currently • Usually by appointment • Math center collaborates with STEM center for tutoring and resources	• 2 STEM advisors • 2 STEM counselors • 15 paid tutors

Primary Resources	• SI sessions
	  ○ For basic science classes
	  ○ Has a lot of publicity on campus
	  ○ SI leaders are paid
	  ○ Use UKMC's SI model
	• Facilitated Study Groups
	  ○ A group of students reserve time with a group leader to study together-more informal than SI
		• Tutoring
		  ○ For a variety of subjects including computer science
		• Sense of community and camaraderie
		• Close-knit support system

How They Allocate Resources	• Use average grade data from previous classes to determine what classes to offer SI sessions in	• Program director (also founder of center) maintains ongoing relationship with each student who uses center and determines needs of students from his conversations with them
Center Hours	• Mon-Thurs 8am-8pm	• Mon-Thurs 8am-6:15 pm • Fri 8am-4:45pm • Sun 11 am-6:30pm

Citrus College STEM center

Pros

- SI sessions clearly well utilized, making an impact for grades in classes they are offered for
- Available for everyone, inclusive

Cons

- Small, cramped space can get chaotic with all the sessions going on at once
- Space not well planned out

El Camino STEM Center

Pros

- Beautiful interior
- Sense of community with other students; like a club

Cons

- Not as many people can use the center; no non-STEM major support
- Space could be used more efficiently; serves the same number of people daily as Citrus with four times the space as Citrus

Conclusion

Based on our student survey, there is strong interest in building a STEM center on campus, with 80% of students stating that they would benefit if one were built. From our own observations in other STEM centers, and the results from our survey, we believe the campus will be best served with an all-inclusive STEM center that offers help and resources to both STEM major and non-STEM major students. 45% of students felt they would benefit most from focused tutoring for specific subjects, and 49% of students felt that tutoring was the most beneficial resource currently offered at the MARC. A full 36% of students surveyed did not know what SI sessions were, leading us to believe they are not well advertised or utilized on campus. Due to this feedback, we feel the student body is most interested in seeing a STEM center that offers an expansion of tutoring programs for STEM classes, and that an expansion of SI sessions would greatly benefit all students on campus as well.

We think it would be best to create a STEM center more closely based on Citrus's STEM center. One reason is that the space at Mt. SAC that is being considered (on the 3rd floor of the Math building) is roughly the same size. Citrus's STEM center is also all-inclusive and serves about the same number of students as El Camino's much larger, but restricted access, facility. We also believe the student body would be best served by investing in more people such as tutors, counselors, and SI session leaders, as opposed to state-of-the-art technology. In general, while high-tech equipment looks nice, it won't provide as much help to students as knowledgeable staff will.

Appendix D
STEM Center Planning Timeline

STEM Center Planning Timeline – Karelyn Hoover

Spring 2014
- STEM Center proposed as part of Student Equity Plan - Interventions
- Budget proposed
- Walk through building science complex buildings with VPI for potential sites for STEM Center

Fall 2014
- Expand budget to capture instructional equipment money
- Meet with President of Harvey Mudd, tour facilities, meet with students
- Meet with Phi Theta Kappa students, review project on STEM Centers
- Preview projector technology to use in STEM Center

Winter 2015
- Meet with campus architect
  Planning meeting to involve students in the process, identify student needs; approximately 20 students, faculty, staff attended
  Purpose:

Spring 2015
- Visioning meeting - Faculty Flex day presentation
- Project manager assigned
- Follow up meetings

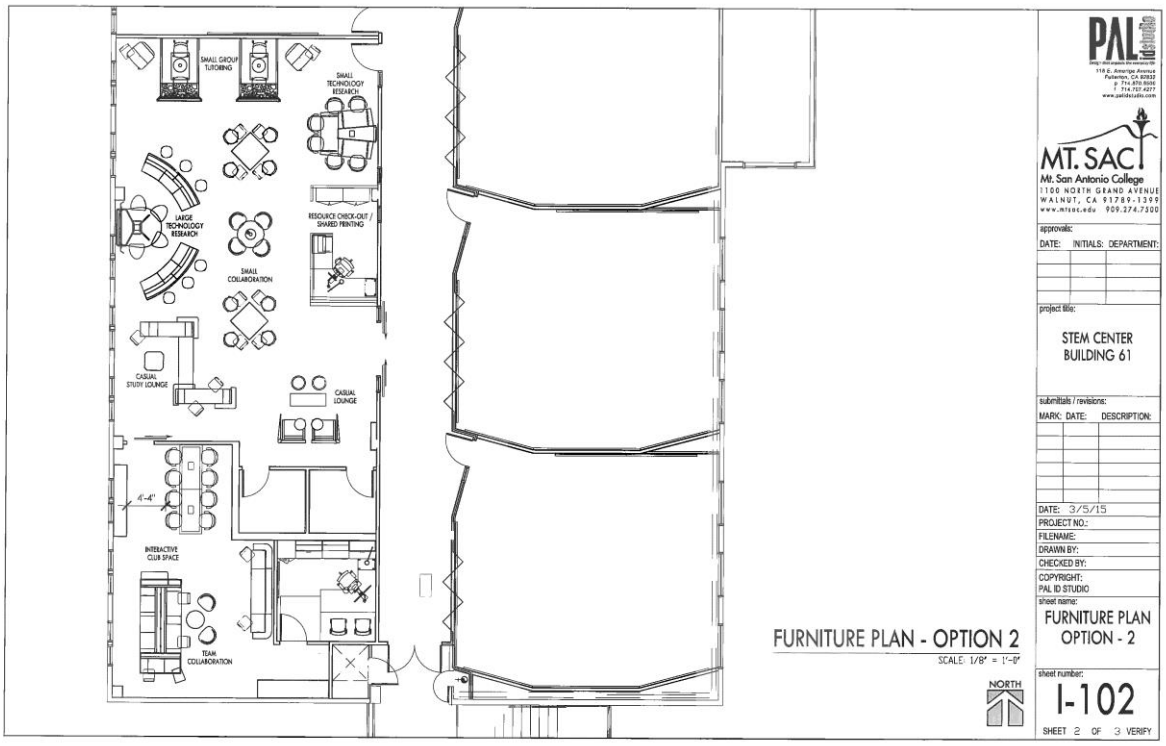
Spring/Summer 2015
- Renovations to space
- Convert Math Study Room to quiet study space

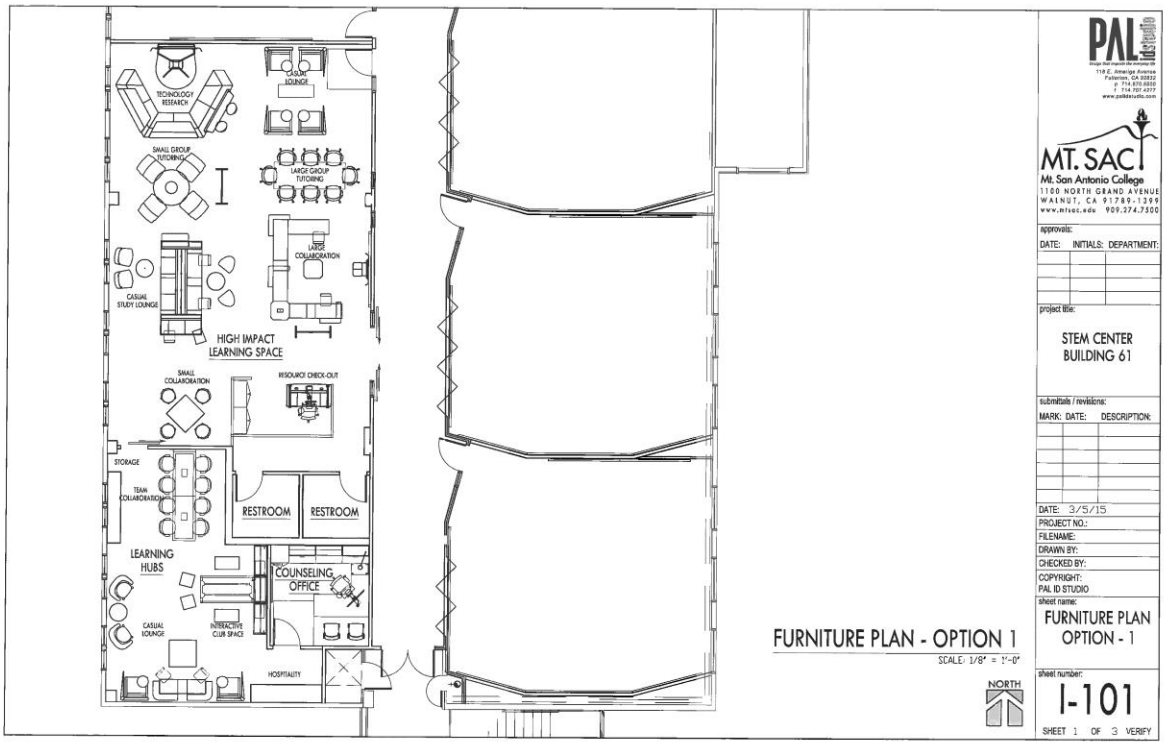
Fall 2015/Spring 2016
- Projected opening of STEM Center

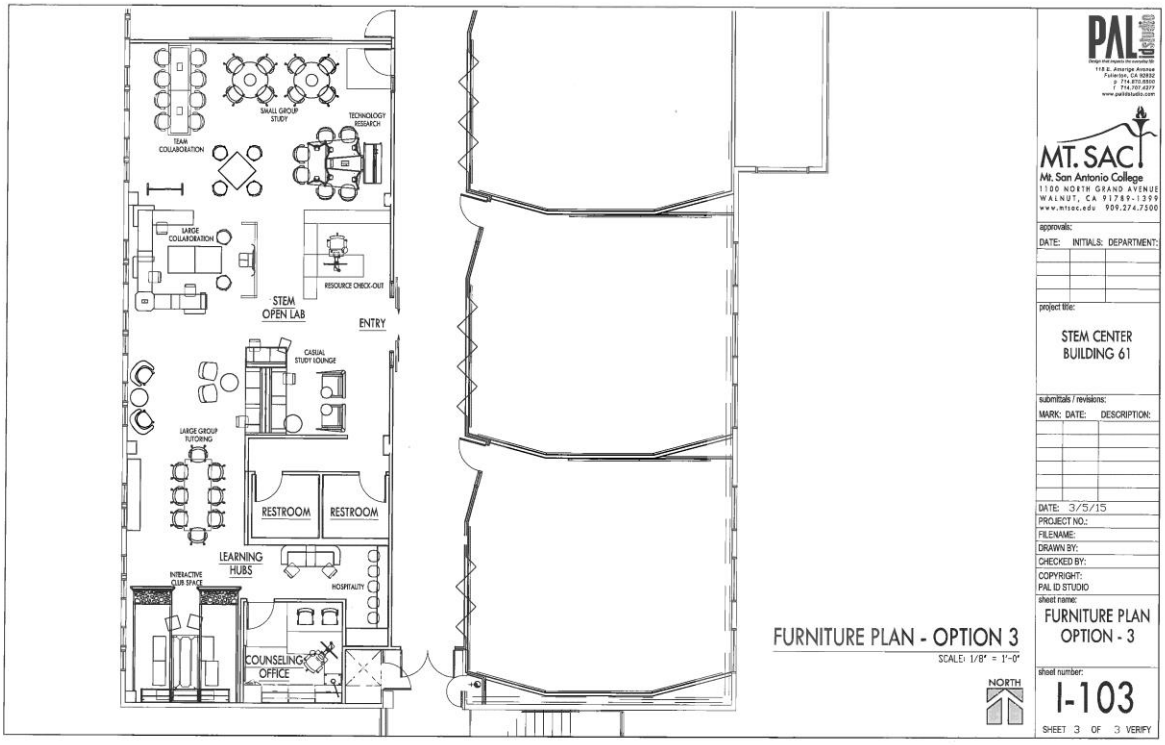
Appendix E
STEM Center Budget

STEM Center Preliminary Budget		
8/13/2014		
Assumptions:		
Serves sciences (Biology, Chemistry, Earth Sciences, Astronomy, Physics), engineering and advanced mathematics (Calculus level)		
Open peak hours for day classes (10 am to 5 pm M-Th); one evening 5 pm - 10 pm; Saturday at least 1/2 day, total of 37 hours per week		
Open in Summer and Winter for prep workshops, refresher courses, etc.		
Personnel: faculty, staff, tutors, student workers		
STEM faculty mentor/faculty reassigned time 60%		30,000/semester
Hourly student workers for clerical/student assistance (2 per hour)	10.27/hr	12,500/semester
Tutors (4 per hour)	11.13/hr	26,500/semester
Part-time Counselor, 47.5%		23,750/semester
Faculty for interventions workshops		5,000/semester
$1,000 stipend-create/pilot success workshops		
Instructional Equipment		
White boards		$2,000
Graphing white board		$500
Electronic white boards		$2,000
Textbooks		$5,000
Calculators		$1,000
Materials		
Science lab materials, repurpose from departments		
Technology: computers, software		
Laptop computers (10)	$1,200 each	$12,000
Tablets (5)	$500 each	$5,000
Printer		$500
Projection system with screen		$1,000
Math software (Maple)	site license	
Molecular Modeling software (such as Spartan)	site license	
ALEKS software	$200 each	$2,000
Other funding sources that we can partner with: Title V, Instructional Equipment, SSSP		

Appendix F STEM
Center Floor Plans






SMALL GROUP STUDY
TECHNOLOGY RESEARCH
TEAM COLLABORATION
LARGE COLLABORATION
RESOURCE CHECK-OUT
STEM OPEN LAB
ENTRY
CASUAL STUDY LOUNGE
LARGE GROUP TUTORING
RESTROOM
RESTROOM
LEARNING HUBS
INTERACTIVE CLUB SPACE
HOSPITALITY
COUNSELING OFFICE
FURNITURE PLAN - OPTION 3
SCALE: 1/8" = 1'-0"
NORTH
PAL
MT. SAC
Mt. San Antonio College
1100 NORTH GRAND AVENUE
WALNUT, CA 91789-1399
www.mtsac.edu 909.274.7300
approvals:
DATE: INITIALS: DEPARTMENT:
project title:
STEM CENTER BUILDING 61
submittals / revisions:
MARK: DATE: DESCRIPTION:
DATE: 3/5/15
PROJECT NO.:
FILENAME:
DRAWN BY:
CHECKED BY:
COPYRIGHT: PAL ID STUDIO
sheet name:
FURNITURE PLAN OPTION - 3
sheet number:
I-103
SHEET 3 OF 3 VERIFY