COMMITTEE ON RESEARCH

Date submitted: February 14, 2013
Designation code: 2012-2013 CR 6

TO: The Academic Senate
FROM: The Committee on Research
SUBJECT: 12-13 CR 6: Proposal for the Center for Science and Education and Research
PURPOSE: For information to the Academic Senate

BACKGROUND INFORMATION:
At the February 28 meeting, CR discussed the Center for Science and Education and Research proposal as presented by Rachelle Distefano and Jeff Seitz. The center’s key goal is to improve K-20 science education. The proposal was approved unanimously.

ACTION REQUESTED:
That the Executive Committee and Academic Senate approve the recommendation from the Committee on Research to refer the Center for Science and Education and Research proposal to the Academic Senate as an information item.
PROPOSED CHARTER
CSU EAST BAY CENTER FOR SCIENCE EDUCATION & RESEARCH

I. INTRODUCTION AND NEED FOR PROJECT

A. Introduction

This proposal is for the approval of the formation of a new university center: CSU East Bay Center for Science Education & Research (CSER). It meets the criteria for a “university center” in that it involves more than one college. This proposal is for five years, with the intent of renewal at the end of the term. Following the National Institutes of Health (NIH) model, CSER will operate under the umbrella of the CSUEB Institute for STEM Education along with the Center for Math Education & Research (CMER) and future centers at CSU East Bay. Consistent with CMER and the NIH model, CSER will have a specific disciplinary-based research and development agenda focusing primarily on transforming K-20 science education.

B. Need

The importance of a strategic focus on advancing quality science instruction, learning, and research opportunities along the pre-K-20 continuum is supported by extensive empirical data indicating that California and our nation is at risk of losing its competitive edge in science and technology. A 2009 study found that even at the height of the global recession, 32% of surveyed companies reported moderate to serious skills shortages. Major deficits in our education system were sited as a factor hampering U.S. competitiveness and that growing a quality science and mathematics teaching workforce was vital to the health of our economy. In addition to growing a domestic workforce of scientists and engineers, an increasing number of other jobs at all levels also require knowledge of science and technology.

Shortages will grow as we face a flattening of our domestic college age population (18- to 24-year-olds) projected to stop growing and to stabilize at about 30 million from 2010 to 2025. Maintaining our competitive edge will not be possible unless we draw upon a largely untapped resource: Black, Hispanic and Native Americans who are historically underrepresented in science and engineering fields. They will account for an increasing share of the college age population, growing from 32 percent in 2010 to 38 percent in 2025. Hispanics will account for 90 percent of the increase in underrepresented minorities.

What gets measured gets taught. California measures mathematics performance in each grade from 3 through 8. Science is only measured in grades 5 and 8. With the focus on mathematics and reading/language arts due to federal No Child Left Behind legislation and state assessments, it should not be surprising that there have been no gains in science performance even though mathematics scores on national assessments rose during the 1990s and early 2000's. Aside from limited time for science instruction do to shifting of instructional time towards reading/language arts, lack of K-8 teacher confidence and preparation in science are sited as contributing to lack of science gains. For California and the nation overall to see improvement in science achievement, science must be given the same priority treatment that math and reading/language arts has in recent years: instructional time and quality professional development and support. Particular attention must be given to schools serving large numbers of low-income and minority students whose
children have less access to science enrichment in school and during out-of-school time than do children from middle class communities.\(^6\) Additionally, effort should be made to ensure the inclusion of small and medium-sized districts in our service area that serve low-income, under-represented populations because they have been particularly ravaged by budget cuts in that they do not have the economies of scale, resources, and celebrity that draws money to large school districts.

A coherent approach to transformation of science teaching and learning that moves under-represented students through the pre-K-20 continuum to science and engineering careers requires transformative practices also at the community college, undergraduate, graduate levels, and teacher preparation programs. Each is vital to increasing the number of students seeking and attaining careers in science, technology, and teaching in the STEM disciplines. Leadership within each stakeholder institution must commit to significant and data-driven systemic change to ensure their meaningful and sustained contribution in transforming the education-to-workforce continuum.

In pre-college grades, research shows that a child who has teachers with the knowledge and skills needed to teach science and mathematics effectively is more likely to be able to close the achievement gaps that he or she experiences and be prepared as an individual for success in college, work and life.\(^7\) There are many performance disparities in students from disadvantaged populations in science as well as math, both urban and rural, who lag far behind their peers. These disparities start as early as kindergarten, persisting across grades, and in most cases widen over time.\(^8\)

Unfortunately, most students who lose interest in science do so during the pivotal middle school years when children are experiencing significant growth in cognitive development.\(^9\) Students not “hooked” on science in middle school have little motivation to take other than the most basic science and mathematics courses required for high school graduation.\(^10\) Evidence from multiple studies and data sources underscores the urgency of strengthening K-8 science instruction.\(^11\) California students’ performance in science is among the poorest in the U.S. National data show, for example, that California eighth graders rank in the bottom one-fifth of U.S. students in both science and mathematics, as measured by the National Assessment of Educational Progress (NAEP).\(^12\) California ranks 49th of the 50 states for 5th grade proficiency in science, with only 50% of students testing at or above proficiency level on the Science STAR exam.\(^13\) An intentional focus on science education is needed.

The comparison of student performance on two international tests points out the difference between memorizing facts, as in the Third International Mathematics and Science Study (TIMSS), and applying knowledge, as in the Program for International Student Assessment (PISA). Each of these two tests has its merits. However, application of one's knowledge is much more important than the direct recall of information. International comparisons between 1995 and 2003 showed some improvement for U.S. eighth grade students in both math and science in the TIMSS assessment. This test measures mastery of curriculum-based knowledge and skills. However, scores for fourth graders generally remained flat over the same period. In 2003 the PISA tests, which measure students' ability to apply scientific and mathematical concepts and skills, was administered to U.S. 15-year-olds. U.S. students scored below the international average. It should be noted that TIMSS included both developed and developing nations; the international averages for PISA are based on scores for the 30 OECD countries (countries that are industrialized).\(^14\)
In California elementary schools, few children have access to high quality science in elementary and only 10% actually have the opportunity to engage in the practices of science. These findings are part of a national trend of decreased time spent on science instruction since 2002. Of surveyed teachers, only 30% reported feeling prepared to teach science and fewer that 15% had received any professional development in science teaching in the three years prior to the survey. Teachers reported feeling less prepared to teach the science curriculum than reading and math. According to this study, “10 times as many multiple subject teachers do not feel adequately prepared” to teach science (41%) as compared to language arts (4%) and mathematics (4%).

Many K-8 teachers rely strongly on science textbooks, avoid teaching more complex science concepts, or minimize the amount of science they teach. There is a lack of experience with inquiry-based science. Teachers with poorer content knowledge and less confidence are also less likely to teach any hands-on labs or inquiry-based science. This may not be surprising given that teacher preparation pathways often require upper division courses in English and Mathematics, but only introductory-level, general education courses in science. Increasing the quantity and relevance of science courses can lead to enhanced teacher confidence and higher quantity and quality of instructional time on science in their classrooms.

The truism that we teach as we were taught is well based in research. The science experiences of future teachers have generally been with elementary teachers who are reluctant to teach science and secondary teachers who are generally under pressure to raise test scores rather than teach science as a way of knowing. Science achievement of California’s K-12 students is among the worst in the country.

In middle and high school, the number of certified science teachers is down. Science education for pre-service teachers at our Nation’s education schools appears to be less rigorous compared to other subjects. College graduates entering the teaching profession tended to have somewhat lower than average academic skills as evidenced by their lower rates of participation in rigorous academic courses in high school, lower achievement tests and lower entrance exams scores than students in other majors.

This lack of professional development articulates directly into the classroom. With the advances in science and technology, it cannot be expected that teachers will understand—and then teach students—about the advances in DNA sequencing, or cloning, or a myriad of other scientific breakthroughs if they have not themselves had a solid scientific foundation. Obviously this lack of professional development has a direct bearing on the content knowledge of our teachers and on their classroom practices.

A coherent approach requires strengthening pathways from community college to four-year institutions. Partnerships with community colleges in our service are is fundamental to dramatically increasing the number of science majors and the supply of science and math teachers. The majority of undergraduates enrolled in higher education attend community colleges. Each year, nearly 70% of students receiving associate or bachelor’s degrees from California’s public colleges and universities are either community college students or CSU or UC students who transferred from a community college. Additionally, California’s community colleges serve a larger proportion of Latino and African-American students, both populations being critical to the state’s future workforce.

Students who start out at community college with plans to complete a bachelor’s degree are significantly less likely to do so than students starting at a four-year institution. Low-
income and non-Asian minority students have the lowest transfer and baccalaureate completion rates. At least part of the reason is economic: many community college students work, so it takes them longer to complete their degrees. The issues are particularly marked in STEM fields. Yet, the factors that lead to success in enhancing transfer in STEM fields are known. Research on community college students shows that those who enroll full-time, participate in a high quality advisement system, and experience socialization into STEM fields and the presence and guidance of peer or faculty mentors have the best transfer rates to four-year institutions. Given that approximately 65% of future teachers in California begin their post-secondary education in a community college, efficient transfer patterns must be established to increase the number of mathematics and science teachers.

Once students reach CSUEB, in addition to quality advising and other wrap-around support services to ensure student success, motivating students through research and hands-on learning activities is vital. The opportunity to carry out original research under the guidance of a faculty member plays a critically important role in the education of students in science and quantitative disciplines. Scientific research helps students develop critical reasoning skills. Such skills are helpful for any field of higher education, but they are particularly helpful for science majors. There is evidence that participation of undergraduate students in research fosters their later participation in graduate studies. It follows, therefore, that expanding the number of undergraduates exposed to developmental biology ultimately will provide a larger pool of researchers.

Research helps enhance a student’s understanding classroom studies. For example, it is one thing to read about how a biological process works but seeing the process develop in the lab can make it come alive. Even if a student is not considering a graduate education, it is an excellent opportunity to become more engaged in the field and interact with faculty members.

The CSER Anchor projects listed below are designed specifically to address some of the challenges identified in this section and each is intended to be scaled to reach a larger population. The work of CSER will build on the successes and partnerships these efforts have generated to advance and support transformative science teaching, learning and research opportunities along the entire pre-K-12 continuum.

C. Similar Centers and Institutes

Centers or institutes supporting science education are common at California State Universities. Examples include the Center for Excellence in Science and Mathematics Education at Cal Poly, San Luis Obispo and the Center for Science and Mathematics Education at San Francisco State University. The proposed center will be distinct in that it will support science education initiatives that primarily impact CSUEB students and the East Bay community. CSUEB faculty working in this area are already collaborating with centers and institutes at other campuses and it is expected that the formation of the proposed Center for Science Education & Research will further enhance these collaborations.

II. MISSION, GOALS, AND GUIDING PRINCIPLES

A. Mission

The CSER will advance transformative science teacher preparation, professional development, teaching practices, learning opportunities, and research. It will do so by
strengthening and building on existing “anchor” science education collaborations among faculty from the College of Science, College of Teacher Education & Allied Studies, other CSU campuses, partner community colleges, and K-12 leadership and educators in school districts regionally and statewide (see “Anchor Initiatives/Collaborations,” below in Section III).

B. Goals and Objectives

Goal 1 – Improve K-20 Science Teaching and Learning

a. Advance science teacher pathways from community college through CSU East Bay science teacher preparation programs,

b. Advance transformative science teaching and learning at the CSUEB undergraduate level,

c. Advance/support science professional development for K-12 educators,

d. Develop/support a distributed leadership model\(^32\) and partnership infrastructure to support science education leadership and systemic change,

e. Develop/support policies necessary to sustain and scale transformative Pre-K-20 science teaching and learning.

Goal 2 – Support Science Research and Opportunities for CSUEB Student Engagement

a. Support faculty in grant administration for science disciplinary research and science education research, including reducing barriers and project management,

b. Support transformative science learning opportunities for undergraduate, graduate, pre-service students, and faculty.

c. Actively work to increase research opportunities and partnerships with industry and national labs.

Goal 3 – Create/Maintain Central Location and Technology Infrastructure for Disciplinary and Science Research

a. Provide a central physical location for assessment and evaluation results of CSER grants,

b. Provide visibility within the larger Institute of STEM Education for CSER projects and their impact, as well as other science disciplinary and science education research of faculty and staff, including science-education related work of faculty in other colleges,

b. Maintain a website designed for collaboration among faculty, staff and partners, and to house and share work product, collaborative tools, and other resources, and
d. Leverage proximity to other STEM faculty and personnel to ensure most efficient use of resources among projects when appropriate.

C. Commitment to Diversity and Other Guiding Principles

The following guiding principals are signature features in the Anchor Initiatives/Collaborations described below in Section III. These principals will continue to be present as signature features in all CSER efforts and are aligned with CSUEB’s Mission Statement and Eight Shared Strategic Commitments:

1. **Supporting Mission of CSUEB.** The shortage of qualified teachers leads to underprepared students entering the university, who are less likely to enter or complete rigorous STEM degrees. It also is a negatively reinforcing cycle where fewer students are qualified to pursue teaching credentials in the STEM fields leading to an even larger shortage of teachers. CSU East Bay is currently working in several areas to combat this problem. Several of CSER’s Anchor Initiatives described in Section III, below, are aimed at recruiting and training science students to become highly qualified science teachers. Other initiatives are working with inservice teachers to deepen their content knowledge and pedagogical skills. Other projects that CSER will initiate and support will focus on recruiting (and supporting) students into STEM disciplines and providing extracurricular STEM learning opportunities, especially those in groups typically underrepresented in STEM.

2. **Commitment to Diversity - Focus on Under-represented, Low-income Populations.** For K-12 activities and projects, CSER’s commitment to diversity is reflected in (a) strategic selection of participating schools and districts with high numbers of low-income, under-represented student populations and (b) use of instructional pedagogy appropriate for non standard-English speaking, limited-English proficient students and those with disabilities. For activities and projects that engage community college, CSUEB undergraduate, and CSUEB graduate students, commitment to diversity will be reflected in outreach and interventions designed to encourage participation by and benefit this population of students. Finally, staffing efforts will be thoughtful and intentionally broad to ensure participation by those traditionally underrepresented in Science education programs.

3. **Promising, Innovative Practices.** Use of promising practices anchored in empirical research will, collectively, lead to transformative K-12 in-service and pre-service science teacher preparation, teaching, learning, and mechanisms for capacity building and sustainability.

4. **Data-Driven Decisions.** Collection and analysis of appropriate formative and summative data will drive project decisions.

5. **Selection of Partners.** Strategic selection of partners who demonstrate a commitment to developing the leadership necessary to support the partnership and advance and sustain the work beyond the initial term of the respective grants.

6. **Coherence.** Coherence among initiatives is essential to leveraging assets, building on lessons learned, sharing of data and minimizing redundancy in data collection, building capacity to advance the work, and ensuring economies of scale.
III. ANCHOR INITIATIVES/COLLABORATIONS

The six projects below will serve as anchor initiatives under the CSER support umbrella. A common denominator of these projects is that they are led and supported by the same science faculty and adhere to the guiding principals articulated above. They are:

A. National Science Foundation: S.F. Bay Integrated Middle School Science Project (IMSS). CSU East Bay has launched the Integrated Middle School Science Project (IMSS), a $12 million, five-year NSF Math Science Partnership grant designed to increase the quality of inquiry-based middle school science instruction and learning that is projected to reach over 400 middle school science teachers working in Title I schools in NCLB Program Improvement in four counties in the San Francisco Bay Region. In addition to the focused science content and inquiry-based professional development provided to participating middle school science teams by STEM and Education faculty, IMSS includes incentives for IMSS science teachers to pursue their Foundational Level General Science (FLGS) credential, a platform for ongoing science education fieldwork opportunities for pre-service teachers, and induction opportunities for newly credentialed middle school science teachers (see http://sciencepartnership.org).

B. IMSS Initiated: STEM K-12 Opportunities for Undergraduates and Pre-service Teachers. IMSS also provides a platform to engage significant numbers of CSU East Bay undergraduates in for-credit, paid, and voluntary tutoring and inquiry-based STEM instructional experiences in middle school science classrooms and in its STEM-centered after school programs, in which students and teachers collaborate with disciplinary faculty as researchers. This opportunity for undergraduates will be coordinated with the Learn and Serve America STEM Grant recently received by the CSU system from the Corporation for National and Community Service which will benefit both CSU East Bay and CSU Los Angeles, and will be coordinated by other service learning opportunities available at CSU East Bay. This project is designed to promote student success in STEM disciplines through service learning in credit-based K-12 STEM experiences and to provide opportunities for students to explore STEM teaching careers through hands-on STEM experiences in K-12 classrooms (see http://www.calstate.edu/cce/ stem/).

C. S.D. Bechtel, Jr. Foundation - Phase I: Foundations in Science Preparation and PD to Strengthen Science Instruction. Funded in 2010 by the S.D. Bechtel, Jr. Foundation, Phase I is designed to improve science instruction in the elementary and middle school grades by strengthening teachers’ content and pedagogical preparation. The objective of this work is the development of a practical and accessible course of study provided with the needed balance of breadth and depth for pre-service and in-service teachers. The impetus for this project, in part, was due to the authorization by the California Commission on Teacher Credentialing (February 2009) of the Foundational Level (K-8) General Science credential. Although the new authorization is a significant advance, no new foundational level general science teacher preparation programs had been established. The program is being developed to serve as a model that can be replicated at other CSU campuses that prepare K-8 science teachers. In California, 53% of teachers in the state are products of the CSU system, and it is prepared to expand the model developed through the project. The model will also be fully appropriate for adoption by the independent colleges and University of California campuses and throughout the nation.
The curriculum is designed to improve understanding of science content and pedagogy (including inquiry-based instruction) for elementary and middle school science teachers and to address the state’s new requirements for the Foundational Level General Science Credential. The sequence of courses and complementary labs can be taken either as a Minor in Science (currently being developed) within the undergraduate curriculum to prepare future teachers or as a Certificate Program in Foundational Science as a rigorous program of professional development for current teachers.

Two features make the model particularly significant. The first is that it will provide an upper division program of study that is carefully aligned with a pattern of lower division study developed in collaboration with community colleges. This sequence will represent a common four-year pattern that includes the study of science in each term in two-year and four-year campuses. The second feature is that the model is suited to undergraduate programs of study for future teachers and to a certificate for current teachers. In both cases, the program will not only fulfill, but go beyond General Education requirements in science.

D. S.D. Bechtel, Jr. Foundation - Phase II: CSUEB and CSULA Model Community College Transfer Program for Future Mathematics and Science Teachers. Funded in 2011 by the S.D. Bechtel, Jr. Foundation, Phase II has four primary outcomes: First, engage in a new phase of community college transfer initiatives focused on developing common transfer patterns for K-8 teachers with the goal of encouraging and preparing K-8 teachers early in their post-secondary education for Foundational Level General Science and Math credentials. Second, provide technical assistance to CSU Los Angeles to replicate secondary and Foundational Level science and math teacher transfer pathways across the Los Angeles Basin. Third, track the progress of community college students in its Model Community College Transfer Program For Future (Secondary) Mathematics and Science Teachers funded by the S.D. Bechtel Jr. Foundation in 2008. Fourth, disseminate knowledge gained from its model comprehensive campus efforts creating Pathways to 21st Century STEM Teaching Careers. The project is establishing a pattern of common lower division courses for students at CSU East Bay and four community colleges in its region and five community colleges in the service area for CSULA to pursue either secondary science or math credentials or K-8 foundational level general science or math credentials. The consequence will be that community college students can make the decision to pursue a four-year degree at any of the participating CSU campuses and take one established course of study that will enable them to begin their course work at the junior level.

E. S.D. Bechtel, Jr. Foundation: Phase III: Developing and Enhancing Multiple FLGS Pathways. Funded in October 2012 by the S.D. Bechtel, Jr. Foundation, Phase III has two primary goals: strengthening and increasing options for access to our existing Foundational Level General Science program and developing collaborative communities to ensure the continuing improvement and dissemination of high quality instructional materials stemming from this and earlier work. Specific objectives are to redesign lower division science pre-requisite courses through improved pedagogical practices and alignment with Next Generation Science Standards; develop a Commission on Teacher Credentialing-approved waiver program for the Added-Authorization in Foundational Level General Science; make FLGS courses stackable towards an Master of Science in Education with an Option in Foundational Level General Science; develop a technology infrastructure to support a community of practice for faculty to share, test, and improve FLGS curricular materials and to provide all CSU students access to FLGS course work and supporting
materials; and accelerate outreach measures to inform teachers, school, and district administrators about FLGS Authorization.

F. CSU Math and Science Teacher Initiative (MSTI) Affiliates Program. This system-wide initiative was launched in 2004 by the CSU Chancellor’s Office to double the production of mathematics and science teachers. The initiative emphasizes recruitment of community college transfer students. The MSTI Affiliates Teaching Assistant program provides early field experience for potential future high school math and science teachers. These TAs serve one or more teachers directly in the classroom.

IV. ORGANIZATIONAL STRUCTURE

A. Organizational Chart. Following the NIH model, CSER will be a recognized entity of the Institute for STEM Education. The CSER Director will work closely with CSER Advisory Committee (a subcommittee of science and education faculty drawn from the Institute Board of Directors) and Institute Executive Director to meet the goals and objectives of each of the projects (i.e., grant-funded) and initiatives (i.e., not grant-funded) under its discipline-based purview. The CSER Director will work with the Institute Executive Director to ensure that administration of CSER projects and initiatives are centralized in ways that create efficiencies in access to and use of resources vital to the success of the individual CSER projects.

Figure 1: Proposed Organizational Chart

B. CSER Reporting and Guidance Overview. The CSER Advisory Committee, along with the Executive Director of the Institute for STEM Education to whom the CSER Director reports, will guide and advise the CSER Director. The CSER Advisory Committee is comprised of Science and Education faculty members of the Institute for STEM Education Board of Directors. CSER partners from K-12, industry, community-based organizations,
and philanthropic organizations will be invited to participate as advisors for individual CSER projects as needed.

The Institute for STEM Education Board of Directors includes the Deans from the College of Science and the College of Education and Allied Studies; eight faculty members representing Sciences, Technology, Engineering, Mathematics and Education; and the Executive Director of the Institute. In 2012, directors are M. Leung, C. Nelson, J., Bicais, S. Couch, C. Inouye, M. Korb, D. LeDuc, S. Motavalli, J. Olkin, J. Seitz, J. Singley. CSER staff will include individuals working on projects affiliated with CSER. Staff within CSER, CMER and Institute projects will be shared as appropriate to ensure efficiency in use of resources.

C. Responsibilities

1. Dr. Rachelle DiStefano will serve as the CSER Director, a full-time position, recommended by the CSER Internal Advisory Committee. The CSER Director will report to and serve at the discretion of the Executive Director of the Institute for STEM Education, and will also serve as the Institute's Science Director. As the CSER Director, a primary responsibility will be to advance CSER’s overall goals and objectives outlined in Section II, above, and more specifically:

   a. In consultation with the P.I.’s of CSER-affiliated projects as appropriate, provide day-to-day management of CSER activities to ensure achievement of agreed upon goals, such as:

      (1) Direct and oversee institute support staff assigned to CSER-affiliated projects,

      (2) Assist the P.I.’s of CSER-affiliated projects in managing the process of hiring and evaluating grant staff, the proper handling of funds, and the financial soundness of the project,

      (3) Ensure that the CSER is adhering to its commitment to diversity in activities and appointments, and

      (4) Contribute to the design, content and ongoing maintenance of CSER’s portion of Institute for STEM Education’s website in compliance with university policy and procedures.

   b. Quarterly, consult with the CSER Advisory Committee;

   c. Serve as a resource for faculty engaged in Science disciplinary research or K-20 Science education research who are developing and managing grant programs, and respond to faculty requests for information to help with their grant writing, budgets, timelines, and personnel questions that fall under the purview of CSER;

   d. Serve as a resource for faculty science teaching pathways, specifically foundational level general science;

   e. Establish and maintain ties with Bay Area school districts and partners in the Gateways East Bay STEM Network to promote science pre-service opportunities; and
f. Establish visibility on and off campus for faculty, funding agencies, and collaborators involved in K-20 science education and educational research.

2. The Institute for STEM Education will support the efforts of CSER by providing staff support, identifying needs and opportunities, providing insights into program design and research, assisting in access to additional core and supporting partners, coordinating the leveraging of resources for improved operational efficiencies across the centers and creating economies of scale, and assisting in the coordination and support of efforts involving multiple centers and other STEM disciplines. Additionally, the Institute advocates policy at the local, regional, state and national levels, and thereby will assist in shaping and advancing the overall direction of CSER and the Institute's other centers.

3. The Institute for STEM Education Staff Assigned to CSER or CSER-affiliated projects, including administrative, program coordination, and other staff, may be hired as a direct line item on individual grants. Responsibilities of the support staff may include:

   a. Providing clerical services to CSER and CSER-affiliated projects,

   b. Working with Office of Research & Sponsored Programs and CSUEB Foundation staff to process paperwork,

   c. Assisting the CSER Director with

      (1) Data collection and management,

      (2) Budget management,

      (3) Communications with constituents,

      (4) Calendaring and workflow management, and

      (5) Website management.

4. The Institute for STEM Education Board of Directors, including the Deans of the College of Science and of the College of Education & Allied Studies will work to ensure that the goals and activities of CSER remained aligned with the academic programs in their colleges.

5. The Advisory Committee, a subcommittee of the Institute for STEM Education Board of Directors, is comprised of College of Science and College of Education & Allied Studies faculty, and will meet monthly to provide guidance on the projects and initiatives within the CSER purview, specifically on budget, staffing, and CSER activities to ensure coordination and leveraging of resources and coherence with goals and objectives of the Institute for STEM Education and Centers. The faculty on the committee will serve at the discretion of the Dean of the College of Science for a term of not more than three years without the re-recommendation of the Dean. They will inform the annual evaluation of the CSER Director.

V. RESOURCES

A. Facilities. The Institute for STEM Education has space allocated for the CSER Director and staff assigned/hired to work on projects affiliated with the CSER. This
Proposed Charter: CSU East Bay Center for Science Education & Research

1. Proposed Charter: CSU East Bay Center for Science Education & Research

2. v. 01.30.2013_distefano/seitz/couch

Dedicated and shared space will foster the development of synergy among faculty and staff associated with the various projects housed there, and create opportunities for leveraging and efficient use of resources. Ultimately, the CSER office will be housed in the STEM building that is in the early planning stage.

**B. Sources of Funding.** Currently, the University receives millions of dollars in federal, state, and philanthropic foundation grant funds to support STEM education activities. Some of these projects will be the purview of CSER and are described in II. ANCHOR INITIATIVES/ COLLABORATIONS, above because of their genesis. The proposed CSER Director has played a key role in the development and administration of a number of the grant-funded projects listed under II. ANCHOR INITIATIVES/ COLLABORATIONS, due to her skill sets and the needs of the faculty involved in the projects. These include the NSF Integrated Middle School Science Partnership (IMSS), Bechtel, Phase II and Bechtel Phase III. Although the CSER Director is a full-time position, approximately 60% of her position is bought out by these grants. They also pay for administrative support for her work on these grants. The remainder of her salary is funded by the College of Science. The funds associated with these grants that will be applied toward the support of CSER are listed in the table below.

<table>
<thead>
<tr>
<th>Project</th>
<th>CSER Director’s Role</th>
<th>Total Project Funding</th>
<th>Allocation/ Resource for CSER</th>
<th>Project Purpose</th>
<th>Target Population</th>
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<tbody>
<tr>
<td>NSF IMSS</td>
<td>Co-I, Co-Dir., Researcher</td>
<td>$11,900,000</td>
<td>25% FTE CSER Dir.</td>
<td>STEM PD – In-service</td>
<td>Middle school teachers, district/site administrators, middle school students, CSU students, 4 counties, 10 districts</td>
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<td></td>
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<td></td>
<td>100% FTE Adm. Supp.</td>
<td>STEM Leadership</td>
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<td>STEM Pre-service</td>
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<td>Hands-On Labs</td>
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<td>EB Science Project</td>
<td>Assoc. Dir.</td>
<td>$50,000</td>
<td>10% FTE CSER Dir.</td>
<td>Science/STEM PD and Research</td>
<td>Above</td>
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<tr>
<td>Bechtel II</td>
<td>Co-I</td>
<td>$600,000</td>
<td>20% FTE Adm. Supp.</td>
<td>STEM Pathways from Community College to CSU campuses</td>
<td>Faculty, students at 7 community colleges and 5 CSUs</td>
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<td>Bechtel III</td>
<td>Co-I, Assoc. Dir.</td>
<td>$675,000</td>
<td>10% FTE CSER Dir.</td>
<td>Strengthen access to STEM teacher pathways and redesign of FLGS courses</td>
<td>STEM graduate, undergraduate, and pre-service teachers (regionally and statewide)</td>
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<td></td>
<td>100% FTE Adm. Supp.</td>
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<tr>
<td>Teacher Recruitment Project (TRP)</td>
<td>Provide support to faculty in advancing science teacher pathways.</td>
<td>$75,000</td>
<td>20% FTE CSER Dir.</td>
<td>Lottery funds for science/math teacher recruitment</td>
<td>Undergraduates</td>
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</tbody>
</table>
C. Future Sources of Funding. Several of the funding sources for STEM Education projects are expected to continue to support the operations of CSER into the foreseeable future, including buying a percentage of the director’s salary. Assets of the Center of Science Education & Research will be leveraged to develop ongoing funding that deepens and scales the efforts that began with the anchor initiatives. These assets include an established relationship with the California Subject Matter Project, a network of regional sites housed in the departments of science of universities and independent colleges, a growing relationship with the National Science Foundation, and strong partnerships with several local foundations, four community colleges, and school districts and county offices of education in four counties. As new grants are written to build on these efforts, they will include funding to sustain CSER. Additionally, the CSER Director will work closely with the Institute for STEM Education Executive Director and faculty in other departments and colleges to identify opportunities to co-create additional successful funding proposals that will sustain and grow the efforts already begun with the above-described initiatives and to link with other faculty-driven initiatives at the university.

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8 Indicators 2006, p 1-5.


13 http://www.cde.ca.gov/nr/ne/yr09/yr09rel119.asp#tab10.

14 *Indicators 2006*, p 1-5.


16 California Council on Science and Technology, Ibid.

17 Dorph, Ibid.


21 Dorph, Ibid.


Distributed Leadership theory recognizes that execution of most leadership functions and activities involve multiple leaders. As opposed to hierarchal, leadership is distributed across people and is defined by the context and skills required. Organizational change and improvement is a collective concern, rather than an individual concern. Collaboration plays an important role and should foster mutual trust and support among team members. Spillane, James P. (2004). *Distributed Leadership: What’s All the Hoopla?* Northwestern University: Institute for Policy Research, School of Education and Social Policy.