Colorado State University

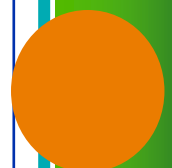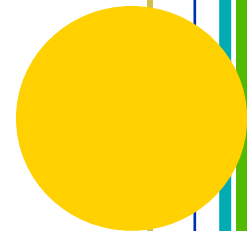## CSUSTEM

CSU STEM Center

Report 2011 - 2013

Prepared by:

Laura Sample McMeeking, Associate Director

Ernest Chavez & Paul Kennedy, Co-Directors

November, 2013

Letter from the Directors

The STEM Center at CSU was established in 2011 in order to collaborate and coordinate CSU's science, engineering, mathematics departments and the teacher preparation and development programs. This was to be accomplished through three main goals:

1) to facilitate or collaborate on STEM education-based program, research, or evaluation grants on and off campus
2) to host a clearinghouse in the form of the CSU STEM Center website for on and off campus STEM education-based projects
3) to serve as a liaison between CSU and off-campus organizations for PK-20 STEM education.

As part of our commitment to goal #2, we are proud to announce the activation of our STEM Center website (http://stem.colostate.edu/) and also to announce that the CSU STEM Center is one of the APLU STEM Centers. We are looking for news and content to go on the website. If you have a STEM education-related program or project you would like us to highlight on the website, or if you have a stem-education related news story, please email the following information to stem_center@mail.colostate.edu:

- Program/Project Title
- Department/Center/etc. (if this is collaborative across groups, please list them all)
- Contact Name and Title (who someone contacts with questions)
- Contact Email Address
- Contact Phone Number
- Short description (5-6 lines of text)
- Website Link (if available)

In addition to developing the website, the Center has, in the last year, increased in its evaluation budget by over $200,000, facilitated relationships with colleges and departments on campus, and maintained active involvement with individual schools and school districts in Colorado. We are also serving on state and national committees concerned with STEM education, outreach, and research. We hope to continue our growth and development and hope to involve more faculty and staff from across the CSU campus.

Dr. Ernest Chavez
Colorado State University
Professor
CSU STEM Center Co-Director

Dr. Paul Kennedy
Colorado State University
Professor
CSU STEM Center Co-Director

STEM CENTER BIENNIAL REPORT

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EXECUTIVE SUMMARY

In January of 2011, CSU created a new center to facilitate activities in the fields of Science, Technology, Engineering, and Mathematics (STEM) education. This STEM Center originated in a series of meetings of a subcommittee formed at the request of President Tony Frank, which included Deans Nancy Hartley and Jan Nerger along with Drs. Brian Cobb, Paul Kennedy, Tom Siller, and Andrew Warnock. The group proposed a STEM Center with a broad vision, which has since been narrowed to include the following goals:

1. Facilitate and collaborate on PK-20 STEM education-based program, research, or evaluation grants on and off campus
2. Host a clearinghouse in the form of the CSU STEM Center website for on and off campus STEM education-based projects
3. Serve as a PK-20 STEM education liaison between CSU and off-campus organizations.

The Center currently has three staff members: the two co-directors, Drs. Ernest Chavez and Paul Kennedy, and a full-time associate director, Dr. Laura Sample McMeeking. As of the publication of this report, the Center also houses two graduate students from the School of Education who are working on evaluation/research projects and one graduate student from Bioagricultural Science and Pest Management who is working on research coordination. In Summer 2013, the Directors requested several changes to the organizational structure of the STEM Center that would ensure equal representation amongst the colleges on the advisory board and a smooth transition between Center Directors over time. By collaborating with other faculty and staff within and outside CSU, we hope to increase our capacity to grow the Center to be better able to serve the needs of CSU and area communities.

This report provides details about the CSU STEM Center's activities for the period of January 2011 through October 2013. Since the founding of the Center in 2011, Center staff have been highly productive in achieving the three goals laid out by the original subcommittee:

- Through collaborations with other faculty and staff, the STEM Center has submitted 15 grants and brought in over $200,000 to cover the salary of staff and graduate students;
- STEM Center staff have several publications and presentation proposals related to research and evaluation work under review and plan to submit more publications by the end of 2013;
- The STEM Center has been active in informing STEM education policy through work with the Colorado Department of Education, the Association for Public and Land-grant Universities, the Legacy Foundation, and Poudre School district;
- STEM Center staff are currently working with four area schools on various stages in planning and implementing STEM-centric aspects of the curriculum and collaborating with the schools on research/evaluation work related to the projects.

For more information on the research and evaluation services provided by the STEM Center, see the Research and Evaluation section at the end of this report. The Center is located in rooms B323 and B325 of the Natural and Environmental Science Building (NESB) near College of Natural Sciences Education and Outreach Center and the Little Shop of Physics.

MISSION AND GOALS

The mission of the CSU STEM Center is to facilitate collaboration and coordination among Colorado State University's science, engineering, mathematics departments, and the teacher preparation and development programs. To do so, the CSU STEM Center supports and collaborates with faculty, staff, and students who focus on STEM research and education and serves as an organizing point for large-scale projects on campus. The goals of the Center are three-fold: 1) to facilitate or collaborate on STEM education-based program, research, or evaluation grants on and off campus; 2) to host a clearinghouse in the form of the CSU STEM Center website for on and off campus STEM education-based projects; and 3) to serve as a liaison between CSU and off-campus organizations for PK-20 STEM education.

Goal 1: Facilitate and collaborate on PK-20 STEM education-based program, research, or evaluation grants on and off campus
The CSU STEM Center will assist and collaborate with faculty involved with STEM education-based research and programming designing and carrying out research or evaluation as appropriate. This includes, but is not limited to, contributing to the intellectual merit of STEM education-based research proposals, developing and carrying out research plans, developing research questions, mentoring undergraduate and graduate students participating in research through funded proposals, and connecting with faculty across campus to bolster STEM education-based research proposals. In the case of program evaluation, the CSU STEM Center will develop evaluation plans and serve as internal evaluator for CSU faculty and staff as funding allows. The CSU STEM Center will also serve as external evaluator for STEM-education related projects funded to other universities and off-campus organizations. If CSU faculty and staff need an external evaluator, the CSU STEM Center will make every effort to connect them with reputable outside evaluators.

Goal 2: Host a clearinghouse in the form of the CSU STEM Center website for on and off campus STEM education-based projects
The CSU STEM Center will coordinate campus-wide STEM education-related activities through a website that will house information on active projects and faculty engaged in STEM education-related projects. This includes enabling users to search using specific terms, providing information to users who may be interested in participation or collaboration, highlighting faculty engaged in STEM education-related activities for the purpose of fostering collaboration within and outside CSU, and highlighting the contributions of individual colleges to STEM education and outreach research and programming.

Goal 3: Serve as a PK-20 STEM education liaison between CSU and off-campus organizations
The CSU STEM Center will serve as an entry point for questions concerning STEM education-related initiatives and activities, prospective collaboration within and outside of the CSU, and possible participation in STEM-education related activities on campus. In addition, the CSU STEM Center will represent CSU at the local and state levels in activities concerning STEM education and outreach.

CONTRACTS AND GRANTS

The STEM Center regularly collaborates on research and evaluation projects related to STEM education and outreach. Since the founding of the STEM Center, the staff have been actively involved in developing and submitting research proposals as co-principal investigators and serving as internal and external evaluators on grant proposals. Proposals have been submitted with CSU faculty from the College of Engineering, the College of Natural Sciences, and the College of Health and Human Sciences, and we have received several evaluation subcontracts from Rutgers University through our collaboration with Dr. Leonard Albright.

The STEM Center has brought in seven evaluation contracts, which total over $200,000, for federally and state funded projects (one is still under contract negotiation and is not listed here). Funded grants and contracts allow us to supplement funding from the University and hire more students and staff.

Funded Contracts and Grants

9/2013 – 8/2015	Siudzinski, L., Wings Aerospace Science Program (W.A.S.P.), subcontract evaluation done by Albright L. & **Sample McMeeking, L.B.** ($16,200 in salary to the STEM Center).
2/2014 – 1/2017	Rocca, J. & De Miranda, M., *NSF EUV ERC RET in Engineering & Computer Science Site Program*, evaluation done by **STEM Center**, ($9,000/$318,681 total grant funding in salary to STEM Center).
6/2013 – 8/2014	Robert, F. (DIMACS) & Cozzens, M. (Rutgers University), *The challenge of interdisciplinary education: Math-Bio*, subcontract evaluation done by Albright, L. & **Sample McMeeking, L.B.**, ($15,078/$32,975 evaluation budget in salary to STEM Center).
6/2013 – 9/2014	Cozzens, M. (Rutgers University), Carpenter, T. (DIMACS), Salzman, H. (Rutgers University), & Roberts, F. (DIMACS), *Mathematical and Computational Methods for Planning a Sustainable Future*, subcontract evaluation done by Albright, L. & **Sample McMeeking, L.B.**, ($30,617/$44,423 evaluation budget in salary to STEM Center).
6/2013 – 6/2014	Cozzens, M. (Rutgers University) & Wright, R. (DIMACS) *The value of computational thinking across grade levels*, subcontract evaluation done by Albright, L. & **Sample McMeeking, L.B.**, ($16,088/$31,096 evaluation budget in salary to STEM Center).
6/2013 – 6/2016	Randall, D., Schubert, W., Moeng, C.H., Helly, J., & Denning, S. *Center for Multi-Scale Modeling of Atmospheric Processes: Education and Outreach Initiatives*, evaluation done by Albright, L. & **Sample McMeeking, L.B.**, ($51,947/$104,874 evaluation budget in salary to STEM Center).

Projects Under Review

2013   Khetani, S.R. (PI, College of Engineering) & **Sample McMeeking (Evaluator, CSU STEM Center)** *Towards a stem cell-derived 3D human liver array for high-throughput screening*, submitted to NSF CAREER, ($8,014/$405,887 to go toward the evaluation; 4/1/14 – 3/30/19).

2013   Schutt, D. (PI, College of Natural Resources) & **Sample McMeeking (Evaluator, CSU STEM Center)** *Examining North American lithospheric and asthenospheric anisotropy through complexly split shear waves*, submitted to NSF CAREER, ($32,000/$455,272 to go toward the evaluation; 6/1/14 – 6/1/19).

2013   Hoke,K. (PI, College of Natural Sciences), Lynch, K. (Co-PI) & **Sample McMeeking (Evaluator, CSU STEM Center)** *IRES: How context cues affect communication in Costa Rican frogs*, submitted to NSF IRES, ($31,762/$250,000 to go toward the evaluation; 2/1/14 – 2/1/18).

Projects Submitted but Not Funded

2013   Siudzinksi, L. (PI – Wings Over the Rockies) & **Sample McMeeking (Co-PI)** *Wings Over the Rockies Daedalus Initiative*, submitted to NSF AISL.

2012   Balgopal, M. (PI), Denning, S. (Co-PI), **Sample McMeeking, L.B. (Co-PI—content and research design expert)**, Weinberg, A. (Co-PI), Jones, B. (Co-PI), *STEMing Elementary Education: Formal and Informal Science Resources for Teaching (SEE FIRST)*, to be re-submitted to NSF DR K-12.

2012   Rambo-Hernandez, K.. (PI), Balgopal, M. (Co-PI), **Sample McMeeking, L.B. (Co-PI— content expert)**, Rogers, M. (Co-PI), *CALC-RAMS: Closing the Assessment Loop in Classrooms – Reasoning and Argumentation in Middle School Science*, submitted to NSF DR K-12.

2012   Kennedy, P.. (PI), **Sample McMeeking, L.B.** (Co-PI—research design expert), Lempuhl, D. (Co-PI), Smith, P. (Co-PI), Schulz Ela, D. (Co-PI), Colorado State University STEM Secondary and Elementary Colorado Urban and Rural Innovation in Teacher Education (STEM SECURITĒ) Partnership, submitted to NSF MSP.

2012   Gutierrez-Hartman, A. (PI), Reed, S. (PI), Albright, L. (Evaluator), & **Sample McMeeking, L.B. (Evaluator)** *University of Colorado Denver Post-Baccalaureate Research Opportunities (UCD-PROs)*, submitted to NIH.

2012   Anderson, S. (PI), Siller, T. (Co-PI), Balgopal, M. (Co-PI), Wolgemuth, J. (Co-PI), **Sample McMeeking, L.B. (Co-PI/Evaluator)** *Fostering Coherent Professional Ethical Identities through the Lends of Ethical Acculturation*, submitted to NSF EESE.

2011   Anderson, S. (PI), Swaim, R. (Co-PI), **Sample McMeeking, L.B.** (Co-I), Wolgemuth, J. (Co-I) *Investigating Models of Ethical Behavior and Ethical Acculturation to Increase Research Integrity*, submitted to NIH (R21) for $330,295 at 3 person months/year.

2011   Warnock, Andrea (PI), **Sample McMeeking, L.B.** (Lead Evaluator) *Pathways to Clean Energy Careers: A Collaborative Approach to Meeting Industry Need*, submitted to NSF for $280,926 at 1 person month/year.

2011   Prasad, A. (PI), **Sample McMeeking, L.B.** (Lead Evaluator) *CAREER: The Landscape of Differentiation: Understanding the Mesenchymal Stem Cell Response to Topography and Geometry of Their Environment*, submitted to NSF for $423,205 at 1 person month/year.

2011   Balgopal, M. (PI), Young, D. (Co-PI), **Sample McMeeking, L.B.** (Lead Evaluator) *Increasing Ecological Literacy of Elementary Students Through IPM Curricula*, submitted to EPA EEE for $99,971.

2011   Anderson, S. (PI), Siller, T. (Co-PI), Balgopal, M. (Co-PI), **Sample McMeeking, L.B.** (Co-I/Lead Evaluator), Wolgemuth, J. (Co-I/Evaluator) *Fostering Coherent Professional Ethical Identities through the Lens of Ethical Acculturation*, submitted to NSF EESE for $299,845 at 2 person months/year.

2011   Anderson, S. (PI), Swaim, R. (Co-PI), **Sample McMeeking, L.B.** (Co-I), Wolgemuth, J. (Co-I) *Investigating and Promoting Research Integrity through the Lens of Ethical Acculturation*, submitted to NIH (R21) for $292,499 at 2 person months/year.

SCHOLARLY WORK

STEM Center staff have been actively engaged in scholarly writing collaborations with faculty across the university. Last year, Dr. Sample McMeeking and colleagues published an article that came from an evaluation of an NSF-funded Math and Science Partnership. Drs. Chavez and Sample McMeeking submitted over five STEM education publications and conference proposals with colleagues from the Department of Psychology, the School of Education, the Department of Mathematics, the School of Teacher Education and Principal Preparation, the Department of Agricultural Economics, the Department of Bioagricultural Sciences & Pest Management, the Department of Ecosystem Science and Sustainability, the USDA, and Agricultural Research Services.

Related Publications

Balgopal, M.M., Klein, J.A., Morgan, J.A., Brown, C.S., Frasier, W.M., & **Sample McMeeking, L.B.** (Under Revision). Linking the science, socio-economic, and political aspects of climate change through a jigsaw learning activity. *Journal of Geoscience Education*.

Beseler, C.L. and **Chavez, E.L** (Under Review) Impact of living/learning communities on college algebra. *Educational Evaluation and Policy Analysis*.

Sample McMeeking, L.B., Orsi, R., Cobb, R.B. (2012). Effects of a Teacher Professional Development Program on the Mathematics Achievement of Middle School Students. *Journal for Research in Mathematics Education*, 43(*2*), 160-182.

Related Presentations

Sample McMeeking, L.B. & Weinberg, A. (Under Review). Participatory Action Research Experiences for Undergraduates. To be presented at the American Geophysical Union Fall Meeting, San Francisco, CA.

Weinberg, A. & **Sample McMeeking, L.B.** (Under Review). Computational thinking: A scoping review of the existing scholarship and research. To be presented at the American Educational Research Association Annual Meeting, Philadelphia, PA.

Pilgrim, Mary E., **Sample McMeeking, L,B.**, & Bloemker, J. (Under Review). The impact of an 8th grade algebra summer camp on 9th grade geometry performance. To be presented at the American Educational Research Association Annual Meeting, Philadelphia, PA.

Sample McMeeking, L,B., & Weinberg, A. (Under Review). Participatory Action Research Experiences for Undergraduates. To be presented at the American Educational Research Association Annual Meeting, Philadelphia, PA.

Balgopal, M.M., **Sample McMeeking, L,B.**, Howe, J. & Winey, T. (Under Review). Defining STEM at a STEM-centric middle school. To be presented at the National Association for Research in Science Teaching Annual Meeting, Pittsburgh, PA.

STEM Center Website

One of the three main goals of the STEM Center is to act as a clearinghouse of STEM education/outreach and STEM education research projects both on and off campus. The test bed site was recently converted to a fully released version of the site. The newly redesigned website is located at: http://stem.colostate.edu. It will also be showcased at the Association of Public and Land-grant Universities website for STEM centers across the country.

The website serves several purposes: 1) to act as a means to showcase the work of CSU faculty and staff around STEM education and outreach, 2) to enable potential program participants to find programs that suit their needs and interests, and 3) to offer information on the STEM Center and the services we provide. To do this, the homepage of the new site is set up with image boxes that link to a page for each college, other university offices, state and local initiatives, and K-12 initiatives (see Figure 1).

Figure 1. Mockup of the homepage for the new STEM Center website.

The new site also includes other information specific to the STEM Center:
- Information on how to solicit research and evaluation services from the STEM Center;
- Biographical sketches for all STEM Center staff, affiliate faculty, and advisory board members;
- Information on projects for which the STEM Center is actively involved;
- STEM education-related publications from STEM Center staff and affiliate faculty

Program information will also be searchable by several categories to allow for website users to find information on programs relevant to them.

Website Contributions

We are looking for content to go on the website. If you have a STEM education-related program or project you would like us to highlight on the website, please email the following information to stem_center@mail.colostate.edu:

- Program/Project Title
- Department/Center/etc. (if this is collaborative across groups, please list them all)
- Contact Name and Title (who someone contacts with questions)
- Contact Email Address
- Contact Phone Number
- Short description (5-6 lines of text)
- Website Link (if available)

We also showcase news items related to faculty and staff at CSU. If you have a news item you would like to see on the website, please send us a title and text for the news item. We will follow up with you for clarification or with questions.

Drs. Chavez, Kennedy, and Sample McMeeking have represented the STEM Center and Colorado State University at many state and local functions. They have also formed partnerships with local area schools, connecting school administrators to CSU faculty and staff, developing curriculum in collaboration with other CSU faculty and staff, and finding potential resources to be used in the schools. Research opportunities have also formed through these school partnerships.

STEM Education Policy

Poudre School District brainstorming session
In Spring 2013, Drs. Chavez and Sample McMeeking were invited to participate in a brainstorming session to consider the question, "What makes a STEM school a STEM school?" During the meeting, opportunities and ways for CSU to help Poudre School District were discussed. Several connections to schools in Poudre School District were made at this meeting, and many projects highlighted below were formed from these connections.

Colorado Department of Education Think Tank
At the first STEM Think Tank meeting, CSU was represented by Dr. Sample McMeeking of the STEM Center and Drs. Balgopal and De Miranda of the School of Education. The purpose of the think tank is to inform the vision for STEM education for the state department of education, to advise the department on implementation and policy issues related to STEM education, to connect STEM educators, and to document best practices for replicability of programs with promising outcomes. Going forward, the STEM Center will remain involved through working groups and regular meetings.

Association for Public and Land-grant Universities STEM Education Center Network
The APLU's STEM Education Center network, funded through the Alfred P. Sloan Foundation, is in their final year of bringing together STEM Centers around the country that are engaged with research and faculty activities around transforming undergraduate STEM teaching and learning. In September CSU's STEM Center was represented at the STEM Education Center workshop in St. Louis. About fifty STEM Center directors from across the country attended as well. Our Center is fairly unique and no two centers seemed to be exactly the same. Some were housed in individual colleges and reported to the dean. Multi-college centers generally reported to the Provost or VPR. Many of the centers deal primarily with K-12 outreach and teacher preparations. One was an independent research entity. Several large centers were quite broad in their approaches including funding for Math Science Partnerships, UTeach models, Noyce Scholars along with outreach. In the near future the CSU STEM Center will be showcased by APLU at http://serc.carleton.edu/StemEdCenters/profiles.html.

Colorado STEM Education Roadmap and Education Plan

The Colorado Legacy Foundation and the Colorado Department of Education are engaged in a three year project to improve STEM education in Colorado by developing and implementing a roadmap and action plan. Currently, the Foundation is running several working groups with Colorado teachers, university faculty, workforce representative, and others to inform the development and implementation of the Roadmap and Action Plan. Drs. Chavez and Sample McMeeking will participate in future development and implementation work through attendance at think tank meetings and commitments to participate in focus groups.

STEM Education Liaison

Roosevelt High School STEM Academy

The STEM Center has partnered with Roosevelt High School as they develop and implement a new Sustainability and Water Resources focused STEM Academy within the school. The 2013-2014 school year marks the first year of the STEM Academy, and as the first cohort of students progresses and new students are accepted into the program, the STEM Center will collaborate with CSU and Roosevelt High School faculty to develop curriculum, connect Roosevelt High School administrators and faculty to outreach opportunities on campus in which students can participate during school hours, and run a summer Algebra-focused camp to help prepare incoming freshman entering Geometry.

Fossil Ridge High School

Fossil Ridge High School STEM Academy is a project-based, externally validated 4-year course of study for high school students interested in STEM content. The STEM Academy consists of four strands: Clean Energy, Engineering, Biotechnology, and Computer Science. The STEM Center has worked with the Fossil Ridge High School STEM Academy to help facilitate interactions with the College of Engineering and relevant Science departments on the CSU campus.

Overland High School Institute of Science & Technology

CSU STEM Center staff have met with the Institute of Science & Technology housed at the Overland-Prairie Campus in Cherry Creek School District. The program offers concentrations several STEM-related areas in order to inspire students to be creative, critical thinkers and collaborative learners who will be competitive in the global STEM workforce.

Preston Middle School

Drs. Sample McMeeking and Balgopal (School of Education) are working with administrators from Preston Middle School to evaluate the summer STEM Institute. The STEM Institute is geared toward upper elementary and middle school students with an interest in STEM. The 2013 inquiry-based summer classes covered varied topics from Flight Simulator to Fashionably Mashed: The Mash-Up of STEM and Fashion. The evaluation looks at the impacts of the STEM Institute on students' awareness of future career options.

Denver Museum of Nature and Science Smithsonian Curriculum Implementation
Dr. Sample McMeeking has collaborated with several colleagues from CSU to forge a partnership with the Denver Museum of Nature and Science as they adapt and implement an effective Elementary and Middle School curriculum within Colorado.

Collaborative Research with Schools

What does STEM mean in a school community?
Drs. Balgopal (School of Education) and Sample McMeeking are collaborating with two Poudre School District schools who have become STEM-centric to evaluate the perceptions of administrators', teachers', and students' perceptions on what STEM means and how it impacts their lives.

Mobile Technologies in Classrooms and the Impact on 21st Century Skill Learning
Drs. Pilgrim (Department of Mathematics) and Sample McMeeking are working with Roosevelt High School to investigate the impact of their 1:1 iPad initiative to be rolled out during the 2014-2015 school year through two separate studies: the impact of whole school iPad classroom integration on students' 21st Century Skills and the impact of a mathematics app on students math and science content knowledge in an interdisciplinary class. Drs. Pilgrim and Sample McMeeking are also exploring the impact of a summer algebra-focused camp on rising 9th graders content knowledge related to geometrical concepts.

Using Graphic Organizers to Impact Student Learning
Dr. Sample McMeeking is collaborating with Dr. Balgopal (School of Education) to test the use of graphic organizers in Middle School science classrooms. Dr. Balgopal has previously tested graphic organizers at various grade levels, and Dr. Sample McMeeking is assisting in the design of a scale-up study in partnership with Conrad Ball Middle School in Thompson School District.

RESEARCH AND EVALUATION

STEM Center Evaluation Services

The CSU STEM Center staff develop and implement evaluations tailored to meet your specific needs at any project stage. Different roles we may take on include the following or any combination of the following:

- Front-End Evaluation: Gauge the interests and preferences of possible participants or identify potential barriers to address during project development
- Logic Model Development: Create a visual model of a program's goals, components, and related outcomes
- Formative Evaluation: Provide feedback about an intervention as it is being developed or implemented
- Process Evaluation: Give oversight concerning processes and structure in complex projects
- Summative Evaluation: Assess the impact of an intervention at the end of a project or near the end of a project.

STEM Center evaluations include the use of both rich, qualitative method (such as descriptions of program activities) and varied quantitative methods as appropriate to each project. If program impact is to be assessed, we also develop and implement experimental and quasi-experimental evaluation designs. Examples of data that may be collected during the course of an evaluation include observations, individual and group interviews, surveys, logs and journals, artifacts, and tests/assessments. Our evaluations are developed using current evaluation frameworks documented in the evaluation literature.

CSU STEM evaluators have experience in both science research and STEM education, allowing us to serve as advisors on project development while maintaining enough distance to provide objective feedback within the evaluations themselves. Part of this process includes listening to your needs, offering alternative perspectives, directing you toward key literature, and encouraging a collaborative relationship.

STEM Center Research Services

STEM Center staff also serve as principle investigator and co-principle investigator where the content of the projects are related to the expertise of particular staff members. In such cases, the process of defining roles, developing the proposal, and negotiating budget are the same as any collaboration between faculty and staff on CSU campus. In addition, in some cases, evaluation plans may closely resemble research plans based on the needs of the project and requirements of the funding agency. We often refer to these types of projects as research/evaluation, as the work is informing both the project and the overall literature in the field.

Choosing the STEM Center as Evaluators

The following frequently asked questions are meant to help guide you as you determine if the STEM Center is right for serving as evaluator on research projects. The questions explain how to get started with us and what we need in order to develop the best evaluation. For other questions regarding research collaboration or evaluation services, please call Dr. Sample McMeeking at (970) 491-3179 or email stem_center@mail.colostate.edu.

How do I get started?

Send an email to stem_center@mail.colostate.edu describing your project and providing contact information for us to reach you. If available, you should also attach pertinent documents such as a Letter of Intent or project summary. We will then contact you to set up a meeting or phone call to discuss your project and needs in more detail. The discussion we have will inform us and you on the appropriateness of our role as evaluator on your project.

What will you want to know when we talk?

In addition to the background information on your project, we will ask you questions such as the following to better understand your needs:

- What are the intended goals and outcomes of the project?
- What do you want to learn about the project?
- Do you have an evaluation role in mind for the STEM Center? If so, what is it?
- What's the timeline for the project and when would the STEM Center be involved?
- If submitting a proposal, what is the timeline for proposal submission?
- Have you already budgeted for the evaluation? If so, what did you budget?

If you don't have answers to all these questions, don't worry! Given enough lead time, we can help you flesh out the different aspects of your program that will enable you to answer these questions.

How much should I budget for evaluation? What does that cover?

Guidelines for evaluation budgets vary by funding agency and other factors. While there are general guidelines for evaluation budgets (about 10-15% of the overall budget), ultimately the cost for individual evaluations will depend on the nature and scope of the work proposed in the evaluation plan. Some examples are below:

- Process evaluations and more advisory roles that do not entail as much data collection and analysis as other types of evaluations may cost less than 10% of the total budget.
- Summative evaluation assessing project impact involves work throughout the life of the project to develop and pilot methods and measures, in addition to the works at the end of the project to address the evaluation goals. This may cost 10-15% of the total project budget.
- Evaluation research, where program impact is one of the primary goals, may cost half or more of the overall budget.

These are just examples of possible evaluation costs. Ultimately evaluation cost will be affected by the design of the overall evaluation, including: numbers of participants, types of data and analyses, extent of measure and instrument development required, amount of travel, and other factors. These all affect the amount of time and resources used by evaluators to complete the evaluation.

Other costs to consider for the evaluation budget are costs for travel and stipends for *evaluation participants* who will most likely be a subset of program participants engaging in extra evaluation activities as appropriate. You should also include our own indirect overhead costs if your funding agency allows for the collection of indirect costs. We will work with you to develop a scope for our evaluation work that matches your needs and budget and aligns with the overall scope of the project. Generally, we will **not** charge you for the cost of our time in developing the proposal with you.

How long will it take to develop an evaluation plan?

The time it takes us to develop and evaluation plan for you may be different for each project as it depends on your project and the role of the evaluator in developing your research and/or evaluation plan. Generally, we ask that you contact us as soon as you have a project conceptualized and know you will need evaluation work done. However, because the timeline for evaluation plan development is so situational, some examples are provided below:

If you have already clearly defined your project and the role you have in mind for the evaluator, it may take as little as two weeks to develop an evaluation plan after the initial discussion (although we prefer a longer lead time if possible)

After reading through the project description and implementation plan, we may find areas that are less clear than originally thought. We may also find aspects of the plan that would be difficult, unethical, or expensive to carry out during an evaluation. In such cases, we would suggest changes project for the sake of clarity and feasibility. This process would likely take a few weeks in addition to the example above of collaborative discussion.

If you would like the CSU STEM Center to collaborate on the development and implementation of a *research* plan, we usually recommend contacting us before drafting the proposal, as we would play an integral role in development of the proposal and would likely be involved in the project as a Co-PI rather than an evaluator. This might begin a few months or more before the proposal is due, depending on the project's complexity.

Are there specific documents I will need from the CSU STEM Center?

Specific documents needed for proposal submission or for currently funded projects vary by funding organization. We will provide you with any support documents required in your particular situation in addition to the evaluation plan narrative, any tables or figures relevant to the evaluation, and citations used in the evaluation. Examples of documents we have provided on past projects are presented below:

- Biographical sketches for pertinent CSU STEM Center staff (formatted for individual agencies)
- Statements of organizational capacity
- Letters of support or commitment
- Curriculum vitae for pertinent CSU STEM Center staff
- Current and pending support statements for pertinent CSU STEM Center staff
- Budgets and/or budget justifications for evaluation work