CENTER FOR STEM LEARNING
2017 ANNUAL REPORT

Contents

Center for STEM Learning
UNIVERSITY OF COLORADO **BOULDER**

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MISSION

The mission of the Center for STEM Learning (CSL) is to improve science, technology, engineering, and mathematics (STEM) education at the University of Colorado Boulder, and to serve as a state, national, and international resource for such efforts.

VISION

The vision of the Center for STEM Learning is to maintain an infrastructure of institutional support in order to transform STEM education, support education research within and across STEM fields and departments, and promote K20 faculty recruitment, preparation, and professional development. The Center seeks to facilitate change in STEM education by integrating an interdisciplinary community of scholars, promoting, sustaining, and evaluating existing reform efforts, sponsoring new programs, advocating for diversity and access, influencing relevant policy, fundraising, and communicating with the public.

VALUE PROPOSITION

The Center for STEM Learning serves as a unique and innovative approach to address the Chancellor's priorities for campus: reputation, retention, and new models for revenue.

The Center for STEM Learning:

- Connects national groups, networks and resources focused on improving STEM education with CU Boulder – CSL connects CU Boulder to a variety of national programs and brings resources to CU-Boulder to help transform faculty practice and programmatic activity
- Supports campus infrastructure and builds capacity for STEM education – CSL supports campus infrastructure for advancing capacity and effectiveness in STEM education. CSL staff advise OIT staff on areas of focus, including the development of analytic tools (e.g., those from the Bay View Alliance) for making evidence based decisions, and importing new tools for faculty practice (e.g., *nota bene*, a web-based collaborative annotation tool from the Massachusetts Institute of Technology, and *Calibrated Peer Review*, a web-based writing and peer-review tool from the University of California, Los Angeles). CSL staff are also advising and supporting campus commissions to advance the institution. Key committees include the Provost's Taskforce on Persistence (increasing retention) and the campus and system wide taskforces in technology use (e.g., online, distance education, and MOOCs)

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- Promotes STEM education research as a central tool in improving the quality, efficacy, and inclusiveness of STEM education – CSL fosters collaboration between researchers across campus, and conducts research that creates new materials, resources, and models for STEM education, directed at improving student learning and access to STEM.

CSL ORGANIZATIONAL STRUCTURE

Currently, CSL operates without the benefit of a dedicated executive director. In practice, the Center for STEM Learning operates through the Project Management Team, comprised of Drs. Valerie Otero and Noah Finkelstein, co-directors of CSL, Anne-Barrie Hunter, CSL Program Development and Outreach and Evaluation Specialist, and William Tarantino, CSL Business and Program Manager. The Project Management Team meets biweekly, as possible; and once per month at least. Robbie Martinez and Michael Cramer assist Tarantino in office administration.

The Fellows of the Center for STEM Learning meet biannually to review CSL programs, activities and financial reports and provide feedback. As necessary, Fellows also collaborate in working groups to advance CSL's work.

An executive board is comprised of the CU-Boulder chancellor, provost, and vice chancellor of strategic relations, and deans of the Graduate School, the School of Education, the College of Arts and Sciences, and the College of Engineering and Applied Sciences, or their appointees will sit on the executive board. The executive board will serve as the primary policy-making body of the center. The executive board meets annually; however, a meeting was not yet been held.

An external advisory board to oversee CSL programs and support development is in the process of being put together based on Fellow recommendations.

PROGRAMS

This section of the annual report presents programming supported by and running through the Center for STEM Learning and lists all of the events (workshops, colloquia, symposia, etc.) that CSL sponsored in the past year.

The Center for STEM Learning (CSL) sponsors three different types of programming:

I. Programs associated with campus funding (i.e., the Annual Fall CSL Symposium, faculty and graduate student *Chancellor's Awards for Educational Excellence,* Community College Summit, one-on-one consultations and professional development workshops)

II. Programs funded by external grants. CSL houses two kinds of external grants:

   A. Conducting original STEM and discipline-based education research (i.e., *Talking about Leaving* Revisited*,* SITAR, TRESTLE)

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B. Initiatives to improve STEM education access at CU (i.e., NSF Creating Academic Pathways in STEM (CAPS) INCLUDES initiative, Research Experiences for Community College Faculty)

III. Programming associated with extramural efforts (i.e., APLU, AAU, Bay View Alliance, AAC&U)

The types of programming supported by the Center for STEM Learning are reported below.

I. CAMPUS-SUPPORTED PROGRAMS

Funding for campus-supported programs comes from the Provost's Office and the Graduate School—the majority of which goes toward the faculty and graduate student Chancellor's Awards for Excellence in STEM Education and the annual CSL Fall Symposium, where Chancellor's Awardees are celebrated. Programs supported by campus funding, also include one-on-one consultations with STEM faculty, professional development workshops and STEM community seminars.

- ***Annual Center for STEM Learning Symposium on STEM Education:*** This event is held at the end of September every year and celebrates CU Boulder's internationally recognized STEM education initiatives. On October 9, 2017, CSL Celebrated the 9th annual symposium. The event highlights ground-breaking STEM education projects on campus, engages campus STEM education scholars, and brings together key CU-Boulder stakeholders to transform STEM education.

  Keynote Speakers:
  - 2017 - Joe Garcia, Director, WICHE; former Lieutenant Governor of Colorado
  - Presented by Joe Neguse, CU Alumni, School of Law, former CU Regent, current candidate for Colorado State Representative,

2017 Annual Center for STEM Learning Symposium on STEM Education Attendee Breakout.

Year	*Under-grad.*	*Grad.*	*Post doc*	*Fac.*	*Inst./ Lecturer*	*Research*	*Staff*	*Admin*	*K-12/ HS/ 2YC*	*Other Guests*	*Totals*
2017	9	19	5	32	16	27	43	7	44	37	**239**

- **Chancellor's Awards -** The Chancellor's Awards for Excellence in STEM Education (CA) is a competitive grant program offered through CSL and represents the Center's main programmatic initiative. The goal of the CA program is to support faculty and graduate student engagement in innovative research on student learning and implementation of research-based STEM education program initiatives.

  In 2017, CSL granted eight Chancellor's Awards to 19 faculty members across several STEM departments (MCDB, GEOSCI, EBIO, CE, ECEE, CBE), the School of Education

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and CIRES. Four Chancellor's Awards were granted to four graduate students (EBIO APS, the School of Education and ATLAS).

Between 2009 and 2017, CSL has funded a total of 80 Chancellor's Awards: 46 to a total of 77 faculty members (there are multiple investigators on several faculty Chancellor's Award proposals: six faculty members, two SASC academic coordinators, two instructors and two researchers each received funding twice). Forty-three awards have been granted to a total of 34 graduate students (one proposal had multiple investigators and seven graduate students have received funding twice).

A study of outcomes resulting from Chancellor's Awards conducted by CSL shows that the Chancellor's Awards program has contributed strongly to:

- course and laboratory development and transformation—focused on student-centered and active teaching and learning pedagogies, largely at the undergraduate level
- A high return on investment—faculty members reported receiving subsequent funding totaling over $60 million to continue their research
- high success in publishing peer-reviewed articles and disseminating results at professional conferences nationally and internationally
- curricula and instruments being used at other institutions across the U.S.
- multiple personal and professional benefits—the opportunity to explore a new field of interest, engage in science education research, and for graduate students, financial assistance to pursue or complete a Ph.D.

In sum, the CA program has been highly successful in meeting its objective to support faculty and graduate student engagement in innovative research on student learning and implementation of research-based STEM education program initiatives.

2017 Faculty and Graduate Student Chancellor's Awards for Excellence in STEM Education Grantee Breakout.

Year	*Tenure Track/ Researchers**	*Post-doc/ Instructors/Staff**	*Graduate Student*	*Total Individuals*
2017	3 GEOSCI 2 CIVIL ENG 1 MCDB 1 ECEG 1 CBE 1 CIRES 1 CARTSS 1 EBIO 1 EDUC	1 MCDB 1 ECEG 1 CBE 1 EDUC	1 EBIO 1 ATLAS 1 APS 1 EDUC	**23**

*Some tenure track, instructors and graduate students are awardees of more than one CA.

- **Fellows' Meetings –** CU faculty and research faculty who serve as Fellows to CSL meet quarterly to review CSL's activities and provide input and feedback on CSL activities.

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There are currently 37 Fellows representing the range of STEM departments, including APS, CHEM, EBIO, GEOSCI, PHYS, MATH, MCDB, as well as several engineering departments, the School of Education, CSL, ATLAS and NCWIT; ~25-30 Fellows attend each meeting.

Fellows' meetings were held:
- May 3, 2017 and
- September 25, 2017.

Meeting agendas and minutes of Fellows' Meetings held are posted for review and commentary on the CSL Fellows' website.

- **Weekly Discipline-Based Education Research (DBER) Seminar Series** - The Discipline-Based Education Research (DBER) seminar is a multi-disciplinary weekly series that emphasizes discipline-based STEM education research. It is a forum for faculty, staff, researchers, postdoctoral and graduate students and undergraduates interested in education research and course transformation to share their research and ideas and to get feedback on their work. ~20-30 STEM faculty, graduate and post-doctoral students attend weekly.

2017 Spring DBER Schedule

Jan 18	**Valerie Otero, Ian Her Many Horses, Laurie Langdon** (International Learning Assistant Alliance)	
	"Pre/Post Assessment Made Easy"	Abstract
Feb 1	**Jenny Knight** (MCDB)	
	"Student reasoning and problem solving in genetics."	Abstract
Feb 8	**Bilge Birsoy** (MCDB), **Mike Klymkowsky** (MCDB)	
	"Development of a Scientific and Experimental Literacy Assessment (SELA) Instrument" Download PDF	Abstract
Feb 15	**Mark Werner** (ASSETT), **Sarah Wise** (EBIO), **Andy Martin** (EBIO)	
	"Shine Like an OPLE and be COPUS-etic with ASSETT's VIP Service"	Abstract
Feb 22	**Rebecca Machen** (Program Coordinator, SASC)	
	"An Intervention for a High-Risk Course"	Abstract
Mar 1	**Stephanie Chasteen** (Physics), **Mark Connoly** (Wisconsin Center for Education Research)	

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	"Theory of Change: Being explicit about our change processes in STEM education to build better interventions" Download PDF Theories of Change - Online PDF	Abstract
Mar 8	**Andrew Shtulman**, (Cognitive Science and Psychology at Occidental College), and **Erin Furtak** (School of Education, C&I: Math & Science Education).	
	"The Conceptual and Epistemic Obstacles to Understanding Science."	Abstract
Mar 15	**DBER Group at large**	
	"Student assessment of teaching: Part 2"	Abstract
Mar 22	**Rachael Deagman** (English)	
	"Shakespeare CoLab"	Abstract
Mar 29	**Spring Break, No DBER**	
Apr 5	**Jennifer Stempien** (Geology)	
	"Creating a collaborative undergraduate geoscience research community"	Abstract
Apr 12	**Lisa Corwin** (EBIO)	
	"Discussion of disciplinary differences in Course Based Undergraduate Research Experiences."	Abstract
Apr 26	**Andrew Martin** (EBIO)	
	"Quantifying learning gains for collaboration"	Abstract
May 3	**Cheryl Pinzone** (Ecology & Evolutionary Biology and Continuing Education)	
	"Modes of Thinking: Getting Students to Think About Their Thinking in the Context of a Controversial Topic"	Abstract

- **STEMinar** - The STEMinar is a graduate student organization at CU Boulder which seeks to promote interdisciplinary interaction among graduate students in STEM departments. The STEMinar hosts bi-weekly seminars given by graduate students about their research. Additionally, the STEMinar publishes a bi--annual journal featuring submissions from STEMinar participants, and gives out a number of research grants each year to support graduate students.

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In 2017, STEMinar's mailing list shows 328 subscribers, the large majority of which are graduate students. STEMinar is run by 3 staff, 2 postdocs, and 2 community members, reaching 12 STEM departments, including:

- Aerospace Engineering
- Chemistry
- Chemical and Biological Engineering
- Civil Engineering
- Computer Science
- Ecology and Evolutionary Biology
- Geological Sciences
- Integrated Physiology
- Mathematics
- Physics
- Psychology

2017 STEMinar Event Attendee Breakout.

Event	*Under grad*	*Grad*	*Post-doc*	*Faculty*	*Staff*	*Community*	*Total*
Rapid Fire STEMinars	-	28	-	-	1		**29**
Euler & Linguistics: Research in the Social Sciences	-	29	1	-		1	**31**
How to Make and Control Nature's Most Exotic Light Source	-	13	1	-		1	**15**
Proof of Censorship	-	15	1	1		1	**18**
The Futurama Theorem	-	16	1	-	-	-	**17**
Building Homes for Cells	1	9	1	-	-	1	**12**
Totals	**1**	**110**	**5**	**1**	**1**	**4**	***122***

II. EXTERNALLY-FUNDED GRANT-SUPPORTED PROGRAMS

Type II programs are funded by external agencies, providing IDC support to CU, CSL and collaborating departments, institutes, and colleges. Note that Otero's 15M+ in STEM education

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grants have not run through CSL due to constraints by the School of Education, however, external grants have supported much of her work with CSL.

A. Original STEM and Discipline-Based Education Research

- **TRESTLE** (2015-2020) - TRESTLE is a multi-university project aimed at implementing and studying a model of STEM education reform, with the ultimate goal of achieving widespread adoption of empirically-validated instructional methods, and thus improving learning and educational outcomes for both STEM students and non-STEM students. PI: Stephanie Chasteen; *Grant amount: $258,134.*

So far, TRESTLE held two events on campus to disseminate preliminary project results. One event was held in 2016, and the second event was held in 2017.

January 2017 CU TRESTLE (On-campus Program Only) Annual Meeting Attendee Breakout

Faculty	*Instructor/Lecturer*	*Staff*	*Admin.*	*Total*
15	8	6	2	**31**

- **Talking about Leaving Revisited** (2012-2018) **-** The 1997 book *Talking about Leaving: Why Undergraduates Leave the Sciences* identified numerous factors that affect STEM persistence. Although there have been widespread efforts over the past 15 years to address these factors, we don't really know if these efforts have had any impact on students' experiences and whether these experiences, in turn, have influenced student persistence in STEM fields. This study explores current factors affecting students' decisions to stay in or leave their STEM majors. PI Anne-Barrie Hunter; *Grant Amount: $2,389,935.*

- **The STEM Institutional Transformation Action Research (SITAR) Project** (2016-2020) (also referred to as the DAT initiative) - The STEM Institutional Transformation Action Research (SITAR) Project, housed in the Center for STEM Learning, aims to improve undergraduate STEM education by professionalizing educational practice through measurement, assessment, and cultural change. We focus on department-wide change to achieve more coherent, long lasting reforms. PI Noah Finkelstein, Co-PIs: Melissa Dancy, Daniel Reinholz, Stanley Deetz and Joel Corbo; *Grant amount: $398,946.*

2017 SITAR Participant Breakout.

Year	*Undergrad.*	*Grad.*	*Post doc. /Instructor*	*Faculty*	*Staff*	*Total*

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2017	-	1	-	9		**10**

- **Partnerships for Informal Science Education in the Community (PISEC)** (2014 - 2018) - PISEC is jointly sponsored by CSL and the JILA Physics Frontier Center, and is engaged in ongoing partnerships with local primary education sites to provide afterschool opportunities for students, especially under-represented minority (URM) students, to explore and develop excitement for science. Typically, PISEC will partner with 3-5 sites per semester and maintain weekly hour-long afterschool sessions where students, facilitated by volunteers from CU Boulder—typically graduate or undergrad students—explore hands-on science activities while practicing scientific skills, such as hypothesis-building, experimentation, scientific writing, reflection, etc. PISEC sites typically run for 8-10 weeks throughout the semester and culminate in a field trip where students visit CU, tour labs of their mentors, and participate in fun experiments. Since, 2015, PISEC has partnered with six different primary sites, implementing its weekly afterschool program at each. In spring 2017, PISEC began partnering with high school sites as well, and has implemented a high school program at two sites since then. PISEC has also hosted approximately five visits to the JILA PFC. PI: Noah Finkelstein, Co-PI Katie Hinko; *Grant amount: $3,400.*

2015-2017 PISEC Participant Breakout.

Undergraduate/Graduate Students	*Post doc*	*Faculty/Staff*	*Total*
130	1	6	**137**

PISEC only started recording student demographic data this semester, but approximately 90% of PISEC volunteers were graduate students this semester and participation is similar for previous semesters.

- **NSF/Twin Cities – Latina SciGirls** (2016 - 2018) - Latina SciGirls is developing a Spanish-language series of half-hour television episodes showing groups of girls and their Latina STEM mentors investigating culturally-relevant science and engineering problems of interest to Hispanic communities across the U.S. The project is also creating a series of family and girl-friendly online video profiles of Latina STEM professionals showing the daily life of a female scientist or engineer, and will provide opportunities to connect girls and their families with in-person Latina role models via community outreach in diverse Hispanic communities across the country. PI: Brad McLain; *Grant amount: $120,234.*

2016-2017 Latina SciGirls Participant Breakout.

Year	*Students*	*Faculty*	*Staff*	*Contractors*

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2017	161	2	3	2

- **SciGirls** (2015 - 2018) - This three-year professional development initiative is designed to help career and technical education (CTE) educators and guidance counselors recruit and retain more girls in science, technology, engineering and math (STEM) pathways, specifically in technology and engineering. PI: Brad McLain; *Grant amount: $242,045.*

2015-2017 SciGirls Participant Breakout.

Year	*Students*	*Faculty*	*Staff*	*Contractors*
2017	361	2	3	1

- **Bayer International Science Teens Annual Summer Camp** (Annually) - This innovative program has been designed for a small, select group of U.S. and international students from 12 countries who join together for hands-on, field-based experiences on human anatomy and physiology led by Dr. Brad McLain, XSci educators, and Anatomy in Clay creator Jon Zahourek. ANATOMY IN CLAY® models have been used in over 6,000 high schools, colleges, veterinary schools, and bodywork training programs. Camp attendees stay on the campus at the University of Colorado, Denver, for one week and on-site in a national park in Leadville, Colo., for the second week. PI: Brad McLain; *Funding amount: ~$130,000 annually from the Bayer foundation.*

2015-2017Bayer International Science Teen Camp Participant Breakout.

Year	*Students*	*Faculty*	*Staff*	*Contractors*
2017	35	2	3	7

- **The Access Network** (2015 - 2018) - The Access Network consists of six university-based programs co-working with graduate and undergraduate students across the country towards a vision of a more diverse, equitable, inclusive, and accessible STEM community. To realize this vision, Access and its member programs empower students as co-leaders, giving them voice and ownership over local and national efforts. Access sites focus on fostering supportive learning communities, engaging students in authentic science practices, and attending to students' development as STEM professionals. PI: Joel Corbo, Co-PI: Daniel Reinholz; *Grant amount: $23,179.*

- **Creating and Studying a National Network of Centers of STEM Education** (2015-2020) - The University of Colorado Boulder is one of the lead public campuses partnering with the Association of Public and Land-grant Universities to create a national network of about 200 campus STEM education centers. The network will provide programming and resources for established and new STEM centers including

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conferences, learning communities, an online engagement platform, toolkits of resources for centers and directory of centers for the community and external stakeholders. CU leads in the development and study of this network. PI: Noah Finkelstein; *Grant amount: $217,133.*

- **Photo Origami** (2014-2017) - This project was part of a $2 million, 4-year NSF EFRI grant. While its primary focus was the development of a light-activated photo polymer, it also included a rich outreach plan including a public education installation, working with an artist, and increasing opportunities for populations underrepresented in STEM. Geometry Point (below) is the outcome of our public installation based on mathematics, with a focus on how geometrical shapes "fold," hence the key component of Photo Origami. Project activities were conducted in collaboration with CU Science Discovery, including the Summer Mentorship program (which brought in $300,000 additional grant money), summer camps, and outreach programs to over 10,000 teachers. As a result of the Photo Origami grant, Geometry Point Park was designed and constructed. Raising community awareness of STEM with the city of Lafayette, Beth Stade managed an artful and mathematically rich project for the Center for STEM Learning in partnership with CU Outreach and Engagement, and the CU School of Engineering. Built by over 100 students, faculty, and community members, Geometry Point, aims to increase public awareness of science, technology, engineering and mathematics (STEM) in a playful and accessible way. *Grant amount: $472,737.*

Photo Origami Education Outreach Activities and Locations.

# and Type of Activity	***Location***
13 STEM Workshops	Littleton, Northglenn. Boulder, Longmont. Sterling, Granby, Steamboat Springs, Craig, Glenwood Springs, Salida
10 teacher Professional Development Workshops	Boulder, Denver, Naturita CO, Syracuse NY, San Diego CA
9 Classroom Presentations	Boulder and Broomfield
4 3D Printer Loan Program	Grand Junction, Denver, Northglenn
3 Photo Origami TARP Opportunities	Akron, Granby and Denver CO
3 Informal Science Education Programs	Boulder
1 Photo Origami REM Program	Boulder
43 Events Total	

Reach of Geometry Point:

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- 4 undergraduate courses participated in design: 2 classes of mathematics from the Visual Arts and 2 Design Studies from ENVD - 85 students total, and Marcell Delange, Faculty.
- About 100 attended the Geometry Point park opening, including local community, faculty from math, the school of education and engineering. Also, local teachers and administrators from BVSD, and local architects and business people from Boulder and Lafayette.
- 5 years of summer camps with Science Discovery with "Bounce and Tangle," reaching ~200 low income kids.
- REM brought to campus 28 local high school students to do mentoring programs with 12 graduate students over 4 years, and also provided activities and programming for additional summer camps.
- The app Photo Origami funded, "Make A Ten" (as part of Geometry point) with PhET has been used over 48,000 times.

Unsolicited note from Beth Stade, PI, Photo Origami and Geometry Point: "These projects demonstrate the importance of the Center for STEM Learning. When the original grant was awarded, my portion of the grant for the outreach activities was set up to run through mathematics, but given the complexities of working with teachers, students, and local government, the math department could not provide the support I needed. I brought the grant to CSL where the team assisted me in taking our program from one graduate student taking a 3D printer to middle schools to the ultimately national reach of the Photo Origami workshops, as well providing crucial support to create the park with the City of Lafayette. None of this could have happened without the support of CSL. The center's understanding of the broad possibilities for the University's outreach potential means that our grant leaves a legacy of the ongoing Geometry Point math park (with apps, teacher activities, and local support and involvement), curriculum and workshop materials, as well as ongoing summer camps with Science Discovery."

- **STROBE: Science and Technology Center on Real-time Functional Imaging** (6/1/2016-8/31/2021) - The mission of STROBE is to create powerful and broadly-applicable real-time nano-to-atomic scale imaging modalities to advance imaging science and increase access, that can be used to address grand challenges in science and technology, while building a diverse STEM workforce. The education and broader participation aspects of STROBE are managed by CSL, ~$1,000,00. PI: Margaret Murnane; Grant amount: NSF IIA – Sci & Tech Centers STC $24,000,000

B. Initiatives to Improve STEM Education Access at CU

The Center for STEM Learning, the Office of Diversity, Equity, and Community Engagement (ODECE) and Center for Applied and Engineering Sciences (CAES) have partnered together to write grants to support initiatives designed to broaden access and diversity in STEM at CU Boulder.

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- **NSF INCLUDES Creating Academic Pathways in STEM (CAPS) initiative** (2017-2018) - The CAPS project seeks to create a cooperative and transformational infrastructure that streamlines STEM pathways for diverse students transferring from five Denver-metro 2-year colleges (2YCs) to 4-year colleges (4YCs) in the state of Colorado. By developing a student-centered infrastructure focused on lowering and eliminating barriers that inhibit 2YC student transfer to 4Y institutions, this initiative intends to increase the number of talented 2YC students interested in pursuing a STEM baccalaureate to successfully transfer and graduate, ultimately advancing the technical capacity of Colorado and our nation's workforce. PI: Sarah Miller (BOLD Center); Co-PIs: Noah Finkelstein, Anne-Barrie Hunter, Sean Shaheen. *Grant amount:* $265,560.

CAPS has sponsored two "town hall" meetings to garner and assess stakeholders' interest in the INCLUDES initiative, and two larger events, bringing together 2Y and 4Y college stakeholders to address issues hindering transfer between 2YCs and CU. The first event was held October 11, 2016. The second event was held April 7, 2017.

April 7, 2017 Town Hall INCLUDES Meeting Attendee Breakout.

#	***Role***	***School/College/Organization***
9	Faculty	5 CAES
		2 A&S
		1 EDUC
		1 2YC
7	Staff	2 A&S
		2 CAES
		1 CSL
		1 ODECE
		1 National lab
6	Administrators	2 A&S
		1 CAES
		1 CCCS
		1 K-12
		1 National Lab
2	Researchers	1 A&S
		1 CIRES
1	Instructor	1 A&S
28	**Total**	

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February 9, 2017 CAPS Two-Year College Summit Attendee Breakout.

#	*School/College/Center/Organization*
19	Front Range Community College
13	Community College of Aurora
7	Community College of Denver
6	Red Rocks Community College
6	Arapahoe Community College
2	Colorado School of Mines
1	Ohlone College
1	Pikes Peak Community College
1	CU Anschutz Medical Campus
60	CU Boulder:
	• Academic Advising Center
	• Academic Success & Achievement Program
	• Aerospace Engineering Sciences
	• ATLAS
	• Center for STEM Learning
	• CIRES
	• College of Arts and Sciences
	• College of Engineering & Applied Science
	• ODECE
	• Continuing Education
	• Ecology & Evolutionary Biology
	• Electrical, Computer and Energy Engineering
	• Engineering Plus
	• Environmental Engineering
	• Ethnography & Evaluation Research
	• Graduate Teacher Program
	• Minority Arts & Sciences Program
	• NCWIT
	• New Student & Family Programs
	• Office of Admissions
	• Office of Financial Aid
	• Office of the Registrar
	• PhET Interactive Simulations
	• Physics Department
	• School of Education
	• Space Grant College
	• BOLD Center
	• Office of the President
	• Communications Specialist
116	**Total**

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In addition to the "town hall" meetings, INCLUDES also held a summit for advisors from 2Y and CU to meet and begin to discuss and address issues affecting 2YC transfer students.

April 28, 2017 Two-year and Four-year College Advisors' Summit Attendee Breakout.

#	*Role*	*Institution*
15	Advisors and junior level administrators	CU Boulder
12	Advisors and junior level administrators	Arapahoe Community College Aurora Community College Community College of Denver Front Range Community College Red Rocks Community College
2	Advisors	Colorado School of Mines
29	**Total**	

- **NSF Research Experiences for Community College Teachers** (2018 – 2021) - This proposal was submitted in October to build upon the NSF INCLUDES initiative to lower the barriers to 2YC transfer to CU Boulder. If awarded, it will support 2YC faculty to come to CU Boulder for eight weeks over the summer to engage in authentic research. CU graduate students and post-docs will work one-on-one with faculty to translate 2YC faculty members' research into modules to be implemented in their classrooms. *Grant amount:* $599,630. Awards should be announced in April.

- **Student support for joining the AAAS "Catalyzing Advocacy in Science and Engineering"** annual workshop. The competition is open to any full-time CU Boulder graduate student or upper-class undergraduate in appropriate STEM fields. From 2013-2017, CSL has partnered with the Graduate School to support the CIRES Center for Science and Technology Policy Research which hosts this initiative. 2-4 graduate students are sent each year.

III. EXTRAMURAL EFFORTS

Type III programming running through CSL connects CU Boulder with prominent, prestigious national policy organizations focused on institutions of higher education and improving college-level teaching in STEM disciplines.

- **APLU**
  - ***Science and Mathematics Teaching Imperative*** - In 2008, APLU launched the Science and Mathematics Teaching Imperative (SMTI) in response to the National Academies' recommendation in *Rising Above the Gathering Storm* (2006) to prepare 10,000 new science and mathematics teachers each year. To

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join SMTI, the president of each higher education institution and system made a commitment to increase the quantity and quality and improve the diversity of secondary science and mathematics teachers prepared on their campus.

- ***Network of STEM Education Centers (NSEC)*** - Addressing calls from the White House and National Academies for multi-institutional approaches to transform undergraduate STEM education, we are building a national network of STEM Education Centers. These centers serve as the campus hub for improving the STEM learning experience for students, broadening participation in STEM, understanding teaching and learning, broadening the impact of campus research, and supporting national and regional scale improvement in STEM education.

- **AAU**
  - The Association of American Universities (AAU) is engaged in an initiative to improve the quality of undergraduate teaching and learning in science, technology, engineering, and mathematics (STEM) fields at its member institutions. It is an initiative based on overwhelming existing research to influence the culture of STEM departments at AAU universities so that faculty members are encouraged to use teaching practices proven to be effective in engaging students in STEM education and in helping students learn, particularly at the first-year and sophomore levels. In partnership with member universities, AAU works to understand the wider setting in which educational innovations take place — the department, the college, the university and the national level – and address the key institutional elements necessary for sustained improvement to undergraduate STEM education. AAU is committed to addressing the institutional and cultural barriers to reforming undergraduate STEM teaching and learning at research universities.

    The AAU Undergraduate STEM Education Initiative project at University of Colorado Boulder targets changes in both culture and structures to foster coherent, long-lasting reforms. The project uses a three-layer approach that focuses on faculty practices, departmental culture, and administrative support/policies.

- **Bay View Alliance (BVA)** - The Bay View Alliance is an international network of research universities exploring strategies for cultural change to support and sustain the widespread adoption of instructional methods that lead to better student learning. Outcomes from participation in the Bayview Alliance include:
  - Participation in RAC 1 Collaborative Transformation of Entry-Level Courses has examined course transformation programs as catalysts for change in faculty teaching practices and culture. The aim of this work is to learn how course transformation initiatives can advance the larger BVA goal of increasing faculty adoption and adaptation of evidence-based teaching methods supporting effective student learning. The TRESTLE grant award is a direct outcome of engagement with the Bayview Alliance.

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- Participation in Learning Analytics RAC 3: Big data analytics and institutional research software development: DASEE; Development of a course observation tool: OPLE and now the VIP service running in ASSETT.
- Participation in RAC 4 (Transforming the Evaluation of Teaching) has explored the process of transforming approaches to teaching evaluation, building on significant prior investments in STEM education reform programs and draws on a common framework grounded in two decades of scholarship on scholarly teaching and its evaluation and peer review of teaching. As an outcome of Bayview Alliance participation in RAC 4, Noah Finkelstein was awarded an NSF collaborative proposal to support implementation and evaluation adoption of improved methods for teaching evaluation.

- **AAC&U, PKAL, Learning Spaces Consortium** - CSL cosponsored the Learning Spaces Consortium, Jun 19, 2017. Approximately 40 faculty / administrators from ~6 institutions participated in this event that are designed as an opportunity for a diverse cadre of stakeholders to explore planning questions that embrace the future, recognize the changing context. This is one of a series of nationally held, brief, four-hour roundtables that are designed only to establish a foundation of audacious questions, reflecting lessons learned from best practices. Throughout 2017, this effort is compiling an LSC Blueprint on Planning Spaces for Learning that builds on the experience of the Forum and Roundtables.

- **Visits hosted by CSL 2015-2017 -** In addition to the listed programming activities, the Center for STEM Learning serves as a clearinghouse for local, national and international institutions of higher education seeking to learn directly about STEM and discipline-based education research informed by the expertise of researchers in these fields at CU Boulder.
  - Colorado State University
  - Florida International University
  - University of Utah
  - Boston University
  - University of Texas at Austin

International Visitors:
In addition, over the past three years CSL has hosted a variety of individual visitors and teams from Japan, Korea, Brazil, Mexico, Ireland, England, Germany, Finland, and Sweden.

BUDGET SOURCES

For FY18, CSL's budget came from:

- The Provost's Office (presumably from general operating funds): $210,000,
- Dean of the Graduate School, Ann Schmiesing: $78,208 (for graduate research assistant salaries and tuition)

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- Dean of CEAS: $15,000 (for a TQF special project)
- Dean of A&S: $35,000 (for TQF special project)
- Grants and Other External Funding/Gift Funds (NSF, Bayer, Sloan, etc): $713,159 (direct cost funding)
- Indirect funding* (DAICR): $55,300

* Note: CSL seeds grant work for projects ***not*** running through the CSL; that is, CSL provides Chancellor's Award funding for efforts that are subsequently funded by external agencies such as NSF. The subsequent awards often operate through faculty members' own departmental units, and that DAICR is not returned to CSL, but to those academic units. ~$9M has resulted in extramural grant funding seeded by CSL Chancellor's Awards and is currently running to other departments / units in the 2012-2017 timeframe.

BUDGET USES

The majority of CSL's budget is comprised of salary paid to conduct extramurally-funded research and sponsored projects. Salary is also provided for ~1.75 FTE staff (business manager, administration, program development and outreach), modest support for the faculty directors (0.5-1 summer month salary), and student workers.

Programmatic work includes the funding of the faculty and graduate student Chancellor's Awards for Excellence in STEM Education, STEM symposia, workshops outreach, and community engagement.

Monies for travel (internally- and externally-funded), support hosting visitors / speakers, and sending CSL Fellows / leadership to participate in STEM education programs outside CU.

Materials and supplies are also budgeted for standard business operations of the CSL.

Another way to consider the CSL budget:

Base Operating Expenses for the CSL run ~$145k/year, which provides ~1.75 FTE, consultants, materials, travel, and some programming. As noted in Q5, these are largely funded internally

- Internally-funded Efforts:
  - Annual faculty and graduate Chancellor's Awards for Excellence in STEM Education (~$120k/ year);
  - Special initiatives like the Teaching Quality Framework (TQF) (from the Deans of A&S and CEAS, ~$50k)
- Externally-funded Efforts:
  - These are both programmatic and research-based efforts supported by NSF, AAU, Bayer, etc., and mostly go to fund people to conduct research and programmatic work (e.g., grants, workshops, sponsored programs, ~$710k/year).

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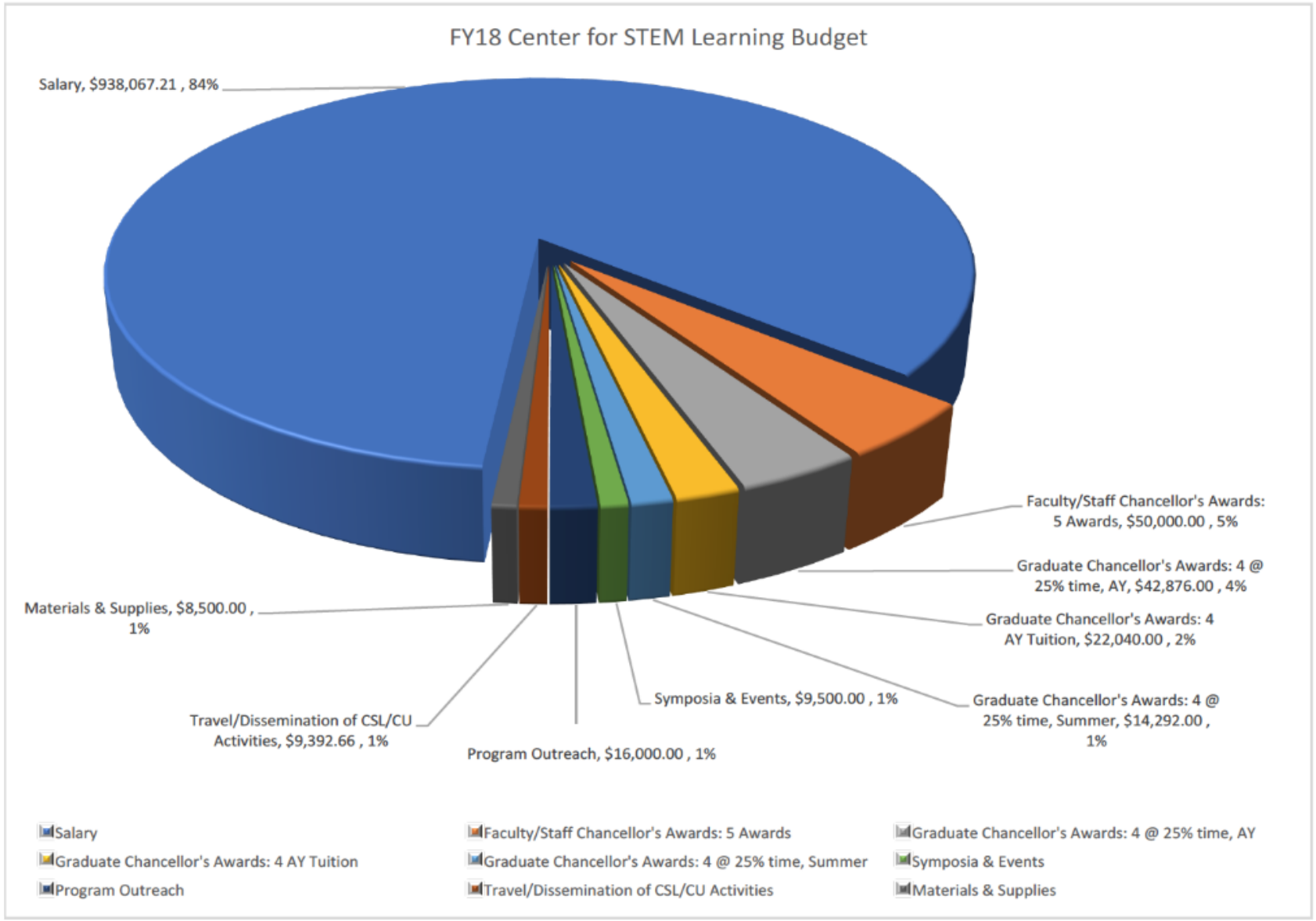

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EVALUATION

As the operations of CSL are multi-faceted and multi-layered, so too are evaluation measures and efforts.

Administrative oversight. Coupled with our organizational structure and reporting, we produce Annual Reports and Executive Summaries that are shared publicly, and given specifically to:

- All members of our advisory board
- All Fellows (and reviewed on a regular basis in Fellows' meetings)
- The Dean of the Graduate School, to whom the Center reports, and the
- Provost

In addition, CSL's Project Management team meets annually with both the Dean of the Graduate School and the Provost to review Center activities, discuss funding, and priorities moving forward. Copies of Executive Summaries and extensive (roughly 100-page) reports can be found at: https://www.colorado.edu/csl/about/brochure-summaries-info-sheets-reports. The FY16 executive summary is included at the end of this document.

Biannual Fellows meetings allow Fellows' feedback on Center operations, budget, programming, and direction. Materials are prepared to share at Fellows' meetings and agendas and minutes from these meetings are kept for review by the Project Management Team and Fellows.

CSL signature programs undergo their own review. In particular, the Chancellor's Awards for Excellence in STEM Education (CSL's largest expenditure funded directly by the Provost's Office and the Graduate School), follows the scholarly peer-reviewed proposal process and is reviewed through: survey of awardees, analysis of award proposals and outcomes, tracking of subsequent funding / uptake, and annual project reports submitted by Chancellor's Award PIs. Dr. Chasteen conducted evaluation of professional development activities that she organized and implemented and provided written reports describing results.

Sponsored project evaluation. Each sponsored project running through the Center conducts its own annual evaluation. This work appears in annual reports to funders (NSF, Bayer, etc.). An example of these reports is the Bayer sponsored summer-camps running through CSL (http://www.xsci.org/bayer-international-science-teen-camp-2016/).

Evaluation of research and development projects in CSL also occurs through peer review of publications. We estimate ~15 peer-reviewed pieces from sponsored projects annually.

Annual review of CSL staff is conducted. These annual merit reviews allow the leadership opportunity to ensure alignment of activities with center mission, and the opportunity to assess and reprioritize staff time and center resources

External evaluation of CSL was previously supported by NSF-funding which allowed the Center to hire an external evaluator. This is no longer the case.

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FUTURE GOALS

The Center for STEM Learning (CSL) provides a coordinated institutional structure at CU-Boulder to improve science, technology, engineering, and mathematics (STEM) education on campus, and to serve as a local, state, national, and international resource for such efforts. The CSL achieves these ends both through service efforts of programmatic work and through the academic enterprises of research and development. It supports close to $8M in sponsored efforts, enhances the reputation of the campus, and helps shape policies to enhance STEM education from CU Boulder to Washington, DC.

Strategic Direction

The Center for STEM Learning is positioned to maintain its primacy as an internationally recognized STEM education center, to grow in its service to CU-Boulder's mission, and to integrate with other efforts at CU-Boulder. While successful in terms of supporting programs that enhance STEM education, leading in research and reputation, and developing revenue for enhanced campus activities, the CSL is still organized and operating in an interim or temporary mode—initially envisioned to be six months when first established in 2012. There is still need and capacity for the CSL to grow to support its originally envisioned three major strands of work: educational transformation, STEM education research, and K20 professional practice (see Mission and Vision Q.2). As shown in the proposed organization chart (see Q. 3), this means the development of associate director positions and the establishment of an executive director (full- or part-time faculty lead). Not only will this enhance the capacity of the CSL to serve campus in key areas, it will enhance its capacity to support and incubate similar efforts in other disciplinary areas (e.g. the $1M Undergraduate Education Development Program effort in the College of Arts & Sciences, which has projects that were modeled on CSL programs and continue to be supported by CSL).

The CSL's three major strands of work, educational transformation, STEM education research, and K20 instructional professional development, can be enhanced and developed over the next five years in the following ways. Strategic directions in educational transformation can integrate efforts with other entities such as the Learning Assistant (LA) program, ASSETT, FTEP, GTP, SASC, Foundations of Excellence, and ODECE. Ultimately, each of these units/programs is working to improve students' educational experience. For example, CSL's TRESTLE program, as well as FTEP and ASSETT provide grants, workshops/seminars, and observations for faculty who seek to better understand, and transform, their teaching. The Learning Assistant (LA) program, on the other hand, is in need of a better faculty development program for faculty whose LA course proposals are rejected because their courses are deemed not yet suitable for supporting LAs. At the same time, STEM education research (CSL's second arm) is needed to incubate new evidence-based approaches, determine who is impacted by educational transformations, under what conditions, and to what extent, and whether or not the transformations are scalable. Both by housing and supporting interdisciplinary educational research grants and by providing CSL Chancellor's awards, faculty, post-doctoral scholars, and graduate students are provided with the resources and a community of support to engage in research on learning, teaching, and other educational issues, leading to support for claims of effectiveness of educational transformations. Finally, CU Boulder has a great presence in the Colorado and national community for K20 education and the CSL can serve these efforts. For

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example, CU Teach is CU Boulder's math, science, and engineering teacher preparation program, and STEM teachers are needed throughout the state and nation. While the CU Teach program is nationally recognized and CU Teach graduates are among the highest regarded teachers in the state, CU Teach could have a bolder presence on campus. By affiliating CU Teach with the CSL, new avenues would be opened for recruiting talented STEM majors to teaching careers and for recruiting talented high school students to CU Boulder—resulting to increased campus collaborations that value the CU Teach program. New partnerships with K12 schools brokered through CSL could be paramount in positively impacting the community. Similarly, CSL is positioned to continue to advance faculty development and undergraduate educational transformation through partnerships with the national leads in this space, including but not limited to: the AAU's STEM Education Initiative, the APLU national Network of STEM Education Centers, the National Academies' Roundtable on Systemic Change in Undergraduate STEM Education, and the Bay View Alliance's efforts for campus-wide transformation.

Pathways Forward:

Depending upon institutional commitment and vision, there are two possible avenues for developing, stabilizing and institutionalizing the Center for STEM Learning.

1) Integration into a new Teaching and Learning Center (TLC)

The core (and maintained brand-name of the CSL, which is of significant value to CU's external reputation), could serve as the research and development arm of an innovative and entrepreneurial TLC. CSL would continue its cross-disciplinary research and continue to develop and enhance models of STEM education, serve as a model for other disciplinary-based R&D arms, and ensure that the programmatic enterprises of the TLC are based on and incubating leading models of practice. In parallel, the CSL could maintain or collaborate on key programmatic activities around teaching and learning, supporting faculty work, graduate development, and departmental-based transformation.

Ultimately, the synergies of housing the CSL in a TLC depends upon the TLC's structure, and if this were to be successful, designers of the TLC need to pay special attention to the challenges of linking administrative / programmatic units (e.g. running faculty workshops, etc.), with the academic efforts of the CSL (grant work, housing researchers, etc.).

2) Growing the CSL into an Institute

When the Center was first formed in 2012, it was envisioned that CSL would become an institute and, in fact, this was called for by members of the initial CSL Chairs & Directors meeting. Becoming an institute, CSL would parallel other leading and essential institutes at CU (with similar infrastructure on campus—such as the Institute for Cognitive Science—and could grow to the stature of JILA). This vision of the CSL would allow CU to capitalize on national moves in STEM Education, including but not limited to: the new forming AAAS STEM DBER Alliance, the National Academies' Roundtable on Systemic Change in Undergraduate STEM Education, and the expanding efforts of the NSF and AAU in its STEM Education Initiative. A vibrant CSL institute would serve as a mechanism to build upon and enhance our discipline-based educational research and systemic transformation efforts growing within departments (e.g. through Departmental Action Teams (DAT) and the Teacher Quality Framework (TQF)). As an institute, it could roster faculty, and develop new graduate programs (including but not limited to professional master's degree programs).

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In such a vision of growing the CSL, key programmatic efforts (i.e., symposia, the Chancellor's Awards, and portions of TRESTLE, see Q.7)) could link to or become a part of a TLC, and the research approaches could continue to reside in CSL. However, with such an approach, CU must be careful, as many of the programmatic efforts associated with educational transformation (many operating through the CSL) are *action-research* based – that is, they intentionally blend research and transformation work. Thus, the splitting of the research and programmatic work could prove to be difficult.

No matter which path forward for the Center for STEM learning, there are essential features of the CSL research and development efforts that should be preserved and built upon:

- Engaging in scholarly work to conduct basic research and development work in STEM education;
- Taking an action research / design-based research approach tightly coupling scholarship and study with change efforts;
- Seeding innovation of ideas and approaches driving innovation in STEM education;
- Supporting cross-unit and collaborative work:
- Engaging in disciplinary focus: to support researchers within STEM units, while also providing a pathway into departments for institutional change;
- Brokering relationships between educational entities (including School of Education and the College of Engineering) and STEM departments.

Potential for Growth:

- Grant funding in STEM education (from national and regional sources) is healthy and anticipated to grow in the longer term. CSL has been successful in obtaining funding and been instrumental in others on campus in obtaining significant funding.
- Philanthropy and development is largely untouched, but parallel centers (e.g. FIU) have raised millions of dollars through active campaigns;
- CSL enhances capacity for building new interdisciplinary programs, not only across fields of STEM education, but in partnership with and between STEM disciplines themselves;
- Ultimately, CSL could roster faculty who simultaneously work within their STEM discipline and education research, allowing CU to maintain its national leadership in discipline-based education research;
- Incubating leading-edge, large-scale efforts. CSL enhances capacity of CU to secure large-scale funding in STEM fields (e.g. supporting and leading education programs for the Physics Frontier Center and the new NSF STC- STROBE imaging science center);
- In parallel, CSL could lead to large-scale funding (at the scale of an NSF Center) in STEM education.

SUMMARY

The Center for STEM Learning seeks to fulfill its overall goals and objectives in alignment with the Chancellor's priorities for campus. CSL serves as a uniquely qualified partner in accomplishing the goals of continuing national renown in innovative STEM education and

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research, building and extending undergraduate student success and retention along with improved access and inclusiveness, and increasing revenue.

However, CSL faces several challenges. Perhaps the leading challenge to the CSL is its funding base. Since inception, it has operated on temporary funding that has been renewed on an annual basis. Not having stable or long-term funding has challenged strategic and long-term planning. In parallel, the scale of funding is also an issue. While CSL leadership is grateful for the institution's continued support, the current scale of funding is insufficient to accomplish the original visions and potential of the CSL. The majority of CU-provided budget is spent on Chancellor's Awards. If CSL is to serve as a key research and development (R&D) arm for seeding new models and approaches in STEM education, funding a full-time executive director, and associate/ faculty-directors of the three major arms—educational transformation, STEM Education research, and professionalizing teaching practice (K-20)—are needed, along with appropriate staff.

Creating structures that intentionally bridge the programmatic services and academic enterprise, will be important and current university structures largely separate these roles. CSL envisions an organizational structure that has not yet been fully realized vis a vis gaining an executive director and, possibly, joining a Teaching and Learning Center to further the work of providing quality STEM education.

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CSL 2017 EXECUTIVE SUMMARY
provided to the executive advisory board of the CSL and CSL Fellows

The Center for STEM Learning (CSL) serves as a unique and innovative mechanism to address the Chancellor's priorities for campus: reputation, retention, and new models for revenue.

Advancing the Reputation of the University of Colorado

As national attention continues to focus on STEM education; CU-Boulder is known as a national resource and innovator in this space.

Evidence of CSL impact and success:

- Boulder is seen as a national leader in STEM education, and recognized as such by Bruce Alberts (past president of National Academies) and Mary Sue Coleman (president of AAU). As detailed below, these prominent and influential national policy-setting agencies fund research studies supported and seeded by the Center.
- Articles about CU-Boulder STEM education and our Center have been published in the New York Times, Science Magazine, and the National Academies Press.
- In the recent National Research Council report, Reaching Students: What Research Says About Effective Instruction in Undergraduate Science and Engineering (2015), there is no institution more cited for research and innovation in STEM education than CU-Boulder. The Center provides the collective home for many of the most-cited discipline-based education research (DBER) scholars in this report, as well as for our weekly DBER seminar series.
- CU Boulder was selected as one of eight national demonstration sites for the AAU STEM Education initiative. CU Boulder is one of nine selected members of the Bay View Alliance—a national coalition to study and promote institutional change. In partnership with APLU, CU-Boulder it has built and leads a national network of more than 150 STEM education centers. Each of these initiatives runs through the Center.
- Faculty Fellows of the Center serve on many, high-profile national committees in STEM education, including the National Academies committees, AAU advisory committees, APLU committees, and committees shaping education policy and practice in the fields of physics, chemistry, biology, mathematics, and engineering and discipline-based and education research.
- As part of the President's and First Lady of the United States of America *College Opportunity Initiative* of 2014, the White House Office of Science and Technology Policy co-sponsored four national workshops on STEM education; CU-Boulder was selected as partner to host one of these: the September 29, 2015 meeting for university presidents and leaders. The Center architected, hosted, organized, and ran this workshop.

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Student Success / Retention / Investing in the Student Experience

The Center incubates, hosts, and advances new models of educational change and effective practices.

Evidence of CSL impact and success:

- The Center serves as resource, connector, and advocate for the roughly 100 programs in STEM education on the CU Boulder campus. The Center supports these programs that advance all students' success, but particularly for women, underrepresented minorities and first-generation college students. Through the weekly DBER seminar series, online resources, the annual symposium, specialized workshops and conferences, advising, and administrative support, the Center advances our collective mission for excellence and inclusion in STEM education and success for students across initiatives.
- The Center directly seeds innovation and advancement of student success through the Chancellor's Awards for STEM Education Excellence. Between 2009-2017, CSL has funded46 awards to 77 faculty members and 34awards to 43 graduate students. . These awards have seeded new educational initiatives spanning science and the arts (for instance, LearnChemE, whose online education resources for chemical engineering are downloaded hundreds of thousands of times per year (http://www.learncheme.com), and innovative Boulder Laptop Orchestra (http://www.colorado.edu/music/ensembles/blork-boulder-laptop-orchestra) and brought in additional extramural funding of ~$60M.
- As a result of Center support provided to graduate students, there have been nearly a dozen Ph.D.s in discipline-based education research (DBER) in the fields of engineering, physics, astrophysics, and atmospheric sciences, among other disciplines.
- The center hosts programs that are innovative and advance our understanding of student learning and educational spaces, and directly serve to advance students and teachers. For instance, the influential study, *Talking about Leaving: Why Undergraduates Leave the Sciences* is currently being replicated, and augmented, by researchers here at CU and at the University of Wisconsin (http://talr.wceruw.org/) is housed within the Center, as is the experiential science (XSci) project, which researches, develops and provides experiential learning programs to students and teachers across the state and nationally through the Battelle STEMx network (http://www.xsci.org/). Currently, the Center hosts a variety such programmatic efforts and is focused on growing these efforts.
- The Center has incubated and hosts the Colorado Achievement Pathways (CAPS) project which is a cross-institution, NSF-INCLUDES grant, one of 47 initial awards from 576 applicants) to build a state-wide network supporting 2Y--to-4Yr college transfer. This project is seeding proposals for a $5M NSF S-STEM Scholarship initiative, an NSF Research Experiences for (2YC) Teachers proposal submission, and the $14M INCLUDES invitation-only competition.
- The Center serves as a home for interdisciplinary discussions that advance student success and contributes to supporting a robust STEM community at CU. In addition, Center Fellows are currently engaged in efforts to examine graduate programs in STEM education, advance under-represented student access through coordinated research experiences, and more.

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Enhancing Revenue Streams

The Center seeds new funding streams, supports extramurally funded work from foundations and federal sources, and allows for agile and innovative approaches to revenue development.

Evidence of CSL impact and success:

- Through the Chancellor's Awards, the Center has provided 46 faculty awards (up to $10k/ each); these have resulted in the award of 11 National Science Foundation (NSF) grants totaling roughly $5M, and more than $1.5M in F&A (indirect) to this institution. Notably these grants, while incubated through the Center, are run through departments and directly support the Colleges of Engineering & Applied Sciences, Arts & Sciences, and School of Education.
- In addition to the awards mentioned above, more than $8M in extramural funding is running through (and managed) by the Center. These awards represent significant national projects.