

Report on the Centers for Chemical Innovation (CCI) Diversity Forum: Evidence-based Practices for Broadening Participation in the Chemical Sciences

Executive Summary

On May 5-6, 2015, the CCI Diversity Forum was held at the National Science Foundation (NSF) in Arlington, VA. The Forum was initiated and organized by the eight CCI Education, Outreach, and Diversity (EOD) Directors, however, representatives from across the CCIs were in attendance, including; two Managing Directors, several CCI research faculty and PIs, presenters, and NSF Program Officers from the Directorate for Mathematical & Physical Sciences (Division of Chemistry) and the Directorate for Education and Human Resources attended the Forum. It was a full two day meeting.

The aims of the Forum were to bring all of the Phase II CCIs together to share their current diversity initiatives, learn more about evidenced based practices from field experts, and explore tools and strategies to enhance broadening participation efforts within and across the CCI network. An anticipated outcome of the Forum was a measurable shift in how CCIs conceptualize diversity, design and implement diversity related programming, and collaborate. Forum topics ranged from *Inspiring K-12 Students to Enter the STEM Workforce* to *Obstacles to Minority Retention in Academic Careers*. The invited speakers included University Research Faculty, a STEM Director, a Research & Evaluation Specialist, and a Diversity Programs Manager from the American Chemical Society (ACS). Compelling evidenced based research and best practices were presented. The presentations also sparked lively discussions and generated new ideas for the CCIs. In fact, four recommendations for moving forward emerged at the meeting:

- Develop a stronger CCI connection to the American Chemical Society & its diversity initiatives and network
- Consider a diversity professional development webinar for the CCIs
- Identify a mechanism to pool diversity related resources
- Provide a forum for sharing diversity related best practices from across disciplines.

It was determined that the CCI EOD Directors would consider the recommendations after the meeting and present a more comprehensive plan for addressing the recommendations to the CCI Managing Directors and NSF Program Officer. This presentation is scheduled to be held on July 15, 2015.

The following report provides additional detail about the Forum, evaluative findings and outcomes the have occurred since the Forum.

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Introduction

The NSF Centers for Chemical Innovation (CCI) program, in the Division of Chemistry in the Directorate for Mathematical & Physical Sciences, supports research centers focused on major, long-term fundamental chemical research challenges. The CCI Program supports both Phase I (development) and Phase II (full Center implementation) awards, with eight Phase II awards currently. As NSF supported Centers, the CCIs (Phase I, Phase II) are deeply vested in addressing NSF's broader impacts, through targeted broadening participation, education and outreach efforts. As a consequence, each CCI has established specific initiatives and programs to address broader impacts.

Last year, preliminary discussions began among the CCI Education, Outreach, and Diversity (EOD) Leaders regarding an interest in a professional development workshop focused on broader impacts, more specifically broadening participation. In recent months, a noticeable surge in discussions related to broadening participation and diversity in the literature and among outreach communities was observed. As such, the CCI EOD Directors revisited the notion of a diversity related workshop. There was overwhelming consensus among the CCI EOD Directors that a deeper understanding and greater knowledge base of evidenced based broadening participation research and practices were needed. There was particular interest in how diversity is defined, approaches CCIs used to address diversity, best practices within and outside of the CCI community, evaluation and assessment practices, and possible opportunities for mutually beneficial collaborations.

An organizing committee of CCI EOD Directors was established to write and submit a diversity workshop proposal to the NSF. Shortly after the proposal was approved, the CCIs held the CCI Diversity Forum at the National Science Foundation, May 5-6, 2015.

Purpose

The purpose of Forum was to bring all of the Phase II CCIs together to share their current diversity and broadening participation initiatives and to consider evidence based research and effective outreach efforts recognized as a leader in attracting and retaining diverse individuals within its STEM programs, fields and ultimately careers. For the purposes of the Forum, the target populations included racial and ethnic minorities, women, people with disabilities and veterans in STEM and within CCIs.

Objectives

The specific objectives of this Forum were:

- To get overviews from each of the centers on individual initiatives for broadening participation of underrepresented groups in chemistry.
- To be introduced to evidence-based best practices for broadening participation in STEM disciplines from experts in the field.
- To explore feasibility of incorporating best practices into center programs for broadening participation gain the tools to further advance broadening participation of underrepresented groups.
- To discuss avenues to effect greater impacts of CCI broadening participation activities through center collaborations.

Format & Content

The Forum was two full days held in a conference room at the National Science Foundation (Attachment A). The first day was primarily an information gathering day. The CCIs presented their diversity initiatives and invited field experts gave insightful, evidenced based presentations on various aspects of diversity and broadening participation within K-12 and higher education contexts.

Selected Forum Topics include:

- Evidence-based practices for broadening participation in Chemistry and other STEM fields
- Examples of collaborations between research centers or institutes to address broader impacts
- Evaluation of activities to increase participation of underrepresented minorities in STEM fields
- Discussion of ideas for collaboration among centers for more impactful approaches to broadening participation in chemistry

The afternoon break-out provided the opportunity for reflection and collaborative discussions on the Day 1 presentations. The second day began with a presentation by an ACS Diversity Program Manager, which was very well received. The remainder of the day primarily focused on evaluation and logic models for diversity initiatives. The facilitator provided several templates and the CCIs were given an opportunity to develop a logic model framework for their diversity initiatives. The Forum ended with a report-out and recommendations for moving forward (see Recommendations & Next Steps section below).

The Forum was facilitated by a professional meeting facilitator.

Recommendations & Next Steps

After a great deal of discussions on the last day, four main recommendations for moving forward were discussed at the meeting:

- (1) Develop a stronger CCI connection to the American Chemical Society & its diversity initiatives and network
- (2) Consider a providing a diversity related professional development webinar for the CCIs
- (3) Identify a mechanism to pool diversity related resources
- (4) Provide a forum for sharing diversity related best practices from across disciplines.

It was determined that the CCI EOD Directors would consider the recommendations after the meeting and present a more comprehensive plan for addressing the recommendations to the CCI Managing Directors and NSF Program Officer. This presentation is scheduled to be held on July 15, 2015.

Evaluation Data

A post-evaluation survey of the forum showed that the meeting was well-received by the participants. Out of the 22 center participants and guest-speakers, 13 responded to the survey. Over 90% of the respondents found the forum moderately or extremely informative, relevant, engaging and organized and over 80% found it moderately or extremely productive. With 10 being the highest, the forum was rated 8 on the level it met participants expectations. In fact, nearly every aspect of the meeting was rated 4 out of 5 or higher on how useful participants found each aspect of the meeting. A notable exception was the session on evaluation, strategic plans and logic maps which was consistently rated less favorably by Forum participants.

The evaluation results also showed a great willingness among the Forum participants to implement changes in their Center and or to seek out new collaborations and resources to improve diversity related programming based on information gleaned at the Forum.

Summary

A detailed summary of the Forum is attached (Attachment C).

Based on the survey data, the Forum met its immediate goals and objectives. In fact, since the Forum, several CCIs have already reported significant changes and impacts on their CCIs as a result of the Forum (Attachment D). It will be through these types of measured shifts in practice, continued vigilance, and follow through with the four recommendations that the impact of long-term goals and objectives of the Forum can be measured and achieved.

ATTACHMENT A

Agenda

Tuesday, May 5

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|------------------|---|
| 9:00 – 9:45 am | Welcome, introductions, overview of meeting goals |
| 9:45 – 11:15 am | Overview from individual CCI's activities for broadening participation |
| 11:15 – 11:30 am | <i>Break</i> |
| 11:30 – 12:15 pm | Turning STEM Interventions into Training Success & Scientific Productivity, <i>Andrew Campbell</i> |
| 12:15 – 1:00 pm | Inspiring K-12 Students to Enter the STEM Workforce Through Authentic Experiences, <i>Darryl Williams</i> |
| 1:00 – 1:45 pm | <i>Lunch at Meeting</i> |
| 1:45 – 2:30 pm | Culture Shift: Rethinking Graduate Admissions and Recruitment Practices for Diversity in STEM, <i>Julie Renee Posselt</i> |
| 2:30 – 3:15 pm | Strategic Approaches for Retention of Diverse Student Populations, <i>Isiah Warner</i> |
| 3:15 – 3:30 pm | <i>Break</i> |
| 3:30 – 5:00 pm | Breakout sessions – lessons learned, applications to CCIs |
| 5:00 – 6:00 pm | Report out and general discussion |
| 6:00 pm | <i>Dinner at local restaurant</i> |

Wednesday, May 6

| | |
|------------------|--|
| 8:30 – 9:15 am | ACS Diversity Programs - A Shared Responsibility, <i>Joy Titus-Young</i> |
| 9:15 – 10:00 am | Strategic Plans, Logic Maps, Evaluation, <i>Allison Titcomb</i> |
| 10:00 – 10:15 am | <i>Break</i> |
| 10:15 – 11:30 am | Breakout session – evaluation, logic maps |
| 11:30 – 1:00 pm | <i>Lunch at conference</i> |
| 1:00 – 2:30 pm | Brainstorming potential CCI collaborations |
| 2:30 – 2:45 pm | <i>Break</i> |
| 2:45 – 4:00 pm | Report out, general discussion, action items |
| 4:00 pm | <i>Meeting adjourns</i> |

ATTACHMENT B**Participant list**

Eve Perara,
Director of Diversity, Education and
Outreach, CENTC
University of Washington
centcdeo@chem.washington.edu

Levi Thompson, CENTC
Professor of Chemical Engineering
University of Michigan
ltt@umich.edu

Michelle DeBoever
Outreach Scientist, CCI Solar
Caltech
mchansen@caltech.edu

Andy Bedingfield
EOD Director, CSMC
Oregon State University
andyb@uoregon.edu

Andre Schirotzek
Managing Director, CASTL
University of California at Irvine
andre.schirotzek@gmail.com

Chris Parsons
EOD Director, CCE
Georgia Tech
christopher.parsons@chemistry.gatec
h.edu

Keith Oden, CCE
Director of Academic Diversity
Department of Chemistry
Georgia Tech
keith.oden@chemistry.gatech.edu

Stefan France, CCE
Associate Professor of Chemistry
Georgia Tech
stefan.france@chemistry.gatech.edu
Monya Ruffin
EOD Director, CCHF
Emory University
monya.ruffin@emory.edu

Simon Blakey, CCHF
Associate Professor of Chemistry
Emory University
sblakey@emory.edu

Jennifer Henderson
EOD Director, CSP
University of Minnesota
hende219@umn.edu

Laura Seifert
Managing Director, CSP
University of Minnesota
seif0056@umn.edu

Anne LaPointe, CSP
Senior Research Associate
Cornell University
lapointe@cornell.edu

Becky Hames
EOD Director, CAICE
University of California at San Diego
bhames@mail.ucsd.edu

Haim Weizman, CAICE
LSOE of Chemistry and Biochemistry
University of California at San Diego
hweizman@ucsd.edu

Andrew Campbell
Division of Biology and Medicine
Brown University Initiative to
Maximize Student Development
Program
Brown University
Andrew_Campbell@Brown.edu

Isiah Warner
Vice Chancellor for Strategic
Initiatives
Louisiana State University
iwarner@lsu.edu

Julia Renee Posselt
Department of Education
University of Michigan
jposselt@umich.edu

Aurora Palacios Kamimura
Center for the Study of Higher and
Postsecondary Education
University of Michigan
aurorak@umich.edu

Darryl Williams
Director, Center for STEM Diversity
Associate Dean for Recruitment,
Retention and Community
Engagement
Tufts University
Darryl.Williams@tufts.edu

Joy Titus-Young
Program Manager
ACS Department of Diversity
Programs
J_Titus-Young@acs.org

Allison Titcomb
ALTA Consulting, LLC
altaconsulting@cox.net

Kathy Covert
NSF Program Officer
Centers for Chemical Innovation
kcovert@nsf.gov

Julie Johnson
NSF Program Officer, Division on
Research and Learning
jjohnson@nsf.gov

ATTACHMENT C

Forum Summary

The speakers addressed varying topics of best practices for successful broadening participation in STEM, including: adjustments to graduate admissions and recruitment, training and intervention for struggling incoming students, and building a critical mass of an underrepresented population, to name a few. Discussions following these speakers led to riveting conversations and many new ideas for the centers to take back with them to implement. Main ideas and accompanying notes from breakout discussion sessions are given below.

1) MSI Visiting Professorship

- Involve professor and student for summer
- Continue project during the following year
- Provide support (ex. \$30K) for faculty at home institution
- Two consecutive years per faculty member

2) Undergraduate Summer Research Programs

- Incorporate professional development, e.g. GRE prep course, ethics training, math, writing skills
- Faculty/postdoc visits to community colleges, MSIs to recruit
- Offer candidates an opportunity to revise and resubmit their applications
- Try to develop critical mass
- Collect longitudinal data on participants (i.e., program Alumni data)

3) Enhanced Diversity Training for CCI Grad Students and Postdocs

- Establish traits of a “perfect scientist” to provide goals for our graduate student and postdoc training
- Identify existing gaps and interventions
- Need student input via exit interviews (or formative interviews of current students
- Faculty input
- Review literature for standards (see Resources/people below)
- Focused student/postdoc mentoring (helping them to reach their goals)
- Individual Development Plans (IDPs) for grad students/postdocs
- Modules to support skills development as related to IDP
- Instill a drive in students (CCI?) to continue their involvement in their respective communities – distributed center institutions and where they go after center participation
- Modules not a plug & play thing, require feedback every year
- Curriculum mapping – alignment, awareness and change

4) For CCI personnel

- Professional development regarding implicit bias and privilege for CCI personnel
- Diversity training – sharing data and research
- Establish expectation that CCI funding required EOD input
- Effect and generate faculty buy-in to diversity programs
- Mentor training

5) Institutional Diversity

- Present to decision makers that investment in diversity pays off in both funding and publications
- Be vocal with center institutions
- Show that increasing diversity doesn't mean lowering standards
- Leverage opportunities to influence institutional diversity decisions
- Use CCIs to collaborate/connect with other institutional elements
- Leverage CCI funding – how can we help the institution
- External consultation for URM perspective in majority dominated departments (to achieve diversity among decision makers)

6) General Understanding of Reaching Diversity Goals

- Changing dynamics of a group involves risk
- Increasing diversity does not mean decreasing standards
- Diversity extends beyond ethnicity, also includes disability, socioeconomic status, other non-traditional students
- Culturally engaging campus environments
- Culturally relevant pedagogy (Gloria Ladson, Billings)

7) Community College-Specific Research Program

- NIH Bridges funding
- Develop projects for students with limited chemistry backgrounds
- Recruit for undergraduate and graduate programs
- Continue program during academic year
- Advantage – no housing costs
- Build critical mass of defined populations
- Start legacy program with specific community colleges
- Critical mass REU - pool funds to have program at one institution and rotate among CCIs

8) Individual CCIs

- Collaborate, connect with other institutional elements
- More than a one-off
- Projects for students without requisite experience

9) CCI Collaborations

- Incorporate diversity in symposia at national venues

- Sharing best practices among CCIs
- Joint CCI research or professional development symposia targeting URM and others
- Collaborate between centers on outreach programs
 - Geography
 - Sharing kits, demos & games
 - Peer interactions (virtual)

- Building Upon the Collaboration Idea & Other Suggestions
 - Pool resources from all CCIs
 - Hire consulting evaluator
 - Menu of programs
 - Best practices
 - For recruitment (LSAMP office connections)
 - Consortium administrator to pull things together
 - Hire web developer for CCI site that includes programs from all CCIs
 - Share job descriptions (EOD Director)
 - Share successful efforts between centers
 - Online database/network of students
- Collaborations on diversity conferences
- ACS collaborations
 - SEED
 - Webinars for professional development of our students
 - ACS Scholars Program

ATTACHMENT D

CCI Diversity Forum Impacts: Shifts in Practice

Center for Aerosol Impacts on Climate and the Environment (CAICE)

- Changed E&O Team to “EOD Team.”
- Plan to increase community college students’ interest in CAICE research by hosting or participating in one outreach event/activity each quarter/semester.
- Plan to facilitate a female faculty panel event (live and via video conferencing) for graduate students which include CAICE female faculty team members. Will be working with campus graduate women in Chemistry campus group (SWIGS) on this coming year’s event.

Center for Chemical Evolution (CCE)

- Met with CCHF about potential collaborations in Atlanta area such as hosting a research symposium at Georgia Tech and Emory.

Center for Chemical Innovation in Solar Fuels (CCI Solar)

- Entertained the idea of a community college summer program and collaboration
- Shared the AGEP postdoc fellow opportunity with minority colleague. Now has been sent to a listserv of URM grad students
- Plan to participate in diversity training webinars hosted by all the CCIs

Center for Enabling New Technology through Catalysis (CENTC)

- Decided to work more personally with MSIs in recruiting for our summer undergraduate program, i.e. sending CENTC postdocs and faculty to give talks/seminars in the fall (and to have our application available earlier in the fall)
- Will provide promising undergraduate applicants whose applications fall short with the opportunity to prepare better applications
- Will connect with ACS about diversity programs that can be incorporated into our center

Center for Selective C-H Functionalization (CCHF)

- Met with CCE to discuss potential Diversity related partnership opportunities
 - CCHF and CCE will be co-sponsoring a diversity talk at Georgia Tech on September 14 with Dr. Christine Luscombe, a materials chemist from CCHF
- Enhanced efforts to better collect and track diversity program alumni (i.e., Chemistry Graduate School Prep Club, CSURP)
- Discussed the possibility of extending our Network for Diversity in Chemistry Research Faculty summer research fellowship appointments to two summers instead of one summer, based on information presented at the Forum.

- Extended CCI Scientific Research Network – CCHF EOD Director will meet briefly with Dr. Levi Thompson (CENTC) during a CCHF Lab visit to UM-Ann Arbor on 7/10/15

Center for Sustainable Materials Chemistry (CSMC)

- Incorporated best learned during the symposium into the Phase III grant proposal, including creating a minority focused summer research program for undergraduates

Center for Sustainable Polymers (CSP)

- Established a postdoctoral diversity fellowship to recruit scientists from underrepresented groups starting 2015-2016. Initial budget is for 2 positions advertised at SACNAS, NOBCChE, and online this fall.
- Plan to offer one (with department match of one additional) diversity fellowship for a first-year graduate student. The student would not be required to join the CSP and the fellowship will be in lieu of a teaching assistant assignment for their first year.
- Started partnership with U. of Minnesota MRSEC to offer graduate school application and admissions workshops for summer undergraduate students to help them prepare competitive applications. (Over 50% of students from these summer groups are from underrepresented groups.)

ATTACHMENT E

Proposed CCI EOD Collaboration Coordinator Position

Four recommendations for next steps emerged at the Forum. Three of the recommendations discussed are development activities. These recommendations include:

- (2) Consider a providing a diversity related professional development webinar for the CCIs
- (3) Identify a mechanism to pool diversity related resources
- (4) Provide a forum for sharing diversity related best practices from across disciplines.

Further discussions at the Forum lead to a suggestion that a degree of centralization would be helpful to address the recommendations above. The establishment of a cross center position to carry out and coordinate the tasks required to address the recommendations was also discussed. As a consequence, an EOD Collaboration Coordinator position description was drafted (see below) and presented with the initial Forum debrief report-out. However, through additional vetting and concerns raised regarding the lack of a viable funding mechanism for the position, the idea for the position has been disregarded. Therefore, plans for addressing the recommendations have been drafted by the CCI EOD Directors and will be presented at the Joint EOD Directors and Managing Directors Meeting on July 15, 2015.

Position Description

Job Title: Education, Outreach and Diversity Collaboration Coordinator for the Centers for Chemical Innovation

Job Summary: This is a part-time, temporary position to assist the National Science Foundation supported Centers for Chemical Innovation (CCIs) Education, Outreach and Diversity (EOD) Directors in their efforts to coordinate resources and programming. The EOD Collaboration Coordinator will develop platforms and programming in conjunction with the EOD Directors to improve EOD efforts at each center and to facilitate collaboration between centers in such efforts. By gathering resources from each center and the broader community and centralizing them in an easily accessible manner, the CCIs will be better equipped to run their diversity and outreach programs, even after the EOD coordinator position is no longer needed. In addition, the EOD Collaboration Coordinator has a background in education evaluation, he or she may be asked to provide evaluation services for CCI programs when needed and or provide referrals to appropriate tools and resources for the center to assist in evaluation efforts. Lastly, the EOD coordinator will be responsible for providing content and working with the web administrator for the [nsf-](#)

cci.com website to provide information and links to job openings, fellowship opportunities, summer research applications, and other resources for the centers.

Job Duties:

- Communicate with EOD Directors to understand their current programming and needs to facilitate collaboration amongst centers
- Develop/moderate a shared space (ex. googledoc or Trello group) for centralization of resources and best practices in broadening participation
- Centralize student recruitment for summer programs by maintaining a list of contacts for MSIs and other diversity in STEM groups or agencies
- Centralize job openings (post-doc, staff, faculty), fellowship opportunities, and summer applications on nsf-cci.com
- Manage nsf-cci.com with updates as needed
- Work with EOD directors to develop center-wide professional development opportunities such as webinars and seminars
- Coordinate CCI-wide efforts at conferences (i.e., research symposia, outreach booth, and recruitment efforts)
- Serve as a resource for CCIs (i.e., evaluation, assessment tools, programming)
- Help the EOD directors develop sustainable practices and platforms to continue these collaborations well into the future

Basic Qualifications:

- Familiarity with the CCIs
- Previous experience in education and outreach
- Excellent communication and organization skills
- Previous experience with evaluation

Preferred Qualifications:

- Background in chemistry or science
- Administrative and organizational leadership skills
- Experience with collaborations, partnerships, and or networks