“Getting to More” Computer Science PD Design Studio

April 25-26, 2013

Michael Lach

Director, STEM Policy and Strategic Initiatives, Urban Education Institute (UEI) at the University of Chicago

UEI URBAN EDUCATION INSTITUTE

CEMSE

THE UNIVERSITY OF CHICAGO


acm


csta
Computer
Science
Teachers
Association


NSF


national center for
women&
INFORMATION
TECHNOLOGY

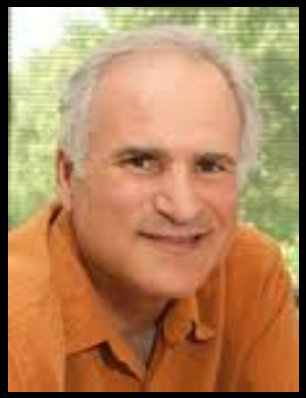

Microsoft


Google


Google

Our Team








“design studio”

for K-12 computer science professional development providers

Goals for our "Design Studio"

1. **Learn Together**. Network with leaders in the field.
2. **Recognize Characteristics of Good PD**. Explore lessons from math and science, and generate consensus around common values for good CS PD.
3. **Identify Strategies for Improvement**. What strategies can we use to deepen/scale/broaden impacts?
4. **Outline Implications**. What does it mean for our individual work and the field writ large?
5. **Develop Action Plans**. What will each of us do to improve our work for the future?

Jan Cuny

Program Director for Computing Education
National Science Foundation

Cameron Wilson

Director of the Office of Public Policy
Association for Computing Machinery (*ACM*)

PARTICIPANTS

Name: **Bob Allen**
Organization: Mercer University
Job Title: Professor of Computer Science
PD Name: Middle Georgia CS Teacher Enrichment
Location: Macon, GA
Email: allen_r@mercer.edu
Role(s):
_x_ Design Curriculum
_x_ Design PD
_x_ Facilitate PD
_x_ (Co-)Primary Investigator

What do I hope to learn: *I'm looking for ways to more effectively reach more teachers with less energy expended.*

Name: **Owen Astrachan**
Organization: Duke University
Job Title: Professor of the Practice of Computer Science
PD Name: Computer Science Principles
Location: Las Vegas, Nevada
Email: ola@cs.duke.edu
Role(s):
_x_ Design Curriculum
_x_ Design PD
__ Facilitate PD
_x_ (Co-)Primary Investigator

What do I hope to learn: *I hope to learn about best practices that might be tastefully used to evolve the content-is-king paradigm.*

Name: **Diane Baxter**
Organization: San Diego Supercomputer Center, UC San Diego
Job Title: Education Director
PD Name: ComPASS - Computing Principles for All Students Success
Location: San Diego, CA
Email: dbaxter@ucsd.edu
Role(s):
__ Design Curriculum
__ Design PD
__ Facilitate PD
_x_ (Co-)Primary Investigator

What do I hope to learn: *I hope to learn at least one element that we can add to our professional development to make it more exciting, effective, or sustainable.*

Heather Bort
Marquette University
Student
CS4HS at Marquette University
Milwaukee, WI
heather.bort@marquette.edu
__ Design Curriculum
__ Design PD
__ Facilitate PD
__ (Co-)Primary Investigator
_x_ Other: Student Researcher

workshop that helps teachers put more

Bennett Brown
PLTW
Associate Director of Curriculum and Instruction
PLTW CSE
Various
bbrown@pltw.org
_x_ Design Curriculum
_x_ Design PD
_x_ Facilitate PD
__ (Co-)Primary Investigator
_x_ Other: Project Coordination

others' PD efforts differentiate
lude teachers with a wide range of CS

Dennis Brylow
Marquette University
Associate Professor
CS4HS@MU
Milwaukee, WI
dennis.brylow@marquette.edu
__ Design Curriculum
_x_ Design PD
_x_ Facilitate PD
_x_ (Co-)Primary Investigator

PD can focus more on effective

Darren Cambridge
American Institutes for Research
Principal Consultant
CS10K Community
Online
dcambridge@air.org
__ Design Curriculum
_x_ Design PD
__ Facilitate PD
_x_ (Co-)Primary Investigator

ork can best support others in
ity to maximize its impact.

Gail Chapman
UCLA
Director of National Outreach, Exploring Computer Science
Exploring Computer Science (ECS)
Los Angeles,Chicago, D.C.
chapgail@gmail.com
_x_ Design Curriculum
_x_ Design PD
_x_ Facilitate PD
__ (Co-)Primary Investigator
__ Other: Outreach

s a community can move to more
wings.

Lucia Dettori
DePaul University
Associate Dean
Taste of Computing - ECS
Chicago/IL
lucia@cdm.depaul.edu
__ Design Curriculum
__ Design PD
__ Facilitate PD
_x_ (Co-)Primary Investigator

What do I hope to learn: *I would like to learn about how other PDs are run and what would be the best plan for creating a sustainable model that will affect a critical mass of existing teachers as well as those who will choose to become teachers in the future.*

Lien Diaz
College Board
Director, AP Program
AP Computer Science Principles
Los Angeles,Chicago, D.C.
ldiaz@collegeboard.org
_x_ Design Curriculum
_x_ Design PD
__ Facilitate PD
_x_ (Co-)Primary Investigator

rious groups and projects designing and

Barbara Ericson
Georgia Tech
Director, Computing Outreach
ICE teacher workshops
Atlanta, GA
ericson@cc.gatech.edu
_x_ Design Curriculum
_x_ Design PD
_x_ Facilitate PD
_x_ (Co-)Primary Investigator

what resources that are available for the

Tasha Frankie
San Diego Mesa College and UCSD
Instructor
ComPASS
San Diego, CA
tashacv@gmail.com
__ Design Curriculum
__ Design PD
_x_ Facilitate PD
__ (Co-)Primary Investigator

D as done in other groups to gain new

To promote learning and sharing so we can all improve, we must…

1. Participate Actively
2. Listen Attentively
3. Be Candid
4. Build on the Ideas of Others
5. Respectfully Challenge One Another's Ideas
6. Recognize the Needs of Others
7. Be Open to New Ideas

Some logistics…

Internet. Wireless is available; please pay attention.

Breaks. Scheduled for midmorning and afternoon.

Restrooms. Past the elevator.

Disruptions. Refrain from having side conversations.

"Before I write my name on the board, I'll need to know how you're planning to use that data."

We're documenting proceedings.

- All the materials will be available on a Dropbox after the event.
- We're video taping the activities and collecting work products for public report at a later date.

Flash Talk presentations – Dropbox

https www.dropbox.com/home/CS%20Design%20Studio%20-%20April%2025-26%2C%202013/Flash%20Talk%20presenta

Mix Reader Facebook Asana Amazon News Mac Tech Music My Life UChicago NSF ED UIC Chicago Food

Flash Talk presentations – Dropbox

Get free space! Michael Lach

Dropbox

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Events
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Flash Talk presentations

CS Design Studio - April 25-26, 2013
Dropbox

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ay.pdf	document pdf	Yesterday 9:00 PM
Beauty and Joy of Computing_Dan-Garcia.pdf	document pdf	Yesterday 9:00 PM
Bibb County Teacher Support_Robert-Allen.pdf	document pdf	Yesterday 9:00 PM
ComPASS - Computing Principles for... Baxter.pdf	document pdf	Yesterday 9:00 PM
CS4HS @ MU and PUMP-CS_Heather Bort.pdf	document pdf	Yesterday 8:59 PM
CS10K Online Community of Practice...bridge.pdf	document pdf	Yesterday 8:59 PM
CS Principles-College Board_Owen-Astrachan.pdf	document pdf	Yesterday 9:00 PM
ECEP_Barb ERickson.pdf	document pdf	Yesterday 8:59 PM
Exploring Computer Science_Gail Chapman.pdf	document pdf	Yesterday 8:59 PM
Exploring Computer Science_Helen-Hu.pdf	document pdf	Yesterday 8:59 PM
Mobile CSP Flash Talk_Chinma Uche.pdf	document pdf	Yesterday 8:59 PM
NM Computer Science for All_Irene-Lee.pdf	document pdf	Yesterday 8:58 PM
Partner4CS_Lori-Pollock.pdf	document pdf	Yesterday 8:58 PM

Hey Michael, try Dropbox for Business!

Start with 1000GB for 5 people

Help Privacy More

Display a menu

"Getting to More"

K-12 Computer Science Professional Development Design Studio

Hosted by

The University of Chicago

AGENDA

Thursday, April 25, 2013

Time	Topic	Facilitator / Presenter
8:00 am	**Registration, Networking Breakfast**	
8:30 am	**Welcome, Goal Setting & Norms** *Michael Lach will welcome and provide an overview of the design studio activities.*	**Michael Lach** *Director, STEM Policy and Strategic Initiatives, Urban Education Institute (UEI) at the University of Chicago*
9:00 am	**Your PD "Flash Talks"** *Participants will take turns to learn from others and share information about their PD in short 10-minute "flash talks."*	**Jean Westrick** *Associate Director, 100K in100 Project, UEI*
10:30 am	**Break**	
10:45 am	**The PD Landscape Study: What we know about the field and what "less to more" means.** *Dr. Jeanne Century will share key findings from the PD landscape study conducted by CEMSE in Fall 2012. Participants will engage in a discussion around the most important findings and their implications for the group.*	**Jeanne Century** *Director of Science Education, Research and Evaluation, Center for Elementary Mathematics and Science Education (CEMSE) at the University of Chicago*
12:00 pm	**Lunch**	
1:00 pm	**Translating PD Principles to Teacher Practice** *Martin Gartzman will present on principles of effective PD and strategies to enact those principles. Participants will engage in a jigsaw activity to explore strategies for designing effective PD.*	**Martin Gartzman** *Executive Director, CEMSE*

Working Agenda—Subject to Change

CENTER FOR ELEMENTARY MATHEMATICS AND SCIENCE EDUCATION
1225 EAST 60TH STREET, CHICAGO, ILLINOIS 60637
P (773) 702-3921 F (773) 834-4665 CEMSE.UCHICAGO.EDU

Release Form

Name: _____

I am attending the Computer Science Design Studio: Getting to More on April 25-26, 2013.

I understand the event will be photographed for the purpose of being used and distributed in various formats by the University of Chicago for educational purposes, including, but not limited to the classroom, television, the Internet (including webcasts, websites and podcasts), and any other communications medium currently existing or later created.

I give my permission and authorize the University of Chicago, to videotape, audiotape, photograph, record, edit or otherwise reproduce my likeness, and to use it in the formats and for the purposed stated above. The University of Chicago retains the right not to use the footage for other than archival purposes.

I agree to indemnify and hold harmless the University of Chicago, their employees and representatives against any and all claims arising out of my presentation, including, but not limited to, claims of copyright infringement, defamation, and misrepresentation.

I declare I have read the above, fully understand its meaning and effect, and agree to be bound by it.

Media Release Preference

_____ Yes, I do agree to the statement above

_____ No, I do NOT agree to the statement above

Any associated work products created for the Computer Science Design Studio: Getting to More can be used for educational purposes.

Work Product Release Preference

_____ Yes, I do agree to the statement above

_____ No, I do NOT agree to the statement above

_____

Signature Date

PARTICIPANTS

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Organization: Mercer University
Job Title: Professor of Computer Science
PD Name: Middle Georgia CS Teacher Enrichment
Location: Macon, GA
Email: allen_r@mercer.edu
Role(s):
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“Getting to More”

K-12 Computer Science Professional Development Design Studio

FLASH TALKS

Name/Organization	Key Ideas

Flash Talks -

Group	Description	Presenters
A	**A Statewide Model for Deploying CS Principles** *Alabama*	Gray, Jeff Muralidhar, Deepa
B	**Beauty and Joy of Computing** *UC Berkley*	Garcia, Dan Harvey, Brian
C	**CS10K Online Community of Practice** *The internets*	Cambridge, Darren Rasmussen, Claudette

Flash Talks -

Group	Description	Presenters
A	**Expanding Computing Education Pathways (ECEP)** *Atlanta, GA*	Ericson, Barbara Furman, Crystal
B	**Partner4CS** *Newark, DE*	Pollock, Lori
C	**Maryland School Teachers PD** *Maryland*	Greenawalt, Joe O'Grady-Cunniff, Dianne

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C	**Exploring Computer Science** *Salt Lake City, UT*	Hu, Helen Lyman, Carl

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C	**Project Lead the Way (PLTW)** *Various Locations*	Brown, Bennet Kind, Bryan

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B	**Taste of Computing PD** *Chicago, IL*	Dettori, Lucia Yanek, Don
C	**SRI / Build IT** *Multiple States & Canada*	Koch, Melissa Meloy, Teresa Lara

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B	**Stevens Point PD** *Stevens Point, WI*	Gibbs, David
C	**MobileCSP** *Hartford, CT*	Morelli, Ralph Uche, Chinma

Landscape Study Less/More Issues and Recommendations

ISSUE	LESS	MORE
COHERENCE		
Priority	Higher education driven	School and district driven
Investment	Externally funded professional development	Co-funded professional development
Pedagogical Understanding	Vaguely defined pedagogical content	Clarified pedagogical strategies and specified classroom applications
Unreached	Providing opportunities where they don't already exist	
Underrepresented	Explicit attention to increasing access and equity	
CUSTOMIZATION		
Audience	Heterogenous groups	Homogenous groups
Recruitment	Casting a broad net for participants in PD	Targeting participants and audience for PD
Fit	Widely varied disciplinary and pedagogical content	Disciplinary and pedagogical content aligned to goals and target audience
CLASSROOMS		
Relevance and Fit	University developed professional development	University and school co-developed professional development
Isolation	Professional development out of school	School based and/or job-embedded professional development
Classroom Application	Isolated content and approaches	Content and pedagogy directly tied to teachers' instructional goals, curricular frameworks and/or courses
PD DESIGN		
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Class Size	Relatively small number of participants	
Educating teachers	Opportunities for small group discussion and reflection	

NISE BRIEF

REPORTING ON ISSUES AND RESEARCH IN SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY EDUCATION

Principles of Effective Professional Development for Mathematics and Science Education: A Synthesis of Standards

by Susan Loucks-Horsley, Katherine Stiles and Peter Hewson

School reformers are paying considerable attention to the role that effective professional development can play in improving the teaching of mathematics and science. Significant contributions on this question are represented in national and state efforts to develop standards to guide reform. Some national efforts, such as those by the National Council of Teachers of Mathematics and the National Research Council, come from those who are interested in improving particular subject matter, as well as teaching and assessment. Other groups, such as the National Staff Development Council, focus on professional development itself.

Despite addressing the question from separate perspectives and disciplines, the different materials we reviewed largely reflect a common vision of effective professional development.

The Professional Development Project of the National Institute for Science Education set out to explore whether the science, mathematics, and professional development communities share a common understanding of what effective professional learning experiences look like, and how teacher development should be nurtured. We examined a variety of standards and related materials (NOTE: The materials reviewed for this brief are listed on page 4).

A Common Vision

In fact, a great deal of consensus was noted. Despite addressing the question from separate perspectives and disciplines, the different materials we reviewed largely reflect a common vision of effective professional development.

According to that shared vision, the best professional development experiences for science and mathematics educators include the following seven principles:

1. They are driven by a clear, well-defined image of effective classroom learning and teaching. This image includes:

- A commitment to the concept that all children can and should learn science and mathematics.
- A sensitivity to the diverse learning needs of individuals and people of different cultures, languages, races, and gender.
- An emphasis on inquiry-based learning, problem-solving, student investigation and discovery, and application of knowledge.
- An approach to the understanding of mathematical and scientific knowledge and skills that helps students construct new understandings, through experiences that extend and challenge what they already know.
- Development of in-depth understanding of core concepts in science and mathematic, not just breadth of coverage.
- Collaborative work.
- Clear outcomes, and assessment of progress toward them that accurately reflects meaningful achievement.

2. They provide teachers with opportunities to develop knowledge and skills and broaden their teaching approaches, so they can create better learning opportunities for students. This process includes:

Agenda – Day One

Welcome

Flash Talks

The CS PD Landscape

Translating PD to Practice

Developing Effective PD: Case Study

Enacting PD

Reflecting On The Day

Agenda – Day One

- Welcome
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Jean Westrick

Associate Director, 100Kin100 SSTEM Project, Urban Education Institute (UEI) at the University of Chciago

Your templates:

{PD Name}

Overview			
About:	{Please included a one sentence description of your PD}		
Institution	{Enter your institution/organization here}	Data for:	{Choose: 2012/13 or 2013/14}
PI/Leader:	{Name of Person in Charge}	Age of Program:	{Years in Existence for Your PD}
Location:	{Location of the PD}	School Districts:	{Districts Served}
Teachers Served			
Served:	{# served annually}	Dosage:	{# of hours per teacher}
Grade(s):	{Grade/Grade Levels taught}	Characteristics	{Pre-Service/In-Service, Course/Subjects taught, etc.}
Program Budget			
Sources:	{Funding Source(s)}	Budget:	{Annual Budget}

“Flash Talks” enable us to quickly learn from our colleagues.

1. Deepen Connections.
2. Learn from Other Strategies and Processes.
3. Highlight Successes and Challenges.

How do Flash Talks Work?

- Six rounds scheduled over the next 90 minutes.
- Three teams present simultaneously.
- Screen and handouts have round assignments.
- Each team leads one 10-min presentation, listens to five.
- Teams should split up to hear from as many others as possible.
- Connect with those you haven't heard from during breaks and lunch.

“Getting to More”

K-12 Computer Science Professional Development Design Studio

FLASH TALKS

Name/Organization	Key Ideas

Flash Talks - **Round 1**

Group	*Description*	*Presenters*
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C	**CS10K Online Community of Practice** *The internets*	Cambridge, Darren Rasmussen, Claudette

Flash Talks - **Round 2**

Group	*Description*	*Presenters*
A	**Expanding Computing Education Pathways (ECEP)** *Atlanta, GA*	Ericson, Barbara Furman, Crystal
B	**Partner4CS** *Newark, DE*	Pollock, Lori
C	**Maryland School Teachers PD** *Maryland*	Greenawalt, Joe O'Grady-Cunniff, Dianne

Flash Talks - **Round 3**

Group	*Description*	*Presenters*
A	**ComPASS - Computing Principles for All Students Success** *San Diego, CA*	Baxter, Diane Frankie, Tasha
B	**Bibb County Teacher Support** *Macon, GA*	Allen, Robert White, Laurie
C	**Exploring Computer Science** *Salt Lake City, UT*	Hu, Helen Lyman, Carl

Flash Talks - **Round 4**

Group	*Description*	*Presenters*
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Flash Talks - **Round 5**

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C	**SRI / Build IT** *Multiple States & Canada*	Koch, Melissa Meloy, Teresa Lara

Flash Talks - **Round 6**

Group	*Description*	*Presenters*
A	**Partnership for Early Engagement in Computer Science-High School (PEECS-HS)** *Washington, DC*	Washington, Alicia Chapman, Gail
B	**Stevens Point PD** *Stevens Point, WI*	Gibbs, David
C	**MobileCSP** *Hartford, CT*	Morelli, Ralph Uche, Chinma

Table Assignments

Table 1	Table 2	Table 3
Chapman, G. Diaz, L. Ericson, B. Frankie, T. Gray, J. Lee, I. Wilson, C.	Allen, R. Furman, C. Muralidhar, D. Osborne, R. Psaila-Dombrowski, M. Washington, A.	Cambridge, D. Dettori, L. Garcia, D. Gibbs, D. Pollock, L. White, L.
Table 4	**Table 5**	**Table 6**
Greenawalt, J. Harvey, B. Hu, H. Morelli, R. Rasmussen, C. Yanek, D.	Bort, H. Brown, B. Koch, M. Lyman, C. O'Grady-Cunniff, D. Uche, C.	Astrachan, O. Baxter, D. Brylow, D. Cuny, J. Kind, B. Meloy, T.

Jan Cuny

Program Director for Computing Education
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Cameron Wilson

Director of the Office of Public Policy
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Agenda – Day One

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Enacting PD

Reflecting On The Day

Jeanne Century

Director of Science Education, Research and Evaluation, Center for Elementary Mathematics and Science Education (CEMSE) at the University of Chicago

Computer Science Education: Landscape Study

- **Sample**: Worked with experts to create a list of 129 high school computer science professional development providers.
- **Access**: Survey publicly available on web site and sent through SIGSCE listserve, ACM blog post and direct outreach.
- **Timing**: August 29, 2012 – October 15, 2012.
- **Respondents**: 76 Total representing 65 unique people, 45 of which were on the original list.

BUILDING AN OPERATING SYSTEM FOR

Computer Science Education: Landscape Study

- **COHERENCE**: As a field, CS education PD providers need to move toward a more common vision and comprehensiveness.
- **CUSTOMIZATION**: As a field, computer science education PD needs to better fit the specific needs of groups that will comprise the computer science teacher workforce.
- **CLASSROOMS**: As a field, computer science education professional development needs to focus more on scaffolding teaching and learning in the classroom.

Who is providing the PD?

Issue	Less	More
Relevance and Fit	University developed professional development	University and school co-developed professional development
Priority	Higher education-driven	School and district-driven
Investment	Externally funded professional development	Co-funded professional development

Who is Participating in the PD?		
Issue	Less	More
Class Size	---	Relatively small numbers of participants
Audience	Mixed groups	Homogenous groups

Computer Science Education: Landscape Study

When, Where and How is the PD Happening?		
Issue	**Less**	**More**
Recruitment	Casting a broad net for participants in PD experiences	Targeting participants and audience for PD experiences
Exposure and Dosage	Single opportunities with little follow up	Continuing exposure to professional development experiences for more hours over longer periods of time
Isolation	Professional development out of school	School based and/or job-embedded professional development
Unreached	-	Providing opportunities where they don't already exist

What is the PD About?		
Issue	**Less**	**More**
Fit	Widely varied disciplinary content within and across PD experiences	Disciplinary content aligned to goals and target audience within PD experiences.
Fit	Widely varied pedagogical content within and across PD experiences	Pedagogical content aligned to goals and target audience within PD experiences.
Pedagogical Understanding	Vaguely defined pedagogical content.	Clarified pedagogical strategies and specified classroom applications.
Classroom Application	Isolated content and approaches	Content and pedagogy directly tied to teachers' instructional goals, curricular frameworks and/or courses.
Underrepresented	-	Attention to increasing access and equity

What Instructional Approaches do PD Providers Use?		
Issue	**Less**	**More**
Educating Teachers	---	Opportunities for teacher reflection
Educating Teachers	---	Small group discussion

BUILDING AN OPERATING SYSTEM FOR

Computer Science Education: Landscape Study

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BUILDING AN OPERATING SYSTEM FOR

Computer Science Education

Landscape Study

- Visit **tinyurl.com/CEMSEcs**

Post Lunch Table Assignments

Table 1	Table 2	Table 3
Allen, R. Chapman, G. Harvey, B. Kind, B. Koch, M. Pollock, L. Wilson, C.	Bort, H. Diaz, L. Greenawalt, J. Meloy, T. Washington, A. White, L.	Brylow, D. Gibbs, D. Hu, H. Lee, I. O'Grady-Cunniff, D. Osborne, R.
Table 4	**Table 5**	**Table 6**
Baxter, D. Cambridge, D. Gray, J. Lyman, C. Morelli, R. Psaila-Dombrowski, M.	Astrachan, O. Dettori, L. Ericson, B. Muralidhar, D. Rasmussen, C. Uche, C.	Brown, B. Cuny, J. Frankie, T. Furman, C. Garcia, D. Yanek, D.

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Principles of Effective Professional Development for Mathematics and Science Education: A Synthesis of Standards

by Susan Loucks-Horsley, Katherine Stiles and Peter Hewson

School reformers are paying considerable attention to the role that effective professional development can play in improving the teaching of mathematics and science. Significant contributions on this question are represented in national and state efforts to develop standards to guide reform. Some national efforts, such as those by the National Council of Teachers of Mathematics and the National Research Council, come from those who are interested in improving particular subject matter, as well as teaching and assessment. Other groups, such as the National Staff Development Council, focus on professional development itself.

Despite addressing the question from separate perspectives and disciplines, the different materials we reviewed largely reflect a common vision of effective professional development.

The Professional Development Project of the National Institute for Science Education set out to explore whether the science, mathematics, and professional development communities share a common understanding of what effective professional learning experiences look like, and how teacher development should be nurtured. We examined a variety of standards and related materials (NOTE: The materials reviewed for this brief are listed on page 4).

A Common Vision

In fact, a great deal of consensus was noted. Despite addressing the question from separate perspectives and disciplines, the different materials we reviewed largely reflect a common vision of effective professional development.

According to that shared vision, the best professional development experiences for science and mathematics educators include the following seven principles:

1. They are driven by a clear, well-defined image of effective classroom learning and teaching. This image includes:

- A commitment to the concept that all children can and should learn science and mathematics.
- A sensitivity to the diverse learning needs of individuals and people of different cultures, languages, races, and gender.
- An emphasis on inquiry-based learning, problem-solving, student investigation and discovery, and application of knowledge.
- An approach to the understanding of mathematical and scientific knowledge and skills that helps students construct new understandings, through experiences that extend and challenge what they already know.
- Development of in-depth understanding of core concepts in science and mathematic, not just breadth of coverage.
- Collaborative work.
- Clear outcomes, and assessment of progress toward them that accurately reflects meaningful achievement.

2. They provide teachers with opportunities to develop knowledge and skills and broaden their teaching approaches, so they can create better learning opportunities for students. This process includes:

Characteristics of Effective PD: Quick Review of Assigned Reading

1. Review the policy brief on principles for effective professional development.
2. Consider the seven principles outlined in the policy brief.
3. Make a quick list: In what ways do your PD plans align well with the recommendations? In what ways is there dissonance?
4. Discuss with your elbow partner.

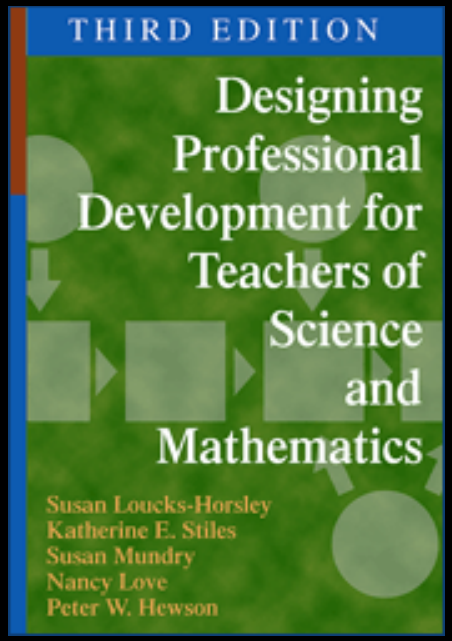
Designing Professional Development

- Need to consider goals, contexts, and stages of concern.
  - What do we want to achieve?
  - What are the contexts that impact our goals—for the PD and for the program implementation?
  - What are the needs of the participants? Where are they in their learning cycle?
- Different strategies target different needs; usually multiple strategies required.
- Lead by example: model what you preach.

Strategies for Professional Learning Jigsaw Activity

- *Designing Professional Development for Teachers of Mathematics and Science* by Loucks-Horsley et al.
- All groups read pp. 166–168 (Repertoire of Strategies).

Table 1	pp. 169-171 & 171-181
Table 2	pp. 186-189 & 190-201
Table 3	pp. 186-189 & 216-229
Table 4	pp. 236-239 & 239-251
Table 5	pp. 251-254 & 254-266
Table 6	pp. 251-254 & 266-278



Strategies for Professional Learning Jigsaw Activity

Rules of Engagement:

1. Read designated pages individually first.
2. Small-group discussion at your table.
3. Create poster for sharing.
4. Report out to full group.

Posters (For Each Strategy):

A. List key elements.
B. List possible uses in computer science PD.
C. Summarize other "takeaways" from your table discussion.

Agenda – Day One

Welcome

Flash Talks

The CS PD Landscape

Translating PD to Practice

Developing Effective PD: Case Study

Enacting PD

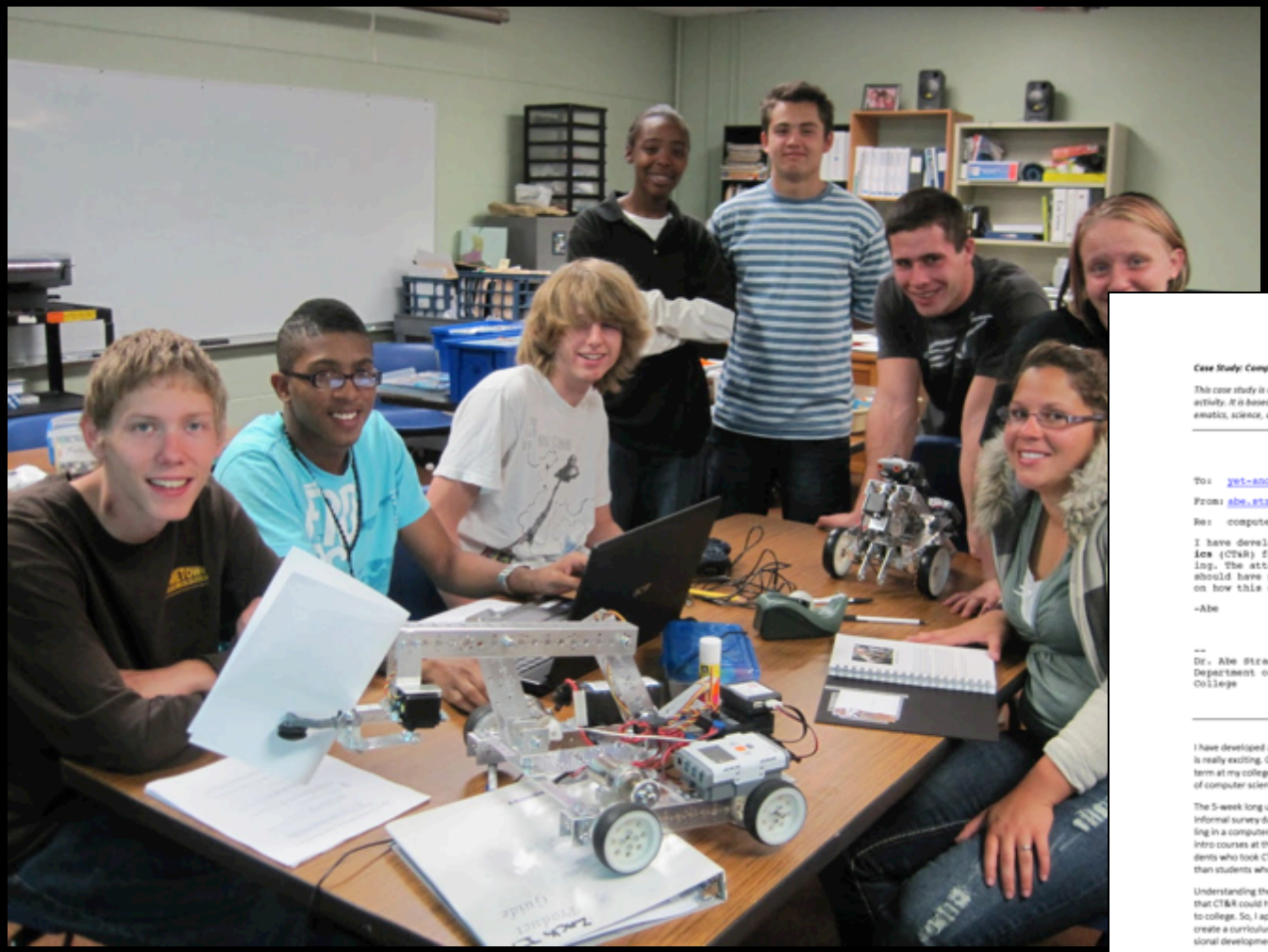
Reflecting On The Day

Baker Franke
Chair, Computer Science Department
University of Chicago Laboratory Schools

Characteristics of Effective PD: Part 2

Now you've become familiar with Principles and Strategies for Effective PD, lets look at a case study…

Case Study: CT&R PD



Case Study: Computational Thinking and Robotics Professional Development

This case study is a fictional description of a K-12 computer science professional development activity. It is based on an amalgam of observed professional development experiences in mathematics, science, and computer science.

To: yet-another-CS-listserv@computerscienceworld.org

From: abe.straction@college.edu

Re: computer science professional development for teachers

I have developed a unit called **Computational Thinking and Robotics** (CT&R) for high school computer science that is really exciting. The attached documents describe it in more detail. I feel it should have more impact than it did, so I'm looking for feedback on how this could be improved.

-Abe

--
Dr. Abe Straction
Department of Computer Science
College

I have developed a unit called **Computational Thinking and Robotics** (CT&R) for high school that is really exciting. CT&R began as a short 5-week course given in the summer and winter inter-term at my college, geared toward incoming freshmen to introduce them to foundational ideas of computer science and perhaps encourage them to take other CS courses, or even major.

The 5-week long unit had strong results at the college and students reported enjoying the unit. Informal survey data from the course showed that students were more likely to consider enrolling in a computer science course after having taken the unit than before, and enrollments in intro courses at the college did indeed tick up after the course was instituted. Furthermore, students who took CT&R as a group received higher grades in introductory CS courses on average than students who didn't, indicating that the student learning was effective.

Understanding the need to get more and better computer science into high schools, I thought that CT&R could have a great impact on changing students' attitudes about CS before going off to college. So, I applied for and received grant money from a local foundation for my team to create a curriculum for CT&R geared toward high school students, and to design some professional development supports in order to train teachers to enact the 5-week unit. My hope was

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page 1 of 7

Characteristics of Effective PD: Part 2 Reflections on a Case Study

Rules of Engagement:

1. Read the Case Study individually
2. Discuss responses to question prompts (next slide) with your elbow partner. [15 mins]
3. Discuss responses with table and prepare poster (poster prompt later) [20 mins]
4. Be prepared as a table to share (nominate a speaker?)
5. Share outs – [30 mins]

PD Case Study Discussion

Discuss with your elbow partner…

1. Was this a "good" PD? Were there good outcomes?
2. What outcomes from the PD need attention? Why?
3. Are there "less to more" issues at play? Which?
4. What strategies might have been employed to change the outcomes, or better align with principles of effective PD?

Case Study Table Poster

With your table… [20 mins]

1. What are the most important issues that surfaced in your elbow discussions?

2. Develop a poster from your table that:
   a. Identifies the 3 most important issues with the PD described in the case
   b. Identifies strategies to address each of the issues raised above.

3. Be prepared to share your poster with the group.

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Enacting PD

Reflecting On The Day

Mary Jo Tavormina
Project Director, Office of HS Development, UIC

James Lynn
Executive Director, Office of HS Development at the University of Illinois at Chicago (UIC)

Characteristics of Effective PD: Part 3 Enacting for Success

SCMI and WCMI Teacher PD Series Session
Cognitive demand and promoting students' mathematical learning

Please sit in mixed grade-level tables.

Please complete the half-sheet implementation survey and ensure you have your student work and line plot ready. Thanks!

Goals of SCMI and WCMI

- Establish a community of school districts and practitioners in Cook County that works together on:
  - Improving mathematics teaching and learning
  - Seeking joint solutions to commonly held problems involving preparing students for algebra in the middle grades and teaching algebra in 8th and 9th grades.
- Strengthen the participating districts' capacity to support improved mathematics instruction and retain highly-qualified staff.
- Support a range of mathematics improvement activities as part of a common and comprehensive mathematics initiative among participating districts.
- Improve student outcomes and success in mathematics.
- Build districts' capacity to gain a deeper understanding of the Common Core State Standards for Mathematics (CCSSM), and their capacity to implement the CCSSM in their schools and classrooms.

Goals of this Series

- Build a professional learning community across participating districts
- Support participants in improving mathematics teaching and learning
- Support participants in using MARS tasks to assess students' mathematical understanding

Goals of this Session

(page 1, bottom)

- Construct principles of math talks, reflect on questions of practice, and examine resources
- Define cognitive demand, see task features, and reflect on ways to maintain the level
- Connect ideas of cognitive demand and student discourse with the CCSSM SMP
- Reflect on the prior and plan the next re-engagement lesson, with goal and prompts

Today's Session
(page 1)

- Welcome and introductions
- Agenda, goals, and norms
- Math talks: Models, principles, and resources
- Defining and recognizing cognitive demand
- Challenges to maintaining cognitive demand
- Connections to the CCSSM SMP
- Reflect on & plan re-engagement lessons
- Next steps, reflection, and feedback

Community Agreements (Norms)

(page 2)

- No one is as smart as all of us are together
- Leave no one behind
- Respect
- Individual think time
- Everyone participates
- Everybody helps

Math Talks

A **daily ritual** with the **entire class** to develop conceptual understanding of **and** efficiency with numbers, operations and mathematics — in approximately 10 minutes per day.

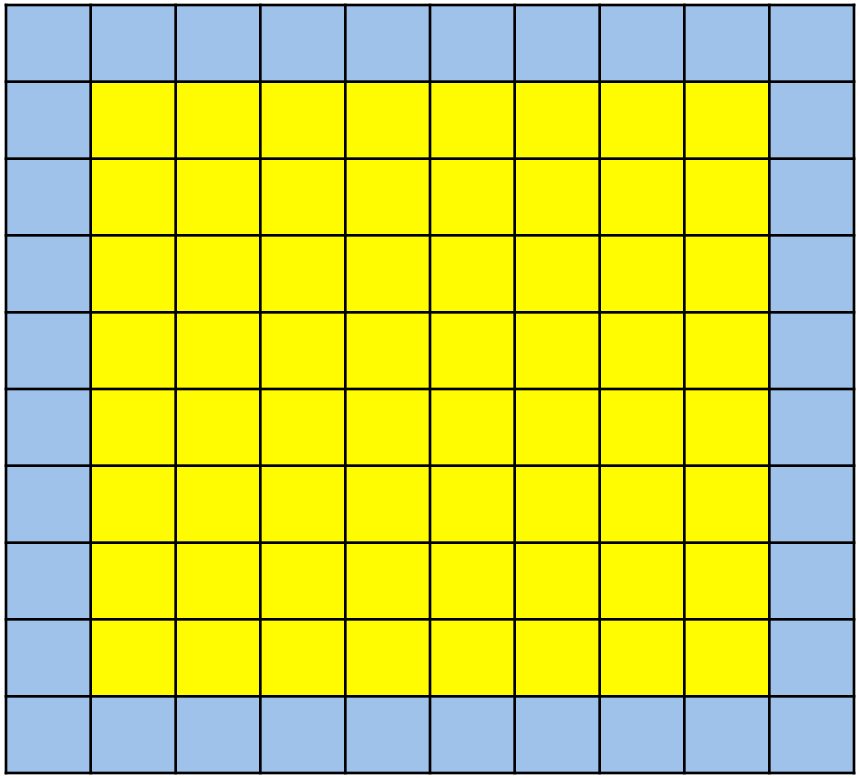
Math Talks are used to:

- Introduce concepts and properties about numbers
- Review, practice, reinforce procedures and concepts
- Explore mathematical connections and relationships

Model of a Math Talk

1. Without writing anything down, calculate the number of blue squares in the 10-by-10 grid shown.

2. Determine a general rule for finding the number of blue squares in any similar *n*-by-*n* grid.



Model of a Math Talk

The number for today is 15.

Write as many expressions as you can that are equal to 15. All the numbers in each expression must be even. Please use two or more operations in each expression.

Model of a Math Talk

$$43 + 28 = 29 + 42$$

$$43 - 28 = 42 - 29$$

$$43 \times 28 = 29 \times 42$$

Some questions to think about

Think about and discuss at your table:

- What answers might students give (that we aren't likely to)?
- As a facilitator, what do you do with the answers (both correct and incorrect)?
- For learners, how did this contrast with a traditional bell-ringer?

Math Talk Outcomes

Teachers have been using math talks for the last year and a half. What kind of outcomes are you seeing?

How do we get Math Talks to work?

Math talks may have potential, but how do we get them to work in real classrooms?

- With a partner, discuss features, routines, or teacher moves that can help make math talks **work well** to promote student learning.
- Note any **possible challenges**, concerns, or questions you have about making math talks work in the classroom.

What are some features that make math talks work well?

What are some possible challenges, concerns, or questions?

Potentially effective features

- Individual think time
- Finger signals make it safe
- Elicits multiple methods, not just right answer
- Students must talk to explain/justify method
- Students must make sense of others' methods
- Scribing helps students follow what's going on
- Visual representations can get kids talking
- Opportunities to connect and generalize

Potential challenges and concerns

- What if no one says anything?
- How do you handle wrong answers?
- What if students' explanations are unclear?
- What if students don't make connections?
- What is appropriate for teacher to say/add?
- How and when do you end the math talk?
- Can the math talk routine be modified? How?
- What if math talks are getting boring for kids?

Another family of math talks

Like many mathematical objects, problems, and tasks, math talks often come in families. Some nice features:

- Intentional use of related questions can help students make connections or generalize to infer properties
- Imposing constraints can raise the level of challenge
- Choices can adjust content focus to fit curricular topics

One family of math talks was the **number of the day** that many folks have been using.

Another interesting family of math talks is **number lines**.

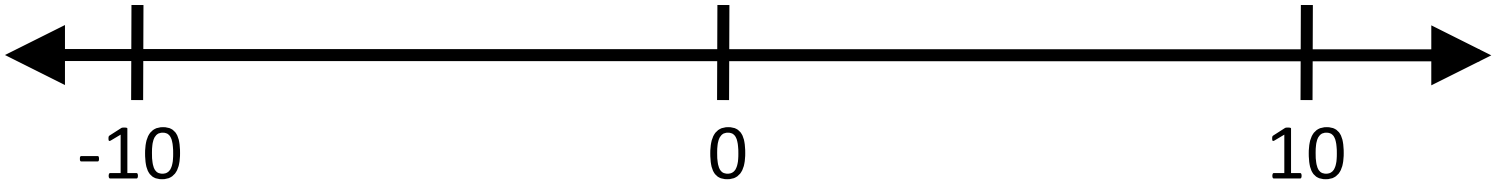
Number Lines: Estimation

What is a reasonable value for the number at the arrow? Why?

Number Lines: Estimation

About where would 835 be? 212? 315?
Justify your answers with mathematically convincing arguments.

Number Lines: Integers



Where would you place 6? -2? -9? Why?

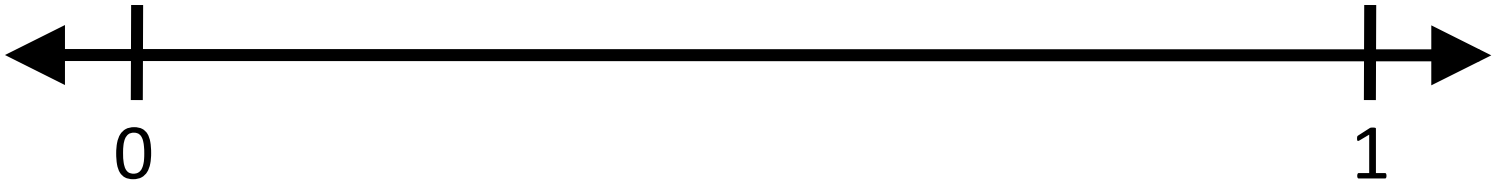
What about 6 + -2? 6 – -2? Why?

What about 3 · 2? 3 · -2? -3 · -2? Why?

Number Lines: Decimals

Where would you place 0.46? 0.7?
0.51? 0.509? 0.59?
0.8? 0.08? 0.008?

Number Lines: Probability



Where would you find a “very likely” event?

Where would you find an “impossible” event?

Where is the probability that it’ll snow tomorrow?

The probability that it *won’t* snow tomorrow?

Number Lines: Further Extensions

It doesn't stop here. Further extensions include:

- Radicals or exponents
- Solutions to a family of equations
- Solutions to inequalities
- Going to two variables: the coordinate plane
- Wrapping the number line around: unit circle

Planning Math Talks *Intentionally*

Math talks can help develop students' proficiency in making arguments and critiquing reasoning.

Just like re-engagement lessons, math talks are most effective when you:

- Have a **goal** for your use of the math talk
- Have **anticipated** potential student responses

With a partner, think about a possible **goal** for a math talk, come up with a **prompt**, and think of possible student responses (correct or incorrect).

Math Talk Resources

We've collected several resources for math talks:

- David Foster's slides with many examples
- Banks of many more examples from San Diego
- Some recommended books

To access them, go to the participant website and log in.

Then click on "**Math Talk Resources**" at left.

Cognitive Demand

Reflecting on what you read in "Analyzing Mathematical Instructional Tasks"

- *Please read through the quotes being distributed.*
- *Pick one or several that stand out to you and write a response or question on a Stickie.*
- *Put your stickie(s) up on the appropriate quote(s)*

Cognitive Demand

- Rotate around the room and read the responses.
- When you return to your table, discuss:
  - What stood out for you?
  - What are the implications for your practice?

FOUR TYPES OF TASKS

Memorization	**Procedures WITH Connections**
Low Cognitive Demand	*High Cognitive Demand*
Procedures WITHOUT Connections	**Doing Mathematics**

CONCERNS ABOUT
HIGH COGNITIVE DEMAND TASKS…

"What if my students can't do it?"

- Give your students an opportunity to surprise you with WHAT they can do.
- Give your students an opportunity to surprise you with HOW they do it.
- Are there ways to make a task more accessible without lowering the cognitive demand?

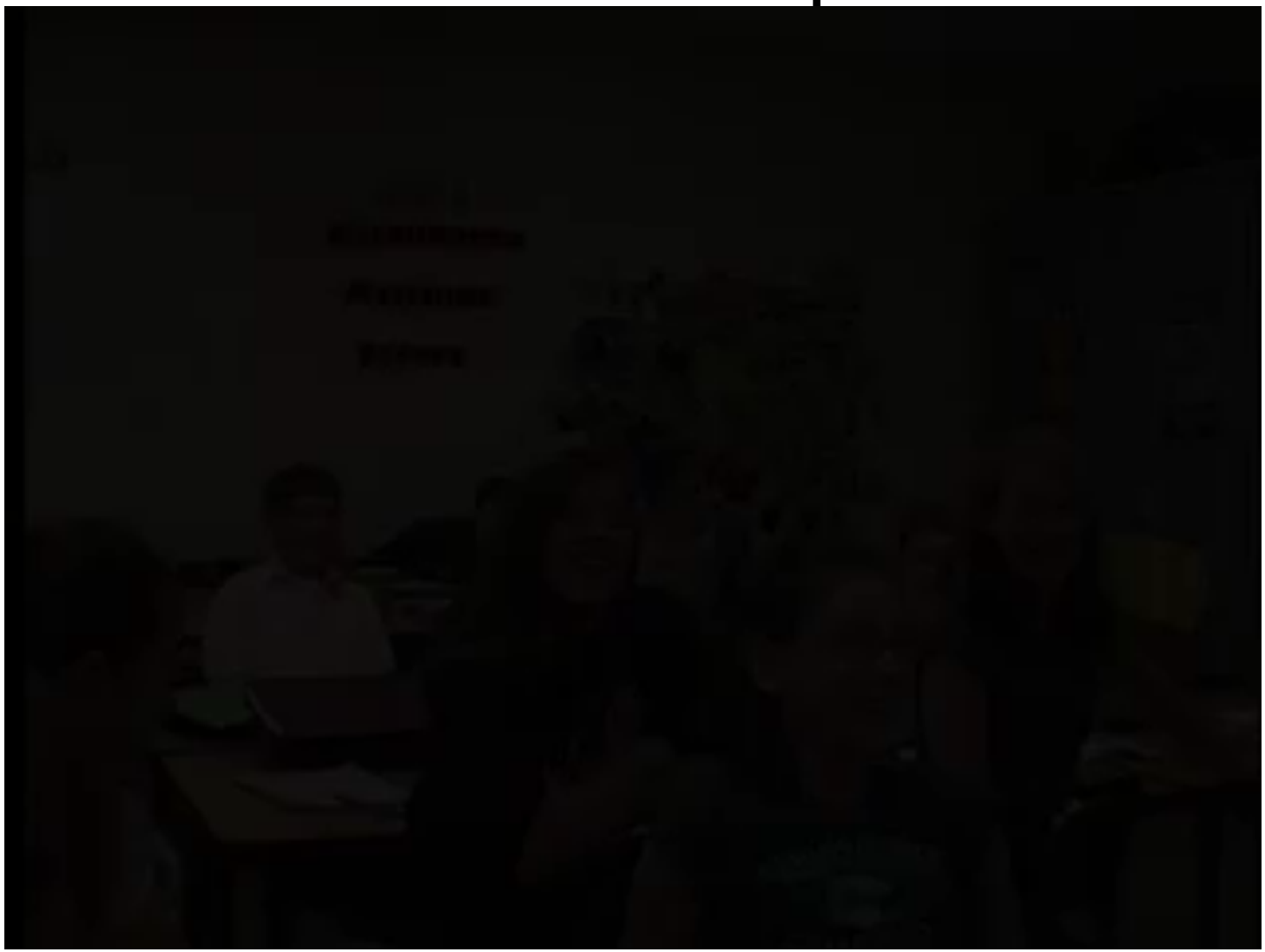
"What if my students get too frustrated?"

- Changing expectations of "instant answer" problems takes time and explicit norm-setting.
- What are lesson features that may cause students to shut down?

COMMON CORE
STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

- Refresh your memory on the Standards for Mathematical Practice (page 19)
- How does cognitive demand connect to the Standards for Mathematical Practice?
- In a moment, we will look at a lesson video. Record connections you see to the SMP on the Recording Template **focusing on #1 and #3** (page 22).

Q: What is 2/3 of a 16 oz. bag of chocolate chips?



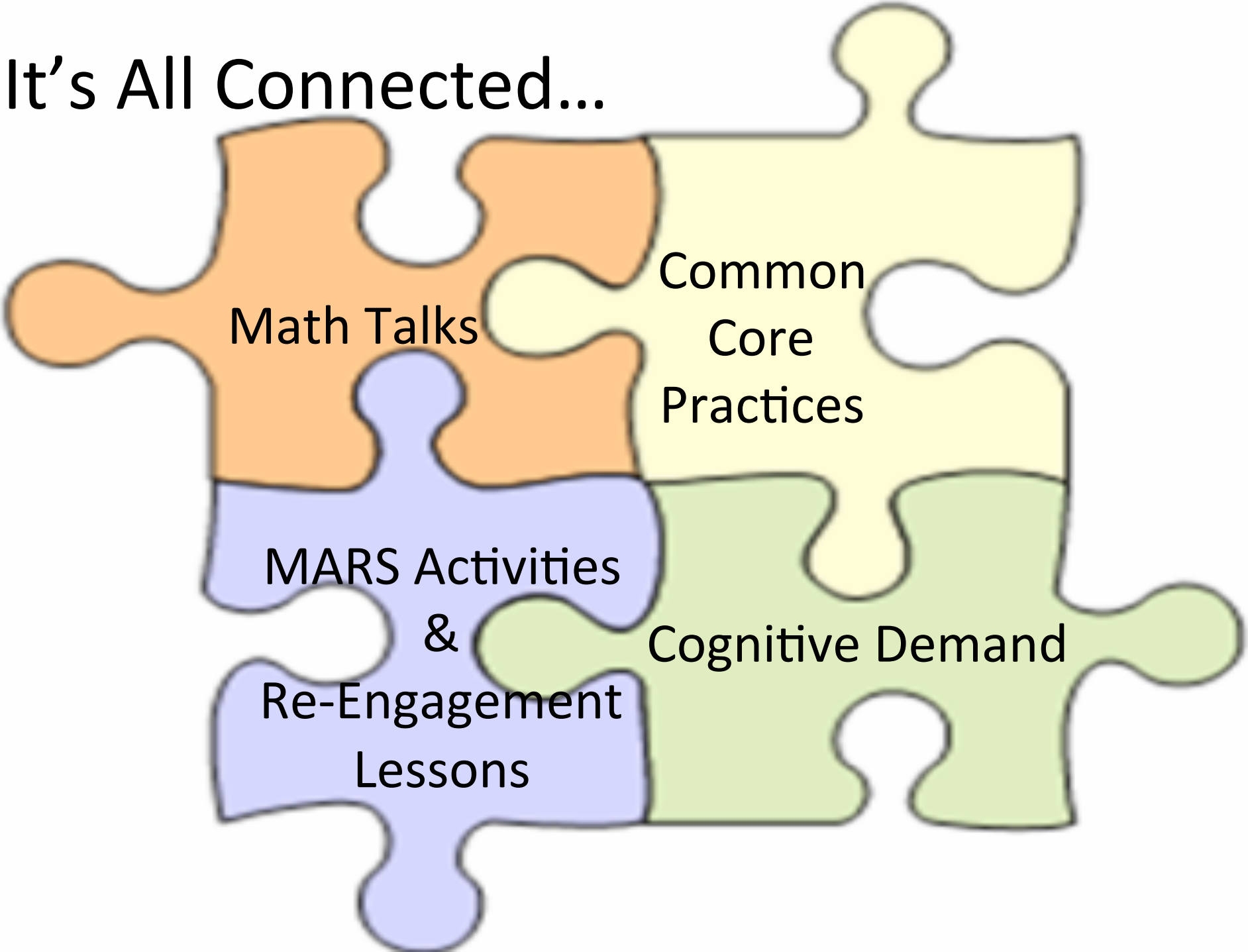
COMMON CORE
STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

What evidence did you see of students engaged in these mathematical practices? Discuss at your table.

Cognitive Demand: How to choose the appropriate level

- Consider carefully the GOALS of your lesson
- Consider ways to bring the STANDARDS FOR MATHEMATICAL PRACTICE alive.
- *Even when* your goal is procedural efficiency, consider ways to establish MEANINGFUL CONNECTIONS through your lesson.

It's All Connected…



Planning your next re-engagement lesson

- Please move into task-alike groups.
- You'll find the tools you need for planning your re-engagement lesson in your binder:
  - Understanding and misconception chart (page 23)
  - MARS Task Analysis Sheet (page 24)
  - Re-engagement planning template (pages 25-26)
  - Guiding questions for planning (page 27)

Next Steps

(Session 1 – Tab 4 – page 30 and Session 3 – Tab 6 – page 29)

Between now and our final session:

- Facilitate re-engagement lesson (RM3) you planned
- Facilitate a lesson with a MARS task as an activity (L4)
- Reflect on these experiences with colleagues
- Have students do the next MARS assessment (M4)
- Score the student work on M4 with your colleagues
- Read CCSSM Progression: Expressions & Equations

Session 4 Preview: Tentative Goals

At our final session, we plan to engage with:

- Using MARS tasks as activities including resources
- Problems of the Month (with colleagues & students)
- Structures and new activities for SCMI/WCMI Year 3
- The CCSSM: Standards for Practice and for Content

Please share your ideas about what *you* would like us to do at Session 4 in your Individual Written Reflection!

Individual Written Reflection

(Page 43)

Please take a moment to reflect on this session:

- What did you learn?
- What do you still have questions about?
- What additional support could you use?
- What will you try in your classroom?

Please also think about sources of support and share any suggestions or comments for us.

Thank You!

Thank you for your effort, engagement, ideas, and collaboration in today's session.

See you again at Session 4!

Team Reflection Grouping: 6 tables, 9 groups

Table 1	Table 2	Table 3
Baxter, D. Frankie, T. Pollock, L.	Koch, M. Meloy, T. Dettori, L. Yanek, D.	Gray, J. Muralidhar, D. Lee, I. Psaila-Dombrowski, M.
Allen, R. White, L. Greenawalt, J. O'Grady-Cunniff, D.	Hu, H. Lyman, C. Chapman, G. Washington, A.	Bort, H. Brylow, D. Gibbs, D.

Table 4	Table 5	Table 6
Astrachan, O. Diaz, L. Osborne, R. Cambridge, D. Rasmussen, C..	Garcia, D. Harvey, B. Morelli, R. Uche, C.	Ericson, B. Furman, C. Brown, B. Kind, B.

Agenda – Day One

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Enacting PD

Reflecting On The Day

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Chair, Computer Science Department
University of Chicago Laboratory Schools

In reflecting on the day…

Individually, then as a small group…please reflect and write down:

- Describe a new connection you made.
- Describe a new learning.
- Describe a old insight you had confirmed.

Reception

- Reception to be held in the Huron Room.
- Food and refreshments served.
- Continue sharing over cocktails.

Tickets to Cocktails

On your table, please fill out post-its (one each):

1. What I got from today's session…
2. What I need….
3. What I value…