Building an interdisciplinary Science of Learning: People, Ideas, and Tools to Connect Research and Education Innovation

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Science of Learning Centers Program, NSF
Challenge

• How can we harness expertise from all relevant disciplines to achieve a more comprehensive and deeper understanding of learning?
Complexity requires integration of parts
Musical training changes sound processing in the brain

Slides Provided by: Nina Kraus (Beginning)
Northwestern University
www.brainvolts.northwestern.edu
Musical experience refines brain processing for music and also speech!

“da”

— musicians
— non-musicians

Musacchia, Sams, Skoe, Kraus, PNAS 2007
Hearing speech in noise

Requires:

- tracking stimulus regularities (e.g., voice *pitch, timing & timbre*)
- excluding irrelevant information
Musicians have enhanced neural processing of speech in noise.
Hearing in noise—a very common difficulty in older adults

Problems hearing speech in noise can lead to social isolation and depression.
Older adults

better speech in noise

Parbery-Clark ....Kraus (2011) *PLOS One*
regular engagement with music influences a variety of nonmusical brain functions

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Synchronization and Attention

The Gamelan Project:
Ability of a child to synchronize correlates with attentional performance
The Gamelan Project

Initial study found significant correlation between ability at rhythmic synchrony and attentional performance. Currently preparing to conduct a randomized intervention study investigating possible translational effects of improved rhythmic synchrony through group music practice.

Alexander Khalil, Victor Minces, and Andrea Chiba, Temporal Dynamics of Learning Center, UCSD
Social Dynamics of Learning: Human, Robot, Video
Challenge

How can we better use our understanding of how people learn to inform educational practice and policy, and conversely, how can we use knowledge and experience gained from educational practice to raise questions that test and refine our research priorities for understanding learning.
Building Bridges

Knowledge and Experience

Science of Learning

Education Practice and Public Policy

People, Ideas & Technology

Translation and development

- cable
- hangers / stringers
- tower
- deck
- anchorage (for cables only)
- anchorage
Connecting Research and Educational Practice

Learning

*-Disciplinary Learning and Education

Small Scale Implementing

Building Capacity of People and Organizations

Large Scale Deploying

People

Research Development Evaluation

Research Development Evaluation

Research Development Evaluation

Research Development Evaluation

Research Development Evaluation

Anytime, Anywhere, Anybody Technology

Knowledge and Experience

Knowledge and Innovation
Current SLC Portfolio

2004 Cohort

• **CELEST:** Center of Excellence for Learning in Education, Science and Technology (Boston U)

• **LIFE:** Learning in Informal and Formal Environments (U of Washington)

• **PSLC:** Pittsburgh Science of Learning Center (Carnegie-Mellon U)

2006 Cohort

• **SILC:** Spatial Intelligence and Learning Center (Temple U)

• **TDLC:** Temporal Dynamics of Learning Center (UC-San Diego)

• **VL2:** Visual Language and Learning Center (Gallaudet U)

[www.nsf.gov/slc]
SLC Network

– Another level of added value and synergy in research, education and training

– Approximately 1000 participants, in US and over 21 countries
  • 450+ students
  • 110+ postdoctoral fellows
  • 313 faculty/researchers
  • 53 academic institutions
  • 220+ other partners (school systems, museums, industry)

– A richness of tools and other resources
Locations of SLC Centers & Partner Institutions

- LIFE
- SILC
- TDLC
- VL2
- CELEST
- PSLC
SLC Network – International Collaboration

• SLC Collaborates – Green (~20 Countries)
• Telluride Collaborate – Orange (~38)
• Spatial Network – Yellow (~16)
Thank you!

Science of Learning Centers Program

www.nsf.gov/slc