The Science of Learning and Development & Teacher Education
Or: How Learning Happens For Students and for Their Teachers
The Science of Learning & Development

Implications for Practice of the Science of Learning and Development
Linda Darling-Hammond, Lisa Flook, Channa Cook-Harvey, Brigid Barron, & David Osher

Malleability, plasticity, and individuality: How children learn and develop in context
Pamela Cantor, David Osher, Juliette Berg, Lily Steyer & Todd Rose

Drivers of human development: How relationships and context shape learning and development
David Osher, Pamela Cantor, Juliette Berg, Lily Steyer & Todd Rose

The Science of Learning & Development
Cellular Level

FROM GENETICS TO EPIGENETICS

MALLEABILITY PLASTICITY
What Matters at the Neurological Level
What Matters at the Human Systems Level
The Science of Learning & Development

• Development is fostered by experience
In Short: What We Know from Science

- The brain and the development of intelligences and capacities are plastic and malleable.

- The brain develops over the entire lifespan as a function of experiences that activate neural pathways which permit new kinds of thinking and performance. **The kinds of experience matter greatly.**

- Human capacities grow across the developmental spectrum (physical, cognitive, affective) in interactive ways.

- What happens in one domain influences what happens in others. **Emotions have physical consequences that can trigger or block learning.**
The Science of Learning & Development

Development is catalyzed & shaped by human relationships

Secure attachment, positive regard, mediating sensemaking, buffering stress
The Science in Action

• Experiences & relationships activate neural pathways
• Learning is social
• Emotion and learning are linked
• Authentic tasks motivate effort
• Feedback shapes learning
• Language generates thinking (as well as representing it)
The Science of Learning & Development

Developmental experiences provide opportunities to ACT and REFLECT
Multiple languages / symbol systems matter. Cognitive flexibility is enhanced by music, art, and world languages.
There are general trends in development, yet the processes of development are individual, influenced by the interaction between unique aspects of the child and his/her family, community, and classroom contexts.

Thus, schools must be designed to attend to the unique needs and trajectories of individual children as well as to patterns of development.
The Development of Neural Networks

Is enhanced by:
• Social interaction
• Rich environments
• Green space
• Physical activity
• Mental activity
• Mindfulness
• Emotional & cultural well-being

Is impaired by:
• Stress
• Anxiety
• Loneliness
• Sleep disruption
• Dietary deficiencies
• Toxins
• Identity threats
What Kind of Schools Are Needed?
The problem is fundamental. Put twenty or more children of roughly the same age in a little room, confine them to desks, make them wait in lines, make them behave. It is as if a secret committee, now lost to history, had made a study of children and, having figured out what the greatest number were least disposed to do, declared that all of them should do it (p. 115).

The Need to Redesign School

Tracy Kidder (1989) Among Schoolchildren
Implications for Practice

1. Organizational supports for attachment and relationships
2. Curriculum, teaching, and assessment that support learning
3. Intentional social, emotional, and academic development
4. Multi-tiered systems of support
5. Educator Development
I. Environmental conditions that support success along the developmental and learning continuum include

- supports for positive, trusting relationships,
- attachment and emotional connections,
- physical and emotional safety, and
- a sense of belonging and purpose;
Supports for Attachment and Relationships

• *Structures for personalization* that enable adults to know students well, so they can teach them well:
  
  • *School structures* – small schools or small learning communities; continuous relationships provided by looping and advisory systems, block scheduling; longer grade spans for schools;
  
  • *Classroom practices* – supportive classroom communities; culturally competent teaching practices that help teachers know their students well;
  
  • *Relational trust and collaboration* among staff and with families -- planned teacher time for home visits, outreach to parents, positive calls home.
II. Curricular designs & instructional strategies that support academic capacity, competence, efficacy, and motivation:

Well-scaffolded instruction and ongoing formative assessment that
• takes students’ prior knowledge, cultural practices, & experiences into account;
• provides the right amount of challenge and support on relevant, engaging tasks;
• integrates inquiry & explicit instruction, reduces cognitive load, stereotype threat
• supports metacognition, learning to learn, & growth mindset through feedback, reflection, & revision.
III. Support for the Development of Social, Emotional, and Cognitive Skills, Mindsets, and Habits

- Self-regulation
- Executive function
- Intrapersonal awareness
- Interpersonal skills
- Growth mindset and
- A sense of agency that support resilience and productive action.
Mindsets Matter

How people interpret events and *make meaning* shapes their development

Meaning is deeply cultural
Development of Mindsets

• Students should receive guidance and support to develop habits and mindsets that promote perseverance, resilience, and the ability to take and use feedback productively

• Support key mindsets that support academic success:
  1) a feeling of belonging at school,
  2) belief in the value of the work,
  3) belief that effort will lead to competence (growth mindset), and
  4) a sense of self-efficacy

• ..by affirming competence and structuring opportunities for mastery on authentic tasks (practice, feedback, support, revision, recognition)
Conditions for Social, Emotional, and Academic Development

Regular opportunities to learn and integrate social, emotional, and cognitive skills throughout the day.

Guidance to develop skills, habits, and mindsets that promote perseverance, resilience, agency (e.g., executive function, stress management, growth mindset).

Educative and restorative behavior supports that foster belonging rather than exclusion.

Identity Safety
Educative and Restorative Behavioral Supports

Behavior supports and practices should aim to be educative and restorative rather than punitive and exclusionary.

- Explicitly teach skills
- Encourage students to take responsibility
- Enable students to make amends and proactively contribute to their community.
IV. Structures that reach beyond the classroom to provide systems of academic and social support.

These include personalized supports that respond to students’ needs and address adversity.
• **Multi-tiered systems of support** addressing learning barriers and other needs based on a shared developmental framework that unites staff, providers, and families

• **Integrated Services**: Access to health and mental health services, as well as learning supports, via on-site supports and community partnerships.

• **Extended Learning Time**: Tutoring, mentoring, after school enrichment, summer school that supports social & academic learning
Educator Development Should Emphasize

Knowledge of and support for child and adolescent development and learning across all domains

Development of practices that support integrated social, emotional, and cognitive development

Development of a curricular vision that supports progress across domains

Development of cultural knowledge and competence, including capacity to engage with families / communities

Development of wide repertoire of skills and resources for scaffolding student learning and meeting needs

Development of practices for teaching metacognition and strategies for “learning to learn”
How Can Teachers Learn These Skills?

Linda Darling-Hammond
Jeannie Oakes

PREPARING TEACHERS FOR DEEPER LEARNING

EMPOWERED EDUCATORS
HOW HIGH-PERFORMING SYSTEMS SHAPE TEACHING QUALITY AROUND THE WORLD
How Teacher Learning Happens

CREATE EXPERIENCES

DEVELOP RELATIONSHIPS THAT SUPPORT CHANGE

SUSTAIN THESE THROUGH COMMUNITIES OF PRACTICE

EVERYTHING STUDENTS NEED FOR THEIR LEARNING, TEACHERS NEED
| Coherent vision of learning enacted across all courses and clinical experiences |
| Strong knowledge base in development and learning APPLIED to practice |
| Modeling of practices within university courses and clinical settings |
| Immersion in settings that support cultural learning |
| Careful child study focused on contexts and learning |
| Performance assessments in which candidates demonstrate practices |
| Ongoing feedback, consultation, and collaboration |
| Engagement in research about practice |
A goal for nations that want to support learning

“Those who can, do. Those who understand, teach.”

“Those who can, teach. Those who can’t go into a less significant line of work.”