From the Brain to the Classroom: Supporting Self-regulation of Children Birth to Five in Early Care and Education

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Agenda

• Underscore critical nature of early brain development
• Define and describe self-regulation and executive function for young children
• Provide real-world illustrations of self-regulation in the classroom
• Note facilitative role of early care and education providers and classrooms
Why should early care providers know about children’s brain development?

- Brain development is **highly dependent** upon early experience
Brain is ‘Wired’

• Each brain is ‘wired’ differently
  – ‘Wiring’ = the architectural design of the brain
  – What we learn creates unique neural connections

What YOU do in the classroom has a direct impact on children’s brain development!
Structure of Neuron

- Brain is made up of several billion brain cells, or neurons, that send ‘messages,’ or electrical signals, to other neurons.
- Connections, or ‘synapses,’ are formed when ‘messages’ are transferred from the end of a neuron (axon) to the start of the next neuron (dendrite).
Developmental Process

• 75% of our brain develops AFTER birth, most of which occurs in the **first five years of life**

• “Use it or lose it” = Only those connections that are frequently activated or “**in use**” are retained

Source: http://www.ala.org/alsc/issuesadv/bomtoread/resources
Brain Plasticity in Early Years

- **Brain plasticity** = the brain’s ability to change and adapt as a result of experience
- Brain is most flexible, or “plastic” early in life

Source: P. Levitt (2009)
Timing of Brain Development

- Critical periods in children’s lives when specific types of learning take place
- Skills beget skills

What are Executive Function and Self-Regulation?

Executive Function
A group of skills that help us to focus on multiple streams of information at the same time, set goals and make plans, make decisions in light of available information, revise plans, and resist hasty actions.
Executive Function Components

Executive Function

- Inhibitory Control
- Working Memory
- Mental Flexibility
Inhibitory Control

• Inhibitory control involves resistance of one impulse in favor of another

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<thead>
<tr>
<th>Age</th>
<th>Developmental Sequence</th>
<th>Real World Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-16 months</td>
<td>Begin to maintain focus even in the face of a minor distraction</td>
<td>Maintain eye contact with page of a book with sibling playing loudly nearby</td>
</tr>
<tr>
<td>2-5 years</td>
<td>Delay first response, based on an arbitrary rule</td>
<td>Stay seated on carpet square and wait turn to hold the pet rabbit</td>
</tr>
<tr>
<td>Adults</td>
<td>Demonstrate self-control appropriate to situation</td>
<td>Keep quiet when boss voices different political views from you</td>
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Inhibitory Control Example

• Marshmallow Experiment
  – Walter Mischel
Working Memory

- Working (short-term) memory is **where we hold information while trying to make sense of or manipulate it**

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<td>Simple, brief recall tasks</td>
<td>Remember when a block is hidden under a blanket</td>
</tr>
<tr>
<td>2-5 years</td>
<td>Recall and act on 2+ rules</td>
<td>Put your shoes in your cubby, wash your hands, then get snack</td>
</tr>
<tr>
<td>Adults</td>
<td>Recall multiple rules</td>
<td>Playing chess</td>
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Mental Flexibility involves adjusting to change, modifying cognitive processes in the face of new tasks, and applying prior knowledge to new and unfamiliar situations.

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<td>Seek alternate methods when initial try fails</td>
<td>Understand need to reach around something that’s in the way of toy</td>
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<td>2-5 years</td>
<td>Shift actions as rules change</td>
<td>Now it’s time to head to the water table (coming from circle time)</td>
</tr>
<tr>
<td>Adults</td>
<td>Revise actions and plans under changing circumstances</td>
<td>Teaching children print concepts, then stopping to intervene in a peer conflict</td>
</tr>
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Executive Function in Action

• Video examples of executive function and self-regulation within ECE settings
Development of Executive Function

Source: Weintraub et al. (2011)
Why is Executive Function Important?

Executive Function Skills

School Readiness, Academic and Social Outcomes
Benefits of Executive Function

• Executive function skills are more strongly related to school readiness than IQ or entry-level reading and math skills (Diamond, Barnett, Thomas & Munro, 2007)

• Children with greater executive function skills:

  ✓ Perform better on early math and reading measures (Blair & Razza, 2007)

  ✓ Have better social emotional outcomes (McClelland, Cameron, Wanless, & Murray, 2007)

  ✓ Develop critical skills such as teamwork, decision-making, working toward goals, and critical thinking (Harvard CDC, 2011)
What Facilitates Executive Function Development?

• Positive relationships

• Everyday interactions with adults and peers

• Safe, secure, and structured environments
Neglect and the Brain

• Children in Romanian orphanages have problems with social skills, attention and comprehension.

• Children raised in these under-stimulating environments, i.e. rarely touched or spoken to, are found to have brains that are 30% smaller than most children their age.
Toxic stress can do damage to the neuron and, in turn, weaker neurons lead to weaker brain architecture.

Source: Center on the Developing Child, Harvard University
Effective Teaching through Interactions

**DOMAINS**

1. **Emotional Support**
   - Positive climate
   - Negative climate
   - Sensitivity
   - Respect for student perspective

2. **Classroom Organization**
   - Behavior management
   - Productivity
   - Instructional learning formats
   - Maximize time, Efficient routines and transitions

3. **Instructional Support**
   - Concept development
   - Quality of feedback
   - Language modeling
   - Analysis/reasoning, Creativity, Integration

**DIMENSIONS**

1. **Emotional Support**
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**INDICATORS**

1. **Emotional Support**
   - Relationships, Affect, Respect, Communication
   - Punitive, Sarcasm/ disrespect, Negativity
   - Aware, Responsive, Address problem, Comfort
   - Flexibility, Autonomy, Student expression

2. **Classroom Organization**
   - Clear expectation, Proactive, Redirection
   - Maximize time, Efficient routines and transitions
   - Variety, Promote student interest, Clarity, Engaging

3. **Instructional Support**
   - Analysis/reasoning, Creativity, Integration
   - Feedback loops, Encourage responses, Expand performance
   - Conversation, Open-ended, Repeat/extend, Advanced language
Early Experiences Matter!

- Video examples of teacher-child interactions
  - Infant
  - Toddler
  - Preschool
  - Kindergarten
Observations in over 4,000 classrooms indicate room for improvement in the ECE field.
Implications for ECE Settings

• **Key Point:** The brain is remarkably adaptive
  
  – Never too late to provide learning opportunities, but **starting early** provides the most promise for long-term benefits
  
  – Prior learning, across developmental domains, sets the stage for subsequent learning
Implications for ECE Settings

• **Key Point:** Language/literacy and math skills are essential, but not sufficient to ensure school success
  – Executive function and self-regulation provide the underpinnings to academic learning
  – Executive function and self-regulation need to be explicit targets of early care and education efforts
    • Increase complexity of skills within a zone of comfort
    • Provide repeated opportunities for practice of skills
Implications for ECE Settings

- **Key point:** Brain development and learning are maximized in an environment of rich, supportive social interactions
  - Dependable, nurturing relationships are foundational to growth
  - Need professional development and training for early care and education providers that fosters these types of interactions
Acknowledgments

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