Measuring What Matters
Capturing Montessori Outcomes
What we’ll Discuss

1. What’s Going on with Testing and Montessori?
   - Measuring what Counts — at least currently

2. What are Montessori Students Actually Learning?
   - Executive Functions
   - Deep Literacy
   - Social Fluency and Emotional Flexibility

3. How do we Measure What Matters?
Outcomes that Count

- Performance on Standardized Tests
  - Reading, Math, Writing, and sometimes Science
- Attendance and Retention
- School Matriculation after Montessori
How did we get Here?

- Lewis Terman imports intelligence test to U.S.
- The Committee of Ten publishes report
- 1893

- Thorndike develops first popular achievement test
- binet creates first intelligence test
- 1905

- First mass testing of Army recruits
- 1916

- Lewis Terman creates the Stanford Achievement Test
- 1917

- Metropolitan Achievement Test created
- 1923

- Iowa Test of Basic Skills created
- 1932

- Rudolf Flesch writes *Why Johnny Can't Read*
- 1935

- Soviet Union launches Sputnik
- 1955

- National Defense Education Act
- 1957

- The Elementary and Secondary Education Act
- 1958

- National Assessment of Education Progress (NAEP) initiated
- 1965

- National Education Summit convened (America 2000)
- 1969

- A Nation at Risk report published
- 1983

- NAEP expanded to include state-by-state comparisons
- 1989

- No Child Left Behind Act signed into law
- 1994

- Goals 2000: Educate America Act signed into law
- 2001
What’s Going on with the Test?

Who has mastered it?

Who has not?

What can we do to move the latter group into the former?
Adequate Yearly Progress

<table>
<thead>
<tr>
<th>Year</th>
<th>Adequate Yearly Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>29%</td>
</tr>
<tr>
<td>2007</td>
<td>28%</td>
</tr>
<tr>
<td>2008</td>
<td>35%</td>
</tr>
<tr>
<td>2009</td>
<td>33%</td>
</tr>
<tr>
<td>2010</td>
<td>39%</td>
</tr>
<tr>
<td>2011</td>
<td>48%</td>
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</table>

Source: Center on Education Policy,
## Common Assessments

<table>
<thead>
<tr>
<th>NWEA MAP</th>
<th>DIBELS</th>
<th>DRA</th>
<th>STAR</th>
<th>AIMS WEB</th>
<th>PARCC</th>
<th>SBAC</th>
<th>STATE TESTS*</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

**STATE TESTS**:
- Canada
- Indiana
- Iowa
- MA
- Missouri
- SAGE (Utah)
- TN Ready

**OTHER**:
- ACT
- CAASP
- Fountas & Pinnell
- Benchmark
- Fundamental Skills
- Assessment Reading Inventory
- I-Ready
- Math Lab
- MAT
- QCA
- WRAT
# Types of Assessments

<table>
<thead>
<tr>
<th>Type</th>
<th>Purpose</th>
<th>Examples</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal Screens</td>
<td>• Diagnostic</td>
<td>• Parent Questionnaires</td>
<td>Baseline knowledge will support instruction for all</td>
</tr>
<tr>
<td></td>
<td>• Baseline Measurement</td>
<td>• PPVT</td>
<td></td>
</tr>
<tr>
<td>Formative/Generative</td>
<td>• Diagnostic</td>
<td>• Self-correcting materials</td>
<td>Feedback will help improve performance</td>
</tr>
<tr>
<td></td>
<td>• Generate knowledge to support improved subsequent performance</td>
<td>• Targeted Observation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conferences</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Critique/Feedback on work</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Progress Reports</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DRA/DIBELS*</td>
<td></td>
</tr>
<tr>
<td>Interim/Benchmark</td>
<td>Predict performance on Summative Assessment</td>
<td>• MAP, Star</td>
<td>Identified learning “gaps” can be filled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• District Benchmarks</td>
<td></td>
</tr>
<tr>
<td>Summative</td>
<td>Determine proficiency levels</td>
<td>• PARCC, SBAC, State</td>
<td>Documenting performance is necessary for accountability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Final Exams/Presentations</td>
<td></td>
</tr>
</tbody>
</table>
Other includes: Social & Emotional Learning, Science, Social Studies
Worst Performance

Other includes: Social Studies, All

Concepts are there; Wording and sequencing often confusing
Outcomes that Matter

Conversation
Engagement/Focus
Reading
Inquiry/Flexible Thinking
Use of Evidence
Well being

THE END OF THE RAINBOW
How Educating for HAPPINESS (Not Money) Would Transform Our Schools
SUSAN ENGEL
Outcomes that Matter

Focus/Self-Control
Perspective Taking
Communicating
Making Connections
Critical Thinking
Taking on Challenges
Self-directed, Engaged Learning
Outcomes that Matter

Collaboration
Communication
Content
Critical Thinking
Creative Innovation
Confidence

BECOMING BRILLIANT
What Science Tells Us About Raising Successful Children

ROBERTA MICHENIK GOLINKOFF, PhD
and KATHY HIRSH-PASEK, PhD
## Outcomes that Matter

<table>
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<tr>
<th>Initiation &amp; Concentration</th>
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<th>Working Memory</th>
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Outcomes that Matter

- Initiation & Concentration
- Inhibitory Control
- Working Memory
- Linguistic & Cultural Fluency
- Social fluency & Emotional Flexibility
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<td>Proficiency in spoken and written language</td>
<td>Responding to social cues</td>
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<tr>
<td>Being Alert</td>
<td>Resisting impulses</td>
<td>Relating one idea to another</td>
<td>Proficiency in interpreting cultural attitudes &amp; expectations</td>
<td>Understanding emotions; recovering from disappointment</td>
</tr>
<tr>
<td>Orienting</td>
<td>Shifting when necessary</td>
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</tr>
<tr>
<td>Persistence Cognitive Flexibility Adaptation Self Regulation</td>
<td>Planning Prioritizing Reflecting</td>
<td>Perspective Taking Adaptability</td>
<td>Empathy Compassion Resilience</td>
<td></td>
</tr>
</tbody>
</table>
THE 4 PLANES OF DEVELOPMENT

THE «BULB»

FINALITY
18
21
MAN

12
PUBERTY

6
DEVELOPMENT OF MAN

3
FORMATION OF MAN

0
NEBULAE

CONCEPTION

THE UNCONSCIOUS LABORATORY

CRECHE
PRE-SCHOOL
FROEBEL

NEBULAE

THE UNCONSCIOUS LABORATORY

CRECHE
PRE-SCHOOL
FROEBEL

ELEMENTARY SCHOOL

PESTALOZZI

HIGH SCHOOL
HERBART [ETC.]

UNIVERSITY
CIVILIZATION

X

MARIA MONTESSORI
ROMA-1951
**EF’s and Human Development**

![Diagram showing the development of executive functions (EFs) across different stages of human development.](image)

- **INFANCY (0-3 years):** Physical Independence
  - Cognitive Flexibility
  - Inhibitory Control
  - Concentration

- **CHILDHOOD (6-12 years):** Mental Independence
  - Anticipating Obstacles
  - Judgment/Planning
  - Error-Correction

- **ADOLESCENCE (12-18 years):** Social Independence
  - Leadership
  - Collaboration
  - Innovation
  - Risk-Taking

- **MATURITY (18-24 years):** Moral Independence
  - Collaboration
  - Innovation
  - Risk-Taking
  - Leadership
Measuring Outcomes
Angeline Lillard1* and Nicole Else-Quest2

Evaluating Montessori Education

We evaluated the social and academic impact of Montessori education. Children who were accepted to Montessori schools performed better on basic thinking skills than those who were not accepted. This was true for both 5-year-olds and 7-year-olds.

**Results for 5-year-olds.**

- **Cognitive/Academic Measures**
  - WJ letter-word
  - WJ word attack
  - WJ applied math
  - False belief (social cognition)
  - Refers to justice
  - Positive shared play
  - Ambiguous rough play

**Tasks**

- Spatial Reasoning and Concept Formation—Abstraction
- Identification (a treat) did not indicate statistical differences favoring Montessori 5-year-olds.

**Figure:**

*Down is better*
Interventions Shown to Aid Executive Function Development in Children 4 to 12 Years Old

Montessori and controls.

We all children need to be instructional, self-regulated, and socially skilled. Children in Montessori programs are more cooperative, motivated, and self-directed than children in traditional programs. In addition, Montessori programs have higher academic and social outcomes relative to a sample of Montessori students.

Fig. 4. In this 12-year-old, Montessori students showed significantly better performance than control students across all executive functions (EFs), the cognitive control functions needed when carrying out complex tasks.

Montessori vs. Control

Sophisticated sentence structures
Creative story
Positive social strategies
Sense of school as community

Age 12
Growth Over Time
Minnesota Executive Function Scale (MEFS)

- Engaging iPad tablet game
- Administered one-on-one
- Children sort virtual cards into two boxes according to rules and make a rule-switch, with increasing difficulty across 7 levels
Average MEFS Adjusted Score Age 2.5-7 Years
(N = 8,030)
Profile Summary

Description

<table>
<thead>
<tr>
<th>Well below age norms</th>
<th>Moderately below age norms</th>
<th>Age typical (low)</th>
<th>Age typical (high)</th>
<th>Moderately above age norms</th>
<th>Well above age norms</th>
</tr>
</thead>
</table>

Interpretation Key

*Well below age norms:* Compared to other children at this age, child lacks proficiency in executive function.

*Moderately below age norms:* Compared to other children at this age, child is somewhat less proficient in executive function.

*Age typical (low):* Child’s proficiency in executive function is typical for children at this age.

*Age typical (high):* Child’s proficiency in executive function is typical for children at this age.

*Moderately above age norms:* Compared to other children at this age, child is somewhat more proficient in executive function.

*Well above age norms:* Compared to other children at this age, child is highly proficient in executive function.
Look, I have these boxes here. This one is orange and this one is green. This is the color game. In the color game, all the orange ones go here and all the green ones go here. (tap + button)
See, here's a green one. It goes in the green box. (E drag)
And here's an orange one. It goes in the orange box. (E drag)
Now it’s going to be your turn to play the color game! (tap + button)
Can you put this green one where it goes? (child drag)
Can you put this orange one where it goes? (child drag)
Can you put this orange one where it goes? (child drag)

Okay let's play.
Press Continue button when ready.

Continue
Tracking Growth In EF's

MEFS Scores Over Time by Site

Total Number of Children: 498
Percent Low Income: 65
Creativity and Math

Divergent Tasks

- Numbers
- Figures

Montessori
Control
Creativity and Math

Convergent Tasks

- Numbers
- Figures

Montessori
Control
SURVEYS
Please circle the response that best describes you

1. I am well-prepared for the work that is expected of me in my new school
   Very much   Mostly   Somewhat   Not much   Not at all

2. I enjoy most of the work I am expected to do at my new school
   Very much   Mostly   Somewhat   Not much   Not at all

3. When focused on a task, I usually stick with it until it is complete
   Very much   Mostly   Somewhat   Not much   Not at all

4. I am really good at ____________________________________________

5. I am less good at ____________________________________________

6. When I have trouble with work, I feel comfortable asking for help
   Very much   Mostly   Somewhat   Not much   Not at all

7. When conflicts happen at school, I try to help resolve them peacefully
   Very much   Mostly   Somewhat   Not much   Not at all

8. When I see another student having difficult, I try to help them
   Very much   Mostly   Somewhat   Not much   Not at all

9. I generally get along with my classmates
   Very much   Mostly   Somewhat   Not much   Not at all

What else would you like to tell us about your experience in your new school?
Dear (insert name of teacher),

We are committed to ensuring that our graduates are well prepared for the challenges of new learning environments. We appreciate you taking a few minutes to complete the questionnaire below.

Please circle the response that best describes this student:

1. The student is genuinely curious about the academic work offered in my classroom
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

2. The student has strong interests in certain subjects and communicates those interests clearly
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

3. When focused on a task, the student sticks with his/her work until it is complete
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

4. The student seems happiest when engaged in highly concentrated work
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

5. The student has overcome setbacks in order to meet an important challenge
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

6. When a classmate or peer is in need, the student offers to help
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

7. When conflicts arise, the student participates in peaceful resolutions
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

8. When encountering problems or challenges, the student asks for help
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

9. The student is adept at working or playing as part of a team
   - Very much
   - Mostly
   - Somewhat
   - Not much
   - Not at all

What else would you like to tell us about this student?
Longitudinal Documentation

2015 Alumni

Curiosity
Persistence
Empathy
Collaboration

Student Evaluation
Teacher Evaluation
What’s going on with this child?

• What is she doing?
• What is she ready for?
• What interests her?
• What is in her way?
Measuring Inputs
WHAT’S GOING ON IN THIS CLASSROOM?

<table>
<thead>
<tr>
<th>CHILD/CHILDREN</th>
<th>ADULTS</th>
<th>ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WHAT ARE CHILDREN LEARNING?
Common Assumptions of Quality

Teacher

Direction
Feedback
Monitoring

Student
The Developmental Core
Overview

2014-2016
Tool Development

Fall 2016
App Development

Jan 2017
DERS Network Launched

July 2017
Working Paper Published

Feb 2018
Training Platform Launched

April 2018
DERS 2.0 Launched

TODAY
73 Schools/Training Centers
225 Individuals Trained/Introduced
145 Certified Observers
Why DERS

Capturing the complexity of developmental learning environments

<table>
<thead>
<tr>
<th>Formative Assessment</th>
<th>Summative Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Walk-Through/Rounds</td>
<td>• Quality Rating Assessments</td>
</tr>
<tr>
<td>• Self-Assessment</td>
<td>• As one data-point in:</td>
</tr>
<tr>
<td>• Coaching</td>
<td>• Teacher Evaluation</td>
</tr>
<tr>
<td>• Professional Development</td>
<td>• 360 Program Evaluation</td>
</tr>
<tr>
<td>• Calibrating definitions of quality</td>
<td>• Program Accreditation</td>
</tr>
<tr>
<td>• Tuning up observation protocols</td>
<td></td>
</tr>
</tbody>
</table>
OUTCOMES THAT MATTER

**EFs**
- Initiation
- Concentration
- Inhibitory Control
- Working Memory

**Language/Culture**
- Linguistic Fluency
- Cultural Competence

**Social/Emotional**
- Trust
- Empathy
- Resilience
- Confidence

**Attention**
- Organization
- Planning

**Joy**
- Reason
- Curiosity
- Creativity

**Perspective Taking**
- Persistence
- Attachment to Reality
- Risk

**Communication**
- Conversation
- Social Cues
- Conflict Resolution

**Self-Regulation**
- Reason
- Curiosity
- Creativity
ATTRIBUTES THAT MATTER

**EFs**
- Precision
- Extended Activity Sequences
- Self-Correction

**Culture/Language**
- Real Objects
- Real Work
- Repetition/Imitation
- Objects for naming
- Singing
- High Interest print material

**Social/Emotional**
- Friendliness with Error
- Voluntary social activity
- Predictability
- Order
- Safety
- Warmth
- Trust between children & adults

**Clarity**
- Observation
- Wonder
- Invitation

**Repetition/Imitation**
- Stories/Pictures
- Conversation
- Soft Voice
- Access to Nature
- Conflict
- Resolution
Magnitude Attributes

- Materials ready for use
- Mixed age grouping
- Multisensory
- Natural materials
- Plants
- Presence of digital technology
- Real tools and real work
- Uninterrupted work

Click here once you complete the observation
FINISH OBSERVATION
Magnitude Attributes

- Caring for classroom
- Completes a work cycle
- Conversation
- Disrupting
- Engaging with purpose
- Joy
- Misusing materials
- Navigating the room with care

Click here once you complete the observation
FINISH OBSERVATION
Joy

- Smiling, laughing, singing.
- Clearly comfortable in the environment.
- Expressing satisfaction with work.
- Peaceful.

0: No children are observed exhibiting joy.
1: Some children exhibit joy.
2: Most children exhibit joy.
3: Almost all children exhibit joy.
Review Observation

Frequency Attributes

- Caring for classroom
- Completes a work cycle
- Converson
- Disrupting

Magnitude Attributes

- Engaging with purpose
- Joy
- Misusing materials
- Navigating the room with care

Done
Report for Grabowski classroom

Organization Name: Practice School
Class Name: Grabowski
Observation Date: 04/12/2018
Duration: 00:12:27

Initiation & Concentration

A few students initiate work, but most work is directed by adults. Many children sought approval or permission from the teacher. Adults shared genuine enthusiasm and joy for the child's accomplishments, but refrained from praise intended to flatter the child. Adults were seen sitting in an observers' chair, taking notes Adults consistently offered children choices of activities and solutions. Adults often use loud, didactic talk that could be heard above student discussion. Adults consistently communicated genuine curiosity about content; lessons are usually presented as invitations to discover something exciting. All
Early Childhood Child Behaviors

- Work as prop
- Offering/receiving help from peers
- Engaging with purpose
- Social graces
- Interrupting
- Initiating work
Navigating the room with care

Resolving needs with words

Waiting turn

Handling materials with care

Joy

Caring for classroom
For more information visit:
www.public-montessori.org
jcossentino@public-montessori.org