Good at doing things: Montessori education and higher-order cognitive functions

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What is a neuropsychologist?

- Clinical psychologist
- Postdoctoral training
- Assessment of brain functioning
- Children with medical, emotional, behavioral, developmental problems impacting brain development, learning, cognitive functioning, or behavior
- Consult to parents, educators, physicians
- Research (attention; poverty; lead; genetic disorders)
- Train future neuropsychologists

What is Montessori Education?

A brain-based, developmental educational method that allows children to make creative choices in discovering the people, places, and knowledge of the world. It emphasizes hands-on learning, self expression, and collaborative play in a beautifully-crafted environment of respect, peace, and joy.

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What do students want to learn?

Top 10 educational goals rated “Very Important” by students (Raven, 1994):

- Leave school confident, willing and able to take the initiative in introducing change (85%)
- Become independent and able to stand on my own feet (83%)
- Help me develop my character and personality (83%)
- Have outside speakers about careers and other educational topics (81%)
- Know how to apply the facts and techniques that I have learned to new problems (79%)
- Ensure that I can speak well and put what I want to say into words easily (77%)
- Have discussion lessons in which I could put forward my own view (76%)
- Learn about different sorts of jobs and careers to help me decide what I want to do (74%)
- Encourage me to have opinions of my own (74%)
- Help me understand the implications and responsibilities of marriage (73%)

Based on the work of John Raven, Ph.D. See www.johnraven.co.uk.
Top 10 educational goals rated “Very Important” by teachers (Raven, 1994):

- Help students develop their characters and personalities (93%)
- Encourage them to be independent and stand on their own feet (92%)
- Make sure they are able to read and study on their own (92%)
- Encourage them to have a sense of duty toward their community (90%)
- Ensure that all pupils can speak well and put what they want to say into words easily (89%)
- Encourage them to have opinions of their own (89%)
- Help them to develop a considerate attitude towards other people (88%)
- Help them to think out what they really want to achieve in life (82%)
- Ensure that they can express themselves clearly in writing (82%)
- Teach them about what is right and wrong (82%)

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My discovery of Montessori Education
“So where do the good kids come from?”
Ask them to do something

Hassle them
Remind them

Hold them accountable

Ask them to do something
They do it
They do it well
Then they embellish it
Look around....

figure out what needs to be done....

...and do it.

“They’re good at doing things.”
“Montessori education is the embodiment of all I learned while studying for a Ph.D. in Child Development.” - Fiona Anderson, Ph.D. (neuropsychologist)

“That’s where my kid is going to school!” - Terry Harrison, Ph.D. (neuropsychologist)
“It’s like education designed by a gifted pediatric neuropsychologist!”
- Steve Hughes, Ph.D. (pediatric neuropsychologist)

“It’s like education designed by a gifted developmental psychologist!”
- Fiona Anderson, Ph.D. (developmental psychologist)
Brain-based learning
Nuggets and Networks

Nuggets
Reading


Activation


Simonson et al., 2002 (in Fletcher, 2006)
Reading Nuggets

- Letter/word recognition
- Phonological processing
- Language comprehension
How can we help developing brains form good nuggets and networks?

How can we build better brains?

How can we build better brains?

Repetition

How can we build better brains?

Security
How can we build better brains?

Hands-on
How can we build better brains?

Multisensory
How can we build better brains?

Self-guided learning
Executive Functions

Modify remote events through intentional behavior
Link Present to Future

Based on the work of Dr. Russell Barkley. See www.russellbarkley.com.
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- Ensure that all pupils can **speak well** and put what they want to say into words easily (89%)
- Encourage them to have **opinions** of their own (89%)
- Help them to develop a **considerate attitude** towards other people (88%)
- Help them to think out what they really want to **achieve in life** (82%)
- Ensure that they can **express themselves** clearly in writing (82%)
- Teach them about what is **right and wrong** (82%)

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Educational goals receiving the most attention (Raven, 1994):

- Help students do as well as they can on **standardized tests** (76%)
- Help them develop a considerate attitude toward other people (63%)
- Make sure they enjoy the lesson (61%)
- Encourage them to have opinions of their own (60%)
- Encourage them to have a sense of duty toward the community (59%)
- Make sure they are able to read and study on their own (57%)
- Teach them about what is right and wrong (57%)
- Ensure they can express themselves clearly in writing (57%)
- Ensure they can speak well and put what they want to say into words easily (55%)
- Encourage them to be independent and stand on their own two feet (53%)

Based on the work of John Raven, Ph.D. See [www.johnraven.co.uk](http://www.johnraven.co.uk).
“Moderately” or “Very” successfully **met** goals (Raven, 1994):

- Help them do as well as they can on **standardized tests** (83%)
- Teach them about what is right and wrong (61%)
- Ensure that all students feel at home with facts and numbers (53%)
- Ensure that they can express themselves clearly in writing (52%)
- Help them to get on with other people (50%)
- Help them to develop their characters and personalities (49%)
- Encourage them to have opinions of their own (48%)
- Give them information about future educational opportunities (47%)
- Encourage them to have a sense of duty towards the community (46%)
- Help them to take an interest in, and understand what is happening in the world (43%)

Based on the work of John Raven, Ph.D. See [www.johnraven.co.uk](http://www.johnraven.co.uk).

“If education is always to be conceived along the same antiquated lines of a mere transmission of knowledge, there is little to be hoped from it in the bettering of man’s future.” - Maria Montessori

Competent vice presidents tend to:

- Show **initiative**
- Set **goals**
- **Coach**
- **Influence** people and organizations
- **Build teams**
- **Listen** & demonstrate empathy
- **Control impulses** - (especially annoyance)
- **Help others** analyze problems and develop strategies
- **Reward** and **recognize** contributions
None of which they learn in business school

Competent machine operators tend to:

- Be **Dependable**
- Be **accurate** in reporting
- Respond to the **needs of the situation** without needing instructions
- **Get along** with others
- Take **responsibility**

None of which they learn at vocational school

Competent school teachers tend to:

- Recognize **unique talents** in each student
- Create **individualized educational processes** that foster each student's unique abilities
- Work with **other teachers** to understanding of how growth is promoted
- Help parents create **developmental environments** for their students at home
- Analyze and harness **sociological forces** that control what happens in schools
- Work to **change society** for the benefit of children
None of which they learn at teacher’s colleges

“Yeah, but what about the book learnin’?”

Strengths of the Lillard (2006) study:
- Excellent implementation
- Random assignment of participants
- Children in “experimental” and “control” conditions were comparable
- Urban, lower income, diverse sample
Craig Montessori School
- Public City School
- Admits by Lottery
- Affiliated with AMI
- 60% African American, 18% White (same as district)
- 520 students, Ages 3 to 14
- 54 3-year-olds enter each fall

Contents courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.

“How did the Montessori kids do compared to the traditional education group?”

“Control” Children’s Schools
39 different Milwaukee area schools
27 public urban (n = 40)
12 suburban public, charter, or voucher (n = 13)

Contents courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.
Social / Cognition Perspective

Social Problem Solving (Rubin)
- 3 acquire object stories,
- 2 make friends stories

"Kathy has been on the swing a long time and Laurie really wants to swing.

What could Laurie do or say so she could have the swing?"

"What else?"

"What would you do?"

Montessori children demonstrated significantly stronger social cognition skills.

Binomial Test, Montessori, $p = .002$; Control Group at chance

Courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.

Social problem-solving

Coding for social problem solving task responses
- "Please, can I swing on the swing?"
  - Positive assertive & Polite
- Suggest that they could each have a minute. "That would be fair."
  - Positive assertive & Social justice
- "I'll be your friend if I can have a turn."
  - Less positive
- Just wait.
  - Passive
- Tell her dad to spank her
  - Negative & Appeal to authority

Courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.
Social Problem Solving

Montessori children make significantly more appeals to justice and fairness

$t(53) = 3.13, p = .003; \text{Cohen's } d = .89$

Courtesy of Angeline Lillard, Ph.D. See [www.montessori-science.org](http://www.montessori-science.org).

Interpersonal behavior

Montessori children showed:

- More positive shared play
- LESS ambiguous rough play

$t(53) = 2.16, p < .04, \text{Cohen's } d = .58; \quad t(53) = -2.81, p < .02, \text{Cohen's } d = .72$

Executive functioning

Courtesy of Angeline Lillard, Ph.D. See [www.montessori-science.org](http://www.montessori-science.org).
Montessori children showed significantly stronger Executive Functioning.

\[ t(53) = 2.11 \ p < .05; \text{Cohen's } d = .61 \]

Courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.

Montessori children showed significantly stronger reading and decoding skills.

\[ t(53) = 1.68, \ p < .10 \ (2-tailed); \text{Cohen's } d = .44; \text{Mann-Whitney } Z = 2.24, \ p < .03 \ t(53) = 2.23, \ p = .03 \text{Cohen's } d = .58 \]

Courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.

Montessori children showed stronger math skills.

\[ t(53) = 2.03, \ p < .05 \text{Cohen's } d = .56 \]

Courtesy of Angeline Lillard, Ph.D. See www.montessori-science.org.

…and those academic skills?
Summary

A real-world, public inner city excellent implementation of Montessori apparently impacted at least:

- At end of Kindergarten:
  - Executive control
  - Decoding and early math
  - Understanding the mind
  - Appeals to social justice
  - Social behavior

- At grade 6:
  - Social skills
  - Sense of community
  - Creativity in stories
  - Complexity of sentence formulation

Success stories for children living in poverty:

East Dallas Community School

- Montessori based
- Serves children ages birth to 3rd grade in one of the most under-served communities in Dallas.
- In 2002, 78% of the school's third-graders applied to Dallas Independent School District’s gifted and talented program.
- All were accepted.
- Since 1978, 97% of EDCS third-graders have graduated from high school or obtained a GED
- Of those, 88% have gone on to college. In comparison, students in the same geographic area who did not attend EDCS, less than 50% graduate from high school.

Alfred G. Zanetti School

Springfield, Massachusetts

- Until 1999, the school had low-test scores, high absenteeism and a student turnover rate of almost 50% a year
- Converted to Montessori
- "Assessments all the way down to the youngest classrooms, exhibit a record of success."
- Turnover rate now 5%
Other scholarly research

- Clifford, Jones and Takacs (1993) Montessori Head Start graduates far surpassed peers in eligibility for the gifted program in Cleveland.

- Boehnlein (1990) found that children of low socio-economic status overall benefited significantly from a Montessori preschool.


“And how is conventional education doing?”

“Hundreds more public schools fall short. The list of public schools failing to meet the No Child Left Behind standards rose from 483 last year to 729 this year.”
- Star Tribune, August 31, 2007
“Schools struggle to hit state marks. More than a third of Minnesota schools are labeled poor performers.... Frustrated education officials say guideline changes are partly to blame.”

- Pioneer Press, August 31, 2007
Concluding thoughts

Culture
“Whoever touches the life of the child touches the most sensitive point of a whole which has roots in the most distant past and climbs toward the infinite future.”
- Maria Montessori
Look around....
figure out what needs to be done....

...and do it.
“Good at doing things.”