

Assessing Creativity and Critical Thinking in Schools: Montessori as a Holistic Intervention

Jacqueline Cossentino and Katie Brown,
National Center for Montessori in the Public Sector

Jacqueline Cossentino is a senior associate and director of research at the National Center for Montessori in the Public Sector. Her Montessori career began as a parent, and quickly evolved into researcher and administrator, as well as university professor. An ethnographer by training, since 2001 she has drawn from her direct experience as head of an independent Montessori school and principal of a large, urban public Montessori school to produce an internationally recognized body of scholarship on Montessori education. Cossentino's twenty-six years in education have included roles as a middle and high school English teacher; an elementary school principal; a professional developer for schools, districts, and museums; and a professor of educational leadership at the University of Maryland. Cossentino has been a Lecturer in Loyola Maryland's Montessori Studies program. She serves on the board of Montessori Northwest. She received a BA in history from Smith College and an M.Ed. and Ed.D. from the Harvard Graduate School of Education.

Katie Brown is a PhD candidate in Urban Education at the University of North Carolina at Charlotte. Her professional experience includes traditional public schools, charter schools, a state education agency, and higher education. Her research examines issues of race, culture, and equity in public Montessori schools.

INTRODUCTION

As readers of this journal (and our peer authors in this issue) are well aware, Montessori education situates creativity at the centre of the enterprise of learning. In fact, creativity is so integral to Montessori education that it cannot be fully appreciated in isolation; creative potential and human potential, essentially, are the same thing. Readers of this journal are equally well aware that such a holistic, integrated vision of education remains, largely, outside the mainstream for many practitioners.

Which is why the National Center for Montessori in the Public Sector (NCMPS) is pleased to be participating in an international examination of the assessment of creative potential sponsored by the Organisation for Economic Cooperation and Development (OECD). Collecting and analysing data from four hundred US public school students, NCMPS is one of four US research teams who, together with thirteen other teams from ten other countries, are examining educational interventions that promote creativity.

Established to administer the Marshall Plan in Europe following the devastation of World War II, the OECD (originally known as the OEEC¹) is focused on issues related to economic development. OECD has long conducted the Program for International Student Assessment (PISA) to evaluate student learning in an international context. The present project is grounded in a growing recognition of the importance of creativity to student academic, economic, and social outcomes, and as such has undertaken an investigation of how various educational interventions promote the growth of creativity.² The research described here is part of this larger study of creativity and critical thinking.

BASIC ASSUMPTIONS: WHAT CREATIVITY IS AND WHY IT MATTERS

The study is grounded in two large premises. The first, the definition of creativity, is consistent with Montessori theory and practice. The second, why it matters, highlights key differences between developmental educational approaches and prevailing mainstream visions of education.

For the purposes of this study, creativity is understood to be a phenomenon—some call it a 'habit of mind'—that can be identified, described, and measured. Most agree that creative activity involves invention, problem solving, and adaptation. Todd Lubart and his colleagues have framed creativity in terms of two key modes of cognition: divergent-exploratory thinking and convergent-integrative thinking.³ Divergent thinking, sometimes called 'lateral' thinking, is characterized by flexibility, curiosity, elaboration, and risk-taking, and it is what many people typically associate with creative performance. Divergent thinkers are insatiably curious, able to generate and iterate new ideas that are both original and complex.

By contrast, convergent thinking, sometimes described as 'linear' thinking, is characterized by speed, accuracy, and the ability to pinpoint the best possible solution to a given problem. Convergent thinkers are adept at analysing, synthesizing, and otherwise manipulating existing knowledge. As a consequence, convergent thinking is most often associated with strong performance on standardized, multiple-choice assessments and, therefore highly valued in conventional measures of intelligence and, often, characterized in opposition to divergent thinking. It turns out, however, that creative performance requires both divergent and convergent thinking.

The rejection of an either/or characterization of divergent and convergent thinking is particularly resonant with Montessori theory and practice. Just as creative performance requires both exploration and integration, learning in a Montessori environment calls for both initiation and inhibition. The Montessori classroom is explicitly designed to enable the acquisition of specific bodies of knowledge alongside the cultivation of cognitive flexibility, risk-taking, and tolerance of ambiguity.

While the concepts of divergent and convergent thinking are helpful in defining what sort of activity constitutes creative activity, the core concept driving the study is the proposition that both types of thinking and, by extension, creativity can be nurtured. One orientation toward creativity is that it is an innate skill or disposition—one either is or is not creative. However, most cognitive psychologists agree not only that that creativity can be fostered through educational interventions,⁴ but that environments that promote creativity often exhibit the following characteristics:

- flexibility in use of classroom space and time,
- teacher-student relationships characterized by mutual respect,
- a culture of intrinsic motivation,
- independent work,
- opportunities for collaboration,
- acceptance of non-conformity, and
- a balance of structure and freedom.

Montessori education, of course, incorporates all of these elements,⁵ and both divergent and convergent thinking can be seen at work in prepared environments at every plane of development.

Moreover, the impact of Montessori education on creativity has already been documented. A comparative study of Montessori and traditional school environments found that Montessori students exhibited significantly greater creative aptitude than their peers in traditional school environments.⁶ Montessori has also been shown to foster executive functions,⁷ which have been linked to the development of creativity.⁸

Valuing Creativity

At the 2008 AMI-USA Refresher Course in Atlanta Georgia, bestselling author Daniel Pink received a standing ovation for his keynote address on the importance of ‘design thinking’ if the US is to retain its competitive edge in the world economy and hailed Montessori schools as exemplars of education that nurtures flexible, creative, ‘right brain’ thinking. A year later, in Houston, Texas, Sir Ken Robinson addressed similar themes, this time speaking directly about creativity, human flourishing, and ‘the public conversation’. Mirroring arguments related to the return on investment for early childhood education,⁹ a growing body of scholarly as well as popular literature has



Student art, courtesy of Joke Verheul

begun to recognize the importance of creative thinking as a means to success in both school and the workplace.¹⁰

The OECD’s interest in creativity, and its inclusion of Montessori, is both significant and predictable. As an organization committed to fostering economic development, it makes sense that its view of education would be oriented similarly. Within that frame, the argument for creativity in education goes something like this: The on-going shift to a knowledge-based economy means that employees who can develop new and different approaches to problem solving are in high demand.¹¹ Divergent thinking and creative problem solving will be key to the success of entrepreneurial endeavours in this new economy.¹² Schools are being called upon to meet this need for workers and citizens who can think creatively.¹³

The economic argument also filters down to discussions of the value of creativity in the classroom. That is, students who view themselves as creative are more involved in school and have more positive academic beliefs.¹⁴ Likewise, creative school environments promote academic achievement,¹⁵ and that creativity is a particularly important aspect of scientific thinking.¹⁶ Economically

disadvantaged students especially stand to gain from creativity in the classroom¹⁷; unfortunately, these are the very students who are least likely to be exposed to creative teaching strategies.¹⁸

Not surprisingly, the notion of education as an instrumental experience designed to enable greater economic productivity leads inevitably to the characterization of creativity as a discrete ‘input’ that can be manipulated, controlled for, maximized, and measured in the service of a desired ‘output’. For the OECD, that output is economic development. And to a large extent, our engagement in this project aims to offer an alternative logic and narrative.

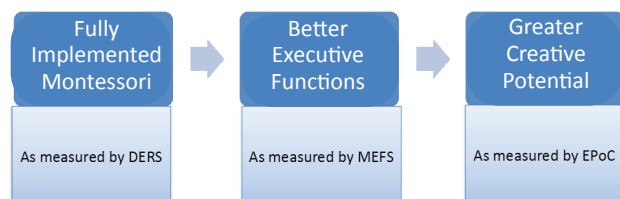
Nurturing Creativity: A Radical Proposition

For Montessorians—indeed all Developmentalists—the economic argument represents a problematic view of the purpose of education and the value of creativity in both learning and human flourishing. Likewise, our orientation to the research aims both to honour the collegial process of joint, international investigation and articulate an orientation toward creativity that is more holistic and less instrumental than that driving the general theory of action for the larger study.

Where OECD’s hope is to identify 1) interventions that nurture creativity and 2) measures that can assess the impact of those interventions, the NCMPS team aims to examine the intersection of a) Montessori learning environments, b) performance on measures of executive function, and c) performance of measures of creative potential. In so doing, we hope to illuminate the complex yet crucial connection between convergent and divergent thinking as it unfolds all day, everyday in learning environments explicitly designed to nurture human potential.

The design of the study rests on the following assumptions:

1. Nurturing creativity requires a holistic approach to all interactions between students, teachers, and content—it will not be well achieved through isolated interventions.
2. Montessori is a holistic intervention that is a) well documented and analysable and b) present in all of the countries participating in the current study.
3. Creativity is strongly linked to the executive functions.¹⁹
4. Executive function performance is strongly correlated to socioeconomic status.



The theory of action driving our approach is illustrated below:

Our hypothesis is that fully implemented Montessori learning environments will yield high performance on measures of executive function and creativity. To measure the fidelity of Montessori implementation using the Developmental Environmental Rating Scale (DERS), an observational tool comprised of sixty research-based items focused on interactions between students, teachers, and the learning environment.²⁰ Using the DERS as an input measure, we proposed to link its administration with two output measures linked to creative potential. The first is the Minnesota Executive Function Scale (MEFS), which measures performance on tasks associated with cognitive flexibility, working memory and inhibitory control. Second is the Evaluation of Potential/Potential Creativity (EPoC), a measure of divergent and convergent thinking, which will be used by all participants in the study around the world.

We elected to use both the DERS and the MEFS alongside the EPoC for two reasons. First is that the DERS is a new assessment tool, which has been vetted by the AMI Global Research Committee and holds great potential as both an alternative to existing classroom quality rating scales and a support for internal pedagogical discussions. Because the DERS is designed to predict performance on measures of executive function, administering it together with the MEFS allows us to test both the functionality and the validity of the instrument.

Second is that both instruments are designed to be used in schools as part of standard assessment protocols. They are affordable, easy-to-use, and connected to cloud-based analytics systems designed to enable customized data collection and analysis. As such, they have the potential for wide-scale administration. Once deployed at scale, the database we are establishing through this project may be adapted for use within the global Montessori community to document a range of activities and outcomes.

FUTURE PLANS

Phase 1 of the project will be complete in winter 2017. At that point, results from all fourteen teams will be analysed, and plans for phase 2 will commence. Because all of the participating countries happen to be home to Montessori communities,²¹ we are hopeful that phase 2 of the study may include additional teams reflecting Montessori’s global scope.

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NOTES

1. The Organisation for European Economic Cooperation (OECD) was established in 1948 with sixteen members whose collective charge was to prepare the European Recovery Programme. In 1961 OECD was superseded by OECD.
2. Lucas, B., G. Claxton, and E. Spencer, "Progression in student creativity in school: First steps towards new forms of formative assessments" (OECD Education Working Paper No. 86, 2012), oecd.org/edu/workingpapers.
3. Lubart, T. I., "Models of the creative process: Past, present and future", in *Creativity Research Journal*, 13.3-4 (2000), pp. 295-308.
4. Besançon, M., T. Lubart, and B. Barbot, "Creative giftedness and educational opportunities", in *Educational & Child Psychology*, 30.2 (2013), pp. 79-88.
5. Beghetto, R. A., and J. C. Kaufman (eds.), *Nurturing creativity in the classroom* (New York: Cambridge University Press, 2010).
6. Cardarello, R., "Enhancing scientific thinking in children: Suggestions based on studies about creativity", in *New Perspectives in Science Education* (2014), conference.pixel-online.net/NPSE/files/npse/ed0003/FP/0306-SERA206-FP-NPSE3.pdf
7. Csikszentmihalyi, M., *Creativity: Flow and the psychology of discovery and invention* (New York: Harper Collins, 1996).
8. Davies, D., D. Jindal-Snape, C. Collier, R. Digby, P. Hay, and A. Howe, "Creative learning environments in education: A systematic literature review", in *Thinking Skills and Creativity*, 8 (2012), pp. 80-91.
9. Piirto, J., *Creativity for 21st Century Skills: How to Embed Creativity into the Curriculum* (Boston: Sense Publishers, 2011).
10. Schacter, J., Y. M. Thum, and D. Zifkin, "How much does creative teaching enhance elementary school students' achievement", in *Journal of Creative Behavior*, 40 (2006), pp. 47-72.
11. Lillard, A. S., *Montessori: The science behind the genius* (New York: Oxford University Press, 2005).
12. Besançon, et al., "Creative giftedness and educational opportunities", 2013.
13. Diamond, A., and K. Lee, "Interventions shown to aid executive function development in children 4 to 12 years old", in *Science*, 333.6045 (2011), pp. 959-64.
14. Lillard, A. S. "Preschool children's development in classic Montessori, supplemented Montessori, and conventional programs", in *Journal of School Psychology*, 50.3 (2012), pp. 379-401. doi: 10.1016/j.jsp.2012.01.001
15. Lillard, A. and N. Else-Quest, "Evaluating Montessori education", in *Science* 313 (2006) pp. 1893-94.
16. Carlson, S. M. "Development of conscious control and imagination", in *Free will and consciousness: How might they work?*, ed. R. Baumeister, A. Mele, and K. Vohs (New York: Oxford University Press, 2010), pp. 135-52.
17. Diamond, A., "Understanding executive functions: What helps or hinders them and how executive functions and language development mutually support one another", in *Perspectives on Language and Literacy*, 40.2 (2014), pp. 7-11.
18. Diamond and Lee, "Interventions shown to aid executive function development in children 4 to 12 years old", 2011.
19. Heckman, J., "Schools, skills, and synapses", in *Economic Inquiry*, 46.3 (2008), pp. 289-324.
20. Partnership for 21st Century Skills, "Framework for 21st Century Learning", p21.org/storage/documents/1._p21_framework_2-pager.pdf
21. Lucas and Spencer, "Progression in student creativity in school", 2012.
22. Piirto, *Creativity for 21st Century Skills*, 2011.
23. Plucker, J. A., J. C. Kaufman, and R. A. Beghetto, "What we know about creativity", n.d., p21.org/storage/documents/docs/Research/P21_4Cs_Research_Brief_Series_-_Creativity.pdf
24. Florida, R., *The Rise of the Creative Class* (New York: Basic Books, 2004).
25. Lucas and Spencer, "Progression in student creativity in school", 2012.
26. Beghetto, R. A., "Creative self-efficacy: Correlates in middle and secondary student", in *Creativity Research Journal*, 18 (2006), pp. 447-57.
27. Davies, et al., "Creative learning environments in education", 2012.
28. Lucas and Spencer, "Progression in student creativity in school", 2012.
29. Schacter, et al., "How much does creative teaching enhance elementary school students' achievement", 2006.
30. Cardarello, "Enhancing scientific thinking in children", 2014.
31. Runco, M. A., *Creativity as an educational objective for disadvantaged students* (Storrs, Connecticut: National Research Center on the Gifted and Talented, 1993), files.eric.ed.gov/fulltext/ED363074.pdf
32. Schacter, et al., "How much does creative teaching enhance elementary school students' achievement", 2006.
33. Carlson, "Development of conscious control and imagination", 2010.
34. Diamond, "Understanding executive functions", 2014.
35. Diamond and Lee, "Interventions shown to aid executive function development in children 4 to 12 years old", 2011.
36. The DERS and E-DERS, which measure early childhood and elementary environments respectively, will be used in conjunction with measures for five-year-olds and nine-year-olds.
37. Participating countries are Brazil, China, Finland, France, Hungary, India, Italy, Netherlands, Slovakia, Thailand, UK, and US.

ADDITIONAL REFERENCES

- Cropley, A., "In Praise of Convergent Thinking", in *Creativity Research Journal* 18.3 (2006), pp. 391-404.
- Gregory, E., et al., "Building creative thinking in the classroom: From research to practice", in *International Journal of Educational Research*, 62 (2013), pp. 43-50, doi: <http://dx.doi.org/10.1016/j.ijer.2013.06.003>
- Lubart, T., and J. Lautrey, "Family environment and creativity", paper presented at the 15th biennial meetings of the international society for the study of behavioral development, Berne, Switzerland, 1998.
- Montessori, M., *To Educate the Human Potential* (Oxford: Clio Press, 2003; originally published in 1947).
- West, M. A. "Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups", in *Applied Psychology: An International Review*, 51 (2002), pp. 355-424.