ZMATH 06675797

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Psychological and neuroscientific perspectives on mathematical creativity and giftedness.

Leikin, Roza (ed.) et al., Creativity and giftedness. Interdisciplinary perspectives from mathematics and beyond. Cham: Springer (ISBN 978-3-319-38838-0/hbk; 978-3-319-38840-3/ebook). Advances in Mathematics Education, 183-199 (2017).

Summary: Creativity and giftedness have long been linked together in the literature, particularly where giftedness is conceived, not in the analytically focused sense of schoolhouse giftedness, but in the sense of creative-productive giftedness that emphasizes the generation and production of ideas. Creativity has a well-established foundation in the psychological literature, and a growing body of work derived from neuroscientific approaches. How do these contrasting psychological and neuroscientific approaches inform our understanding of creativity as a component of giftedness in general? How is giftedness manifest in mathematics in the creative-productive sense? What do psychology and neuroscience tell us about the process of fostering mathematical giftedness specifically? In this chapter, we examine first general aspects of creativity and giftedness, noting that *D. J. Treffinger*'s ["Introduction to creativity and giftedness: three decades of inquiry and development", in: D. J. Treffinger (ed.), Creativity and giftedness. Thousand Oaks, CA: Corwin Press and the National Association for Gifted Children. xxiii–xxx (2004) five themes provide a framework for understanding the connection between creativity and giftedness. Having established that creativity and giftedness are connected through these five themes, we then turn attention first to a psychological view of factors that are important for understanding mathematical creativity and giftedness, followed by a neuroscientific examination of the same. The chapter concludes with the notion that mathematical creativity and giftedness can be thought of as a special case of the intersection of creativity and giftedness more generally, and that creativity and giftedness – mathematical or otherwise – can be characterized by a series of dualities. Elements of the person, the cognitive processes employed, the outcome and the environment associated with mathematical creativity and giftedness are unique to this domain, and the blending of psychological and neuroscientific approaches offers the best means for understanding and fostering this ability.

Classification: C80 C40
Keywords: creativity; giftedness; psychology; neuroscience
doi:10.1007/978-3-319-38840-3_12