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The planimeter as a real and virtual instrument that mediates an infinitesimal approach to area.

Leung, Allen (ed.) et al., Digital technologies in designing mathematics education tasks. Potential and pitfalls. Cham: Springer (ISBN 978-3-319-43421-6/hbk; 978-3-319-43423-0/ebook). Mathematics Education in the Digital Era 8, 121-149 (2017).

Summary: Drawing on a didactic gap detected between the elementary concept of area and the infinitesimal approach to it within the Italian secondary school curriculum, the notion of swept area is introduced in grades 10–11. The idea of swept area is introduced through the mediation of an artifact, the Polar Planimeter, both as a concrete physical-tool and as a virtual-object. It triggers and supports the semiotic productions of the students so that they can grasp the new concept. The notion of didactic cycle is used for designing students' learning sequences. The activities in such sequences are of two types: sensory-motor and symbolic. The mediation of the artifact allows intertwining the two types so that the one can constantly be built on the other. Indeed, the practices mentioned above show a deep intertwining between their cultural and cognitive components.

Classification: U70 U60 G30 G70

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