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Ángeles Navarro, María; Pérez Carreras, Pedro

An empirical study in convergence via iteration and its visualization.

Teach. Math. 15, No. 2, 85-112 (2012).

Summary: Our aim is to provide an educative experience for high school students leading to a precise verbal description of the notion of convergence of a sequence of numbers generated by an iterative process triggered by the visualization of an unending geometric progression. Iteration as a guiding idea is chosen because it is easy to grasp, opens the door to further mathematical topics of the curriculum and encourages the use of technology. The experience is structured as an interview where a computer-generated tool, providing data generated by iteration and their visual dynamic representations, is available as an unavoidable aid to our goal of getting insight before formality. It all ends up to a very simple observation: the step-by-step implementation of a manual/visual routine together with reporting verbally what you see and what you don't see at every step is the clue to the understanding of the Weierstrassian definition of convergence, showing that its reputation of unintelligibility is hardly deserved. A detailed discussion of the experience concludes the exposition.

Classification: I34 C34 U74

Keywords: convergence of a sequence; visualization; geometric progression; use of technology; dynamic representations; iteration