



Using MaLT for restructuring the approach of curves in secondary education

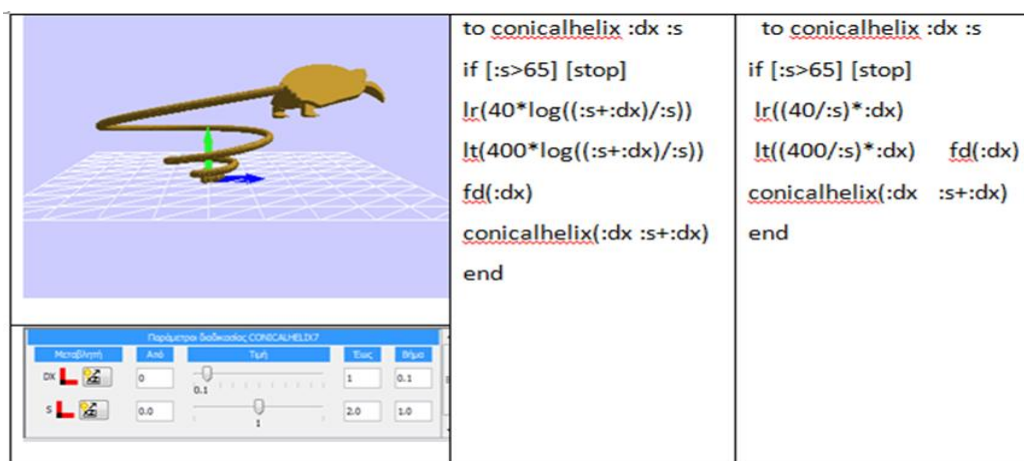
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Abstract

In secondary education, at least in Greece, the curriculum involves only the simplest geometric curves and function curves which are abstract representation of mathematical relation rather than geometrical figures (Kynigos and Psycharis, 2003). But, in every kind of practical activity and experience of nature, we constantly encounter curves of widely different forms. What about for arbitrary curves and especially for 3d curves? Yet such investigation is completely natural and necessary. What about notions and activities such as the approximation of the length of a circle for example? What does a straight line mean? What does the shortest path mean?

For a restructuration of this domain (in the sense of Wilensky, 2010) we used MaLT, a 3d Logo / Turtle Geometry environment (<http://etl.ppp.uoa.gr>) to design a microworld for a differential approximation of curves (Fig. right). The turtle movements reflect exactly the way a curve is designed in space and give to even young students the ability to study, explore and symbolically express these movements by means of logo programming language, at least at an intuitive level, before they reach the complicated formulas of differential geometry.



Kynigos, C., & Psycharis, G. (2003). 13 year-olds meanings around intrinsic curves with a medium for symbolic expression and dynamic manipulation. In N. A. Paterman, B. Dougherty, & J. Zilliox (Ed.), Proc. 27th Conf. of the Int. Group for the Psychology of Mathematics Education (Vol. 3, pp. 165–172). Honolulu, Hawaii, U.S.A: PME.

Wilensky, U. (2010). Restructurations: Reformulating knowledge disciplines throw new representational forms. In J. E. Clayson & I. Kalas (Ed), constructionism 2010 Paris, France