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Pedro Lealdino Filho, Christian Bokhove, Jean-François Nicaud, Ulrich Kortenkamp, Mohamed El-Demerdash, Manolis Mavrikis, Eirini Geraniou

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# Exploring and Making Online Creative Digital Math Books for Creative Mathematical Thinking

**Pedro Lealdino Filho, Christian Bokhove, Jean-Francois Nicaud, Ulrich Kortenkamp, Mohamed El-Demerdash, Manolis Mavrikis and Eirini Geraniou**

When we look at e-books designed for mathematics education, we can distinguish two streams. On the one hand, we see publishers of traditional mathematics textbooks have digital versions of their products, mostly static pdf documents that can be downloaded and used on different devices. In anticipation of new interactive possibilities, limited interactivity is sometimes built in. On the other hand, we see innovative groups of designers that have started to develop highly interactive tools and micro-worlds for mathematics education. Initially, many of these tools were implemented as standalone applications. These tools have been increasingly integrated with written tasks, producing interactive worksheets, dynamic web pages, and e-books for math. In some European countries, the M C Squared project has aimed at starting several so-called Communities of Interest (CoI) that work on digital, interactive, and creative mathematics textbooks called c-books. The c-books are authored in the M C Squared platform, where authors can construct books using various interactive “widgets.” The workshop aimed to introduce the project and acquaint participants with the affordances and authoring process of the M C Squared platform.

A short overview of M C Squared and the architecture of the authoring tool platform was given, showing the possibilities of creating c-books individually or collectively. An example of a unit of a c-book, “Experimental Geometry” (Fig. 1) was given showing the different widget factories and how they perform inside the c-book and the creative mathematical thinking affordances present in the c-book.

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P.L. Filho (✉)  
Université Claude Bernard, Lyon, France  
e-mail: pedrolealdino@gmail.com

The screenshot shows an interactive geometry page in the MC<sup>2</sup> environment. The title is "Loci of special points in a triangle". The page is divided into two main sections. On the left, there is a coordinate plane with a triangle ABC. Point C is on a horizontal line L. A point D is shown moving along a locus, which is a dashed orange curve. On the right, there is an interactive widget with a calculator interface. The calculator has buttons for "Edit", "Style", "Zoom", "Table", "Result", "Settings", "LANG", and "Help". Below the calculator, there is a text box with the instruction: "Write an equation below and press the 'Draw function' button to visualize the graphical representation of the formula in the interactive construction. You may change coefficients in your formula and see the ripple effects on the drawn curve to match the generated locus." Below this text box, there is a text input field containing the equation  $y = 3x$ . At the bottom of the page, there is a chat icon for EpsilonChat and a "Next page" link. The bottom status bar shows "Problem: 1 2 3 4 5" and "Score: Total: 0".

Fig. 1 Screenshot of a c-book page showing the widgets: Cinderella, EpsilonWriter and EpsilonChat

Another goal of the workshop was to teach participants how to author a simple interactive c-book and explore existing resources created along the duration of the project. The participants got acquainted with a selection of other M C Squared platform features such as student work storage and answer checking.

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