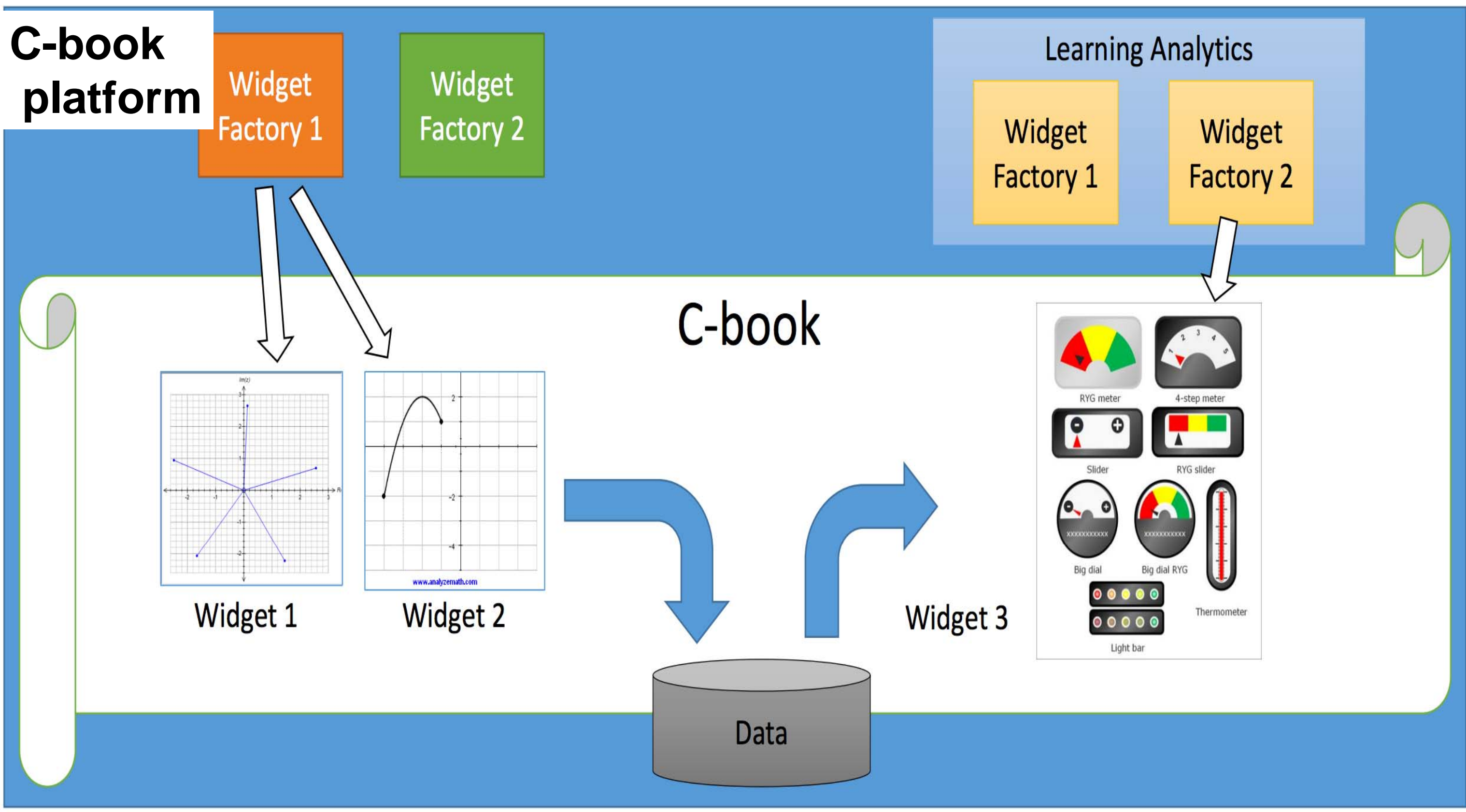# THE POTENTIAL OF AUTHORING CREATIVE ELECTRONIC MATHEMATICS BOOKS IN THE MC-SQUARED PROJECT

Christian Bokhove, Manolis Mavrikis, Keith Jones and the MC-squared project team

1. The MC-squared project

The MC squared project (http://www.mc2-project.eu) aims to design and develop a new genre of authorable e-book, which we call 'the c-book' (c for creative), extending e-book technologies to include diverse interactive components, learning analytics and collective design. As a research lens, literature from communities of interest (COI) is used (Fischer, 2001). Below we present the key features of the platform and reflect on the first cautious steps of the English COI - offering observations about the role that the project technology is playing in teacher professional development.

2. Key features of the c-book platform

The c-book platform accommodates the authoring of c-books (i.e. creative books); these are digital mathematics textbooks that consist of pages with carefully-designed interactive elements called widgets. The circles at the bottom of the figure 1 denote the pages; this particular page has some text and instruction to the left, an open answer textbox bottom right and a planet simulation widget (made in Cinderella) to the right. There are many more widgets available, ranging from basic ones like equation boxes and multimedia ones to full-fledged manipulatives and micro-worlds (see examples in the figures). This demonstrates one key aspect of c-books: they have interactivity. In addition c-books are responsive in that they can provide feedback to students and teachers.
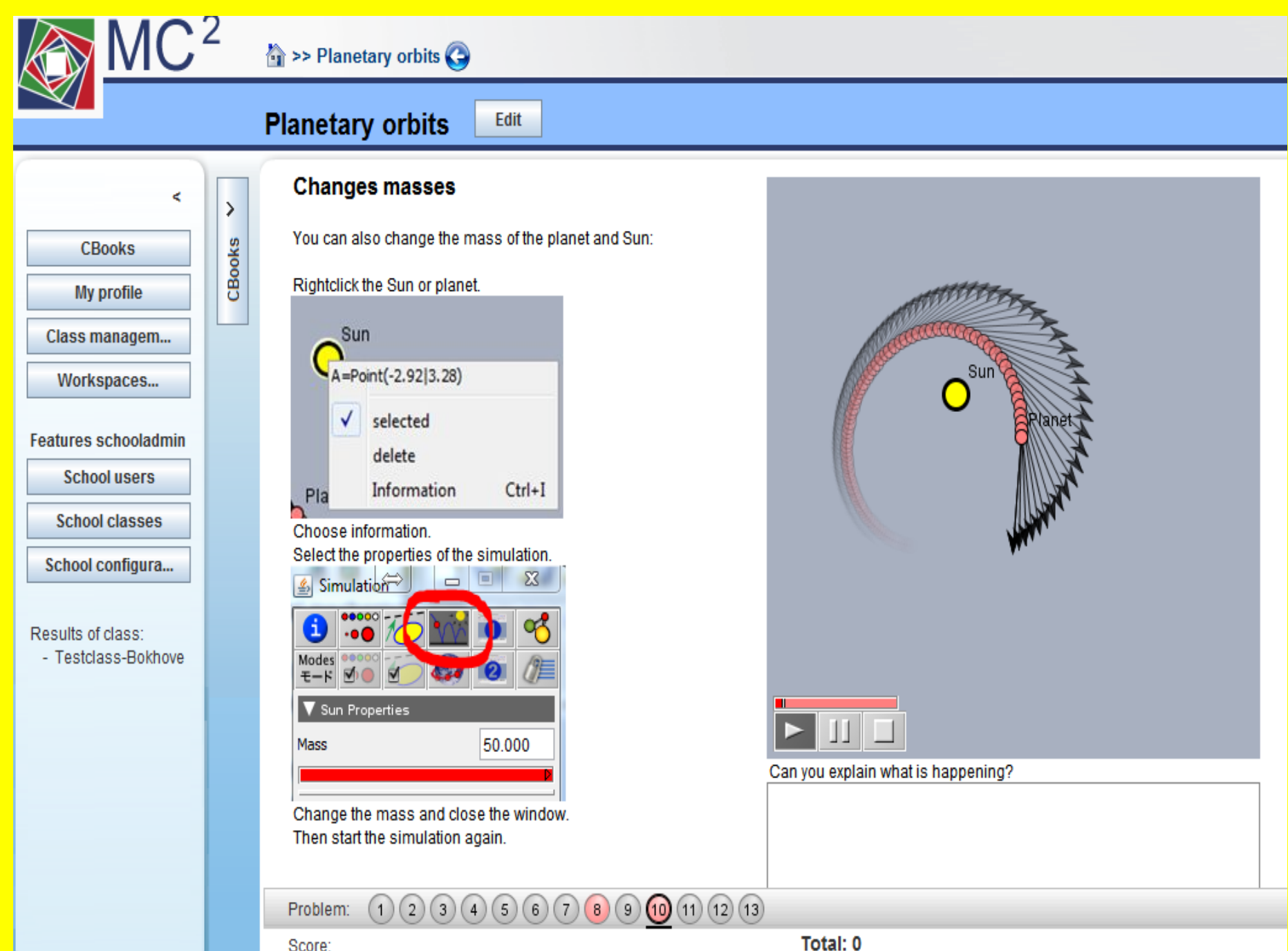
The c-book platform is capable of storing results. This means that the complete platform does not only present c-books but also stores student data which can subsequently be used for the delivery of useful and appropriate Learning Analytics. C-books can be accessed via the World Wide Web (HTML5 under development) making it possible to use and read the book anytime, anyplace, anywhere with an internet connection.

As the c in a c-book stands for 'creative', the c-book platform is meant to be a catalyst for creativity (see example in Figure 2). The c-book platform allows for the authorability of c-books, as noted above and shown in Figure 3. This means that the content of a c-book can easily be changed. The c-book platform has communication features that allow for collaborative work. The two features of authorability and communication enable teachers to use the c-books within the c-book online platform as boundary objects (Akkerman & Bakker, 2011) where researchers, teacher educators and teachers, amongst others, co-design and use resources for teaching.

The c-book platform brings together all aforementioned distinct elements in one integrated platform. Although one could arguable say that technologies exist for most of the elements mentioned, the integration of all of these in one c-book platform, to our knowledge, makes it unique.

3. C-books for professional development

Within the CoI (community of interest) in England we are finding that c-books can function as catalysts to teacher professional development. Within these communities, teachers who co-design and use resources for teaching are contributing to their own professional development in ways suggested by Jaworski (2006). We are observing that c-books and the MC-squared technology might provide a useful focus on the overlap of domain, pedagogical and technical knowledge that Mishra and Koehler (2006) refer to as technological pedagogical content knowledge (TPACK). The development entails appreciating that only by engaging in design activities, teachers in the project can develop a better understanding of the relationships between technology, pedagogy, and the content being taught.

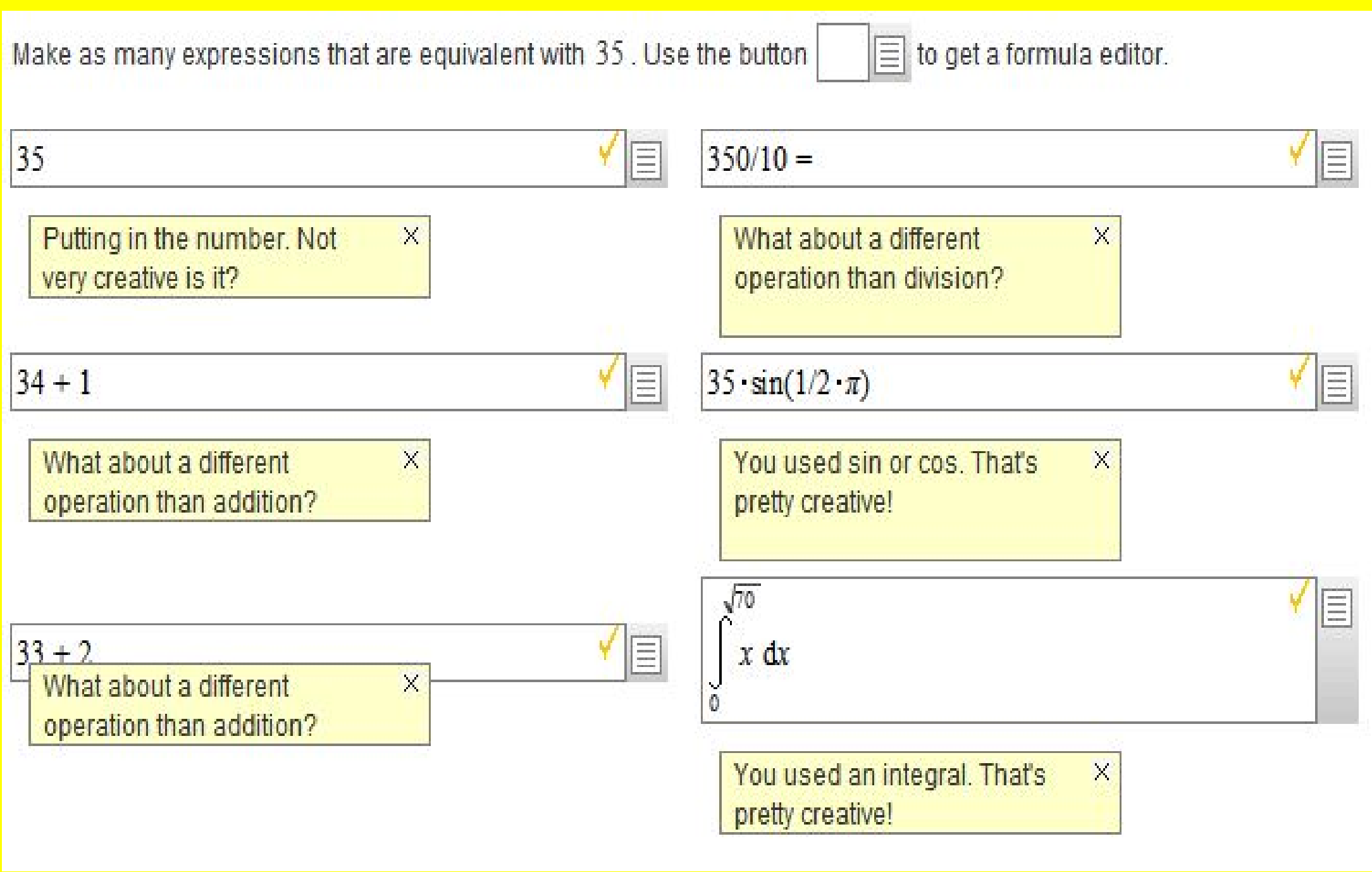Figure 1: Example c-book on planetary orbits with Cinderella widget
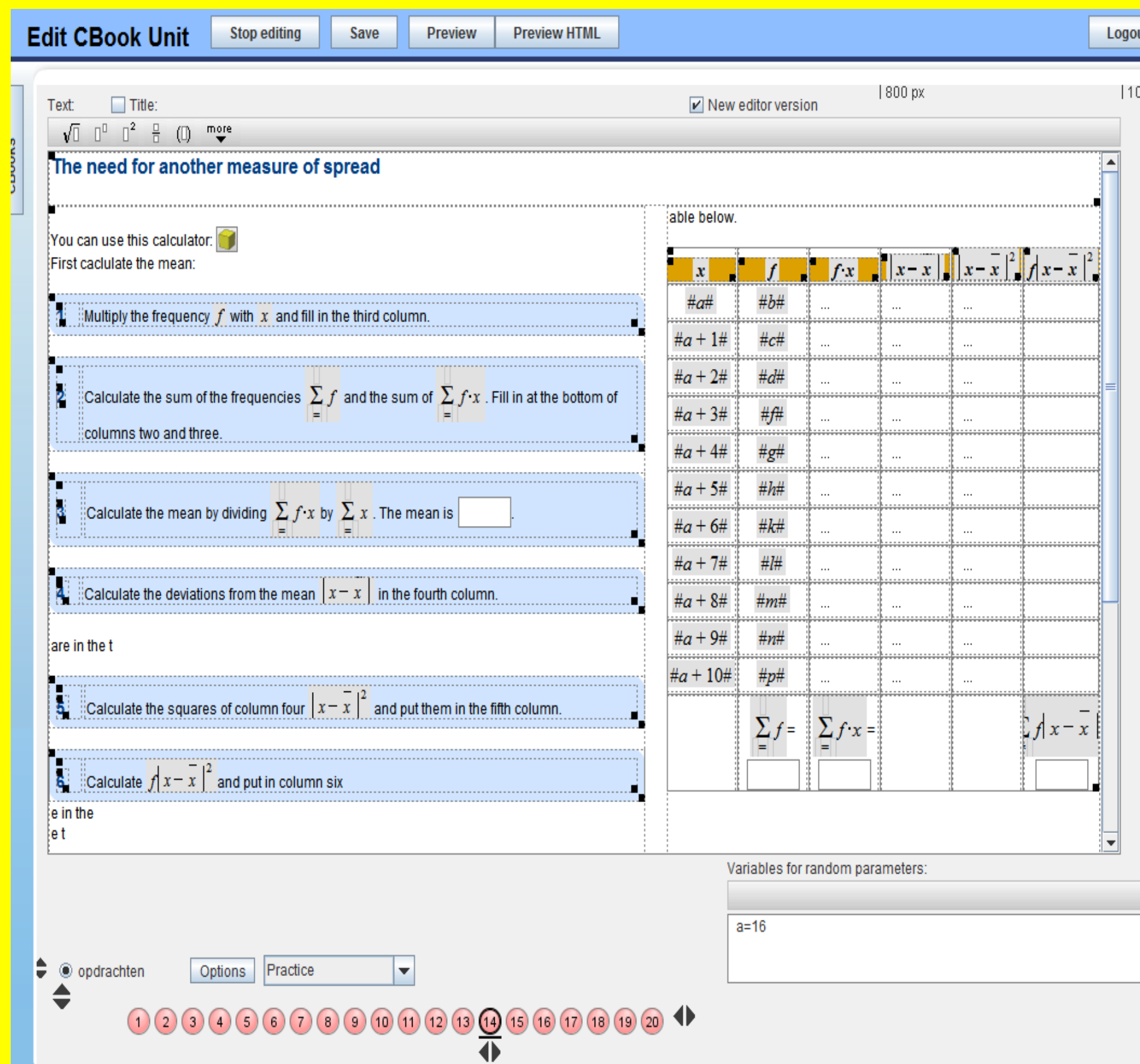

Figure 2: Experimental feedback on creativity

Figure 3: Authoring c-books

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