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Digital Resources to Enhance Creative Mathematical Thinking in a Biomathematics Context

In this poster, we present new kinds of digital resources, a c-book unit ("c" for creative) designed within the MC Squared project (http://mc2-project.eu). A c-book unit is a digital book produced within an innovative socio-technological environment called "C-book technology" allowing meshing narratives with interconnected interactive dynamic digital artefacts, called widgets, to promote students' Creative Mathematical Thinking (CMT).

The c-book unit presented in the poster is produced by the French Community of Interest (CoI) gathering mathematics teachers, teacher educators, computer scientists and researchers in mathematics education. It proposes a sequence of activities within a biomathematics context aimed at supporting learning and mathematical reasoning, using a wide range of widgets useful in biology.

The c-book consists of four sections: the first is an introduction to biomathematics, its meaning and its study fields. In the second section, mathematics is used to model biological traits, leading to a reflection on magnitudes. Golden ratio is studied in the third section, its occurrences in nature, paintings, architecture and Fibonacci numbers. The c-book unit ends with the analysis of spiral images uploaded by students themselves, and allowing them to build their own artwork.

The -book unit embeds many widgets such as EpsilonWriter (Dynamic Algebra System), Cinderella and GeoGebra (Dynamic Geometry System). An innovative feature of cross-widget communication allows EpsilonWriter and Cinderella to communicate. Some open-ended activities are designed to train a high degree of CMT such as reflecting on models, modelling spirals and code tweaking in a half-baked logo microworld.

In this poster, we highlight some widgets produced by the collaborative design of the French CoI in the "c-book" innovative socio-technical environment. We discuss the design choices resulting in the resource affordances to promote creativity in mathematics in terms of personalized non-linear path, constructivist approach, and meta-cognition based activities, among others.