Designing a duo of material and digital artifacts: the pascaline and Cabri Elem e-books in primary school mathematics.

Summary: This paper focuses on a duo of artifacts, constituted by a physical artifact and its digital counterpart. It deals with the theoretically and empirically underpinned design process of the digital artifact, the e-pascaline developed with Cabri Elem technology, in reference to a physical artifact, the pascaline. The theoretical frameworks of the instrumental approach and the theory of semiotic mediation together with the analysis of teaching experiments with the pascaline support the design in terms of continuity and discontinuity between the two artifacts. The components of the digital artifact were chosen from among the components of the physical artifact that are the object of instrumental genesis by the students and that are analyzed as having a semiotic potential that contributes to didactical aims. Components instrumented by students which had inadequate semiotic potential were eliminated. With the resulting duo, each artifact adds value to the use of the other artifact for mathematical learning.

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