DESIGN AS INTENTION AND *AS IMPLEMENTATION* TO INTRODUCE DISTRIBUTIVITY PROPERTY

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The aim of this contribution is to analyze a case of task designed to introduce students to the distributivity property of multiplication over addition in a meaningful way, combining the two issues of design as intention and as implementation. The process of task design is seen as a complex process that involves several steps, such as the definition of a theoretical framework (Realistic Mathematics Education) and the design of a Hypothetical Learning Trajectory. Results from a teaching experiment are reported. Starting from their informal mathematical strategies to solve a realistic task, and guided by the instructional design, students reinvented the concept of distributivity of multiplication over addition.

DESIGN AS INTENTION

Which task design can provide primary school students with opportunities to be introduced to the distributivity property of multiplication over addition (DP) in a meaningful way? The design heuristics of *guided re-invention*, *didactical phenomenology* and *emergent modelling* (Gravemeijer, 1994) permitted to formulate some hypothesis on students' learning by the definition of the components of an Hypothetical Learning Trajectory (Simon, 1995): *learning goal*: re-invention of DP; *hypothetical learning process*: students should re-invent DP by facing with the problem of performing multiplications between a 1-digit and a 2-digits number ($26 \times 4 \rightarrow 26 = 20 + 6 \rightarrow\ 20 \times 4 = 80,\ 6 \times 4 = 24 \rightarrow 80 + 24 = 104 \Rightarrow 26 \times 4 = (20 + 6) \times 4 = (20 \times 4) + (6 \times 4)$); *learning activities*: group work to solve a realistic and rich (Freudenthal, 1991) problem of designing a floor tiling of their classroom using some given types of tiles.

DESIGN AS IMPLEMENTATION

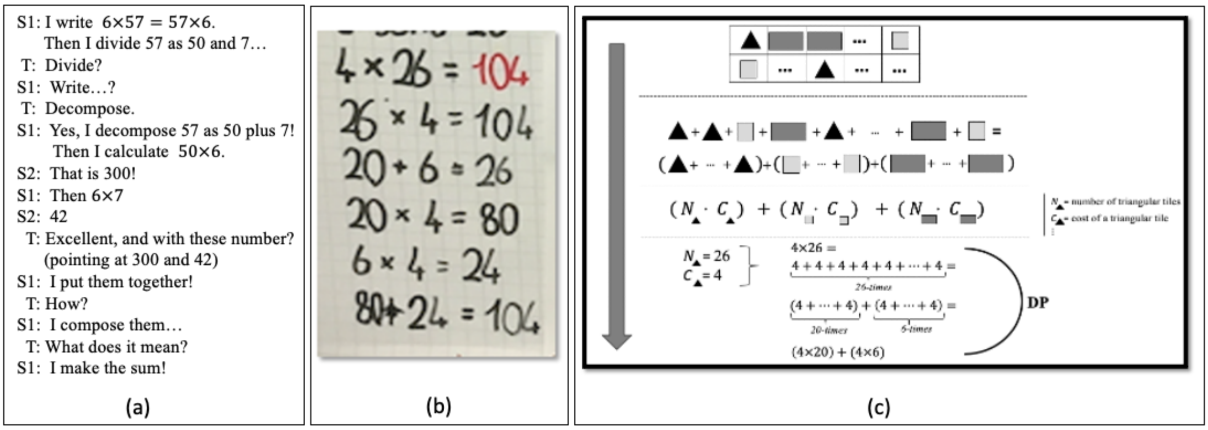

Figure 1: Some results from a teaching experiment in a 2nd-grade class

References

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Gravemeijer, K. (1994). *Developing realistic mathematics education*. Utrecht: CD Bèta Press.

Simon, M.A. (1995). Reconstructing mathematics pedagogy from a constructivist perspective. *Journal for Research in Mathematics Education, 26*, 114-145.