Comparative study for the teaching of subtraction in France and Switzerland: explicit and implicit stances

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Context of the study

PHD research: comparative study of the future of an instructional design in different didactical systems in France and Switzerland

Methodology

A methodology borrowed from Schwab (1964)

- Rhetorical: what are the arguments justifying the structure of the curriculum?
- Syntactic: how are the objects of study organized?
- Semantic: what are the objects of study?

in Switzerland (Geneva district)

Rhetorical Elements

- Public school provides a comprehensive and general training mission that integrates education and instruction for all students to learn and to learn how to learn in order to become able to continue their education throughout their lives.» (PER, Déclaration de la Conférence Inter cantonale de l’Instruction Publique)

- An overall training project focused on pupils
- Knowledge built in co or interdisciplinarity
- Scientific attitude and problem solving to justify the copresence of Mathematics and Life Sciences (MSN) in a single field

Syntactic Elements

General education, subject matter and transversal skills structure the curriculum

- Scientific attitude and problem solving organize the MSN field
- Problem solving as a trigger for the construction of mathematical concepts: generating new knowledge
- Implicit reference (naturalized) to Piaget

Semantic Elements

5 thematic themes: space / numbers / operations / size and measurement modelling

- Numerical knowledge objects are placed into two themes « Numbers » and « Operations », and presented as problem solving tasks requiring mathematical knowledge.
- Additive and subtractive solving problems (EEE, ETE, ECE)

Problem solving in mathematics

Disciplines and « Common Base of Knowledge and Skills » structure the curriculum

- Technics / automatism and solving problem organize the discipline “Mathematics”.
- Implicit reference to the theoretical framework of the double approach
- Problem solving appears at the end of the construction of mathematical concepts: applying, practicing, reusing previously learnt concepts

Substraction in 4P / CE1

4 main themes:
- Numbers and calculation / geometry / quantities and measurement / Numerical organization and management
- Digital knowledge objects lie in one thematic, « Numbers and calculation », and are presented as a list of notions, properties, and mathematical techniques
- Additive and subtractive solving problems (EEE, ETE, ECE)

Reference to Vergnaud’s typology of additive structures.

Solving problem is a major activity in both curricula. They do not occupy the same place in the didactical time. What about the teaching practices?