

1. Record Nr.	UNINA9910623986703321
Autore	Houdement Catherine
Titolo	Semiotic Approaches in Science Didactics
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2022 ©2022
ISBN	1-394-17379-2 1-394-17377-6
Descrizione fisica	1 online resource (309 pages)
Altri autori (Persone)	de HossonCécile HacheChristophe
Soggetti	Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Introduction -- Part 1. A Study of the Dynamics of the Development of Scientific Knowledge: Semiotic Opportunities -- Introduction to Part 1 -- Chapter 1. A Walk in Semiotics and Mathematics -- 1.1. A glance at semiotics -- 1.1.1. Ferdinand de Saussure -- 1.1.2. Charles Sanders Peirce -- 1.2. At the heart of mathematics, the symbolic -- 1.2.1. The epistemological life of the mathematical signs + and = -- 1.2.2. The evolution of signs, a driver for the invention of mathematics -- 1.3. The life of a basic sign in contexts -- 1.3.1. The = sign in a teaching context -- 1.3.2. The = sign in society -- 1.4. Semiotics and questions of teaching -- 1.4.1. Duval's approach on semiotics and mathematics -- 1.4.2. Semiotics and geometry -- 1.4.3. Semiotics and numbers -- 1.4.4. And language in all this? -- 1.5. Conclusion -- 1.6. Appendix: the mystery writing in Figure 1.1 -- 1.7. References -- Chapter 2. Semiotic Systems Specific to Chemistry and Their Learning -- 2.1. Introduction -- 2.2. The specific signs of chemistry -- 2.2.1. Diversity of chemical signs presented to students -- 2.2.2. A consideration of chemical signs using the "chemistry triplet" -- 2.2.3. Beyond the chemistry triplet -- 2.3. Didactical analysis framework: domains of knowledge in chemistry -- 2.3.1. The empirical register -- 2.3.2. The register of models -- 2.3.3. The communication of knowledge -- 2.4.

Semiotic supports -- 2.4.1. Triadic semiotic relationship -- 2.4.2. Relation between the sign and the represented object -- 2.4.3. The meaning of a semiotic representation through the prism of its belonging to a semiotic system -- 2.4.4. Semiotic systems and cognitive activities -- 2.5. The challenges of learning some chemical signs -- 2.5.1. Chemical formulae and names -- 2.5.2. Spatial representations of molecules -- 2.5.3. Summary.

2.6. Students' understanding of names and formulae -- 2.6.1. A single sign for two objects: students' difficulties -- 2.6.2. Interpretation by students of a molecular formula depending on the context -- 2.6.3. Summary -- 2.7. Students' understanding of stereochemical formulae -- 2.7.1. Exploration of the cognitive function behind processing -- 2.7.2. Exploration of the cognitive function used in conversion between systems -- 2.7.3. Summary -- 2.8. Conclusion -- 2.9. References --

Part 2. The Semiotic Approach: Toward the Invention of New Forms of Didactic Intervention -- Introduction to Part 2 -- Chapter 3. Scientific Knowledge at the Mercy of the "BD" Comic Strip -- 3.1. Introduction -- 3.2. Science in comic strips: semiotic analysis of some strips by apprentice-authors -- 3.2.1. A device for scientific mediation: "BD-sciences" workshops -- 3.2.2. Science in the apprentice-authors' strips: where? how? why? -- 3.3. Science in science comics for the "wider public": some narrative-visual invariants -- 3.3.1. The text: a favorable space for scholarly pronouncements -- 3.3.2. The supernatural for micro-macro-scales -- 3.3.3. The unavoidability of personification -- 3.3.4. Metaphorical universes -- 3.3.5. Humor: a link between popularization and comics -- 3.4. Science comics at the mercy of the reader -- 3.4.1. Graphic and verbal signals to decode -- 3.4.2. Scientific fiction at work -- 3.4.3. Scientific knowledge is not always integrated -- 3.4.4. ... but reading requires help -- 3.5. Conclusion -- 3.6. References -- Chapter 4. The Map at the Heart of Disciplinary Learning -- 4.1. Introduction -- 4.2. Cartography in the classroom: a complex learning challenge -- 4.2.1. The languages of maps -- 4.2.2. The map, the favored tool for educational geography -- 4.3. Toward a renewal of mapping practices? -- 4.3.1. Methodology for analyzing textbooks.

4.3.2. [Should we use] the cartography of riddles to consider maps? -- 4.4. The sensitive map, a lever for renewing mapping -- 4.5. Conclusion -- 4.6. References --

Part 3. The Multimodal Semiotic Approach: A Look at Didactic Interactions and Cognitive Processes -- Introduction to Part 3 -- Chapter 5. Semiotic Modes and Models in Physics -- 5.1. An initial epistemological anchoring: modeling -- 5.1.1. An epistemological approach to physics -- 5.1.2. The constituent elements of modeling activities -- 5.1.3. Example: modeling the functioning of a flashlight -- 5.2. The second anchoring: semiotic representations -- 5.2.1. Definition of semiotic representations -- 5.2.2. Semiotic representations in physics -- 5.2.3. Example: from drawings to diagrams in electrokinetics -- 5.3. The contribution of gestures -- 5.3.1. Gestures as semiotic modes -- 5.3.2. Gestures for teaching electrokinetics -- 5.4. Articulation of modeling and semiotic representations within the epistemo-semiotic framework -- 5.4.1. Complementary activities -- 5.4.2. Implications for teaching and learning -- 5.5. Solving the problem of the principle of inertia at upper secondary school -- 5.5.1. Context of the study and research questions -- 5.5.2. A priori analysis of the situation -- 5.5.3. Analysis of students' written productions -- 5.5.4. Analysis of interactions within a group of students -- 5.5.5. Summary of results -- 5.6. Conclusion -- 5.7. References -- Chapter 6. The Didactic Effects of Semiotic Microphenomena in Mathematics -- 6.1. Some foundations -- 6.1.1.

Our vision of learning -- 6.1.2. Theoretical tools for semiotic analysis -- 6.1.3. Semiotic dissonance -- 6.2. Dissonance and interactions in a mainstream class -- 6.2.1. Presentation of the context, the data studied -- 6.2.2. Studying communication and regulation of the task. 6.2.3. Noting semiotic dissonances on language -- 6.3. Dissonances and symbols in a class at a medical-education institute -- 6.3.1. Presentation of the context, the data studied -- 6.3.2. Semiotic dissonances and numbers -- 6.3.3. Semiotic dissonances and arithmetical writing -- 6.4. The table, a support for hidden complexity -- 6.4.1. A table for breaking numbers down into tens -- 6.4.2. A table for breaking down the numbers into hundreds -- 6.4.3. The table, an analytical aide for the researcher? -- 6.4.4. In sum: the table, a sign in itself -- 6.5. Conclusion -- 6.6. References -- Chapter 7. Body, Matter and Signs in the Constitution of Meaning in Mathematics -- 7.1. Introduction -- 7.2. Body, matter and thought -- 7.2.1. From Antiquity to the Middle Ages -- 7.2.2. Rationalism and empiricism in the 17th and 18th centuries -- 7.2.3. The body and the senses in contemporary research -- 7.3. The body and the historical emergence of algebraic symbolism -- 7.4. Sight, touch, orality and symbol -- 7.5. Conclusion -- 7.6. References -- Conclusion -- List of Authors -- Index -- EULA.
