

THE ONTO-SEMIOTIC APPROACH AS AN INTEGRATIVE THEORETICAL FRAMEWORK FOR STATISTICAL EDUCATION

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We present a synthesis of recent developments in the Onto-Semiotic Approach (OSA), a theoretical framework arising from semiotic and anthropological assumptions about statistics (mathematics), and from socio-constructivist and interactional principles for the study of teaching and learning processes (Godino, Batanero & Font, 2007). The OSA was started by the “Theory of Mathematics Education” Research Group at the University of Granada (Spain) in the early nineties, and is now developed and applied by others Spanish and Latin-American research groups in both mathematics education and statistics education (Godino, Ortiz, Roa & Wilhelmi (in preparation)). The theoretical notions that compose OSA are classified into five clusters, each of them allowing specific level of analysis for the teaching and learning processes of particular statistics and mathematical themes:

1. *System of* (operative and discursive) *practices*. We assume a pragmatist – anthropological conception of statistics (mathematics), both from the institutional (socio-cultural) and personal (psychological) viewpoints. Problem solving activity is considered as the key element in the construction of statistical knowledge.
2. *Configuration of mathematical objects and processes* that emerge and intervene in statistical practices. An interactionist notion of object and a pragmatist view of meaning (content of semiotic functions) allow to articulate the anthropological (Wittgenstein) and realistic positions of statistics (mathematics). Various types of expressions (language) fulfill the double role of instruments for statistical work and representation of statistical objects.
3. *Didactical configuration*, conceived as the articulated system of teachers’ and students’ activity when interacting within a configuration of statistical objects and processes linked to a problem-situation, is the main tool to analyze statistical instruction. Didactical configurations and didactical trajectories take into account the different dimensions that characterize the teaching and learning processes: epistemic (institutional knowledge), cognitive (personal knowledge), affective, mediational (technological resources and time), interactional and ecological dimensions.
4. *Normative dimension*: the system of rules and habits that restrict and support statistical and didactical practices. They generalize the notions of didactical contract and socio-mathematical norms and explain some didactical phenomena.
5. *Didactical suitability*: general criteria to assess the adequacy of the educational actions, knowledge and resources used in a specific study process. A system of empirical indicators for each dimension guides the systematic analysis and progressive improvement of teaching.

The Onto-semiotic Approach allows a coherent articulation of diverse theoretical models usually applied in Statistics and Mathematics Education research (didactical phenomenology, ethno-mathematics, anthropological theory, didactical situations, conceptual fields, semiotic representation registers, socio-epistemology, etc.).

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