Doctoral Dissertation: Ana Serradó Bayés

Ttitle: Dealing with Chance in Secondary School

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This research work is included in the research agenda developed by the "Teachers' professional development group" at the University of Cadiz, Spain. The main aim was carrying out a first approximation to studying the planning of the teaching and learning process related with Dealing with Chance at Secondary School level. The elected methodological research design was qualitative and interpretative, and focused on two topics: textbooks and teacher's arguments. Content analysis of the chapters devoted to Chance and Probability in a sample of secondary school textbooks in four different teaching levels (12-16 years-old students) of the Spanish publishers Guadiel, Santillana, Bruño and McGraw Hill was carried out. The content analysis aims were describing the units, charactering the elements that configure the teacher's intervention and delimiting possible subjacent didactic models.

The study of three teacher's arguments served to analyse their ideas and decisions about the use of information sources in the process of planning the teaching and learning. We also investigated the teachers' different arguments in relation to their judgements and decisions to introduce this unit and the possible influence of information sources on this decision.

We based on the Teachers Professional Knowledge framework to elaborate the instruments for collecting information, the category systems and to interpret the results. Three progress hypotheses about the evolution of teachers of increasing complexity were stated. We introduce the hypotheses about the teachers' progression in the use of information sources when planning the teaching and learning process, where we differentiate information and knowledge sources.

Differences between textbooks, referring to the unit structure and content treatment showed two tendencies in the teaching of chance and probability. The first one is associated to traditional didactic models and is characterised by predominance of classical laplacian probability, where the study of outcomes is independent of the study of random generators. The second tendency is linked to technological didactic models and gives priority to frequentist probability. Here outcomes become a tool to facilitate the quantification of probability and take into account the obstacles and errors that can

appear in building this notion. These differences reflect the tendencies in the textbooks subjacent didactic model, and produce information about two possible perspectives in the teacher's planning of these units.

The analysis of teachers' arguments suggests a profile of traditional intervention, where the main information source is the textbooks that facilitate the teachers' content election and sequence. Teachers do not consider the students conceptions as a source of information about their previous knowledge. Two of the teachers presented some evolution through a spontaneous model, characterised by considering different sources of information, such as courses, journals, etc, that allows them to introduce some innovations in the teaching and learning process to promote the students' experimentation and participation. These teachers introduced these innovations in a non-systematic manner, after reflecting about the necessities detected in the development of their teaching interventions.

The third teacher presented some evolution through a technological didactic model, where he made a more systematic planning of the necessities detected in the evaluation of students' knowledge, and tried to help students overcome their errors.

Two teachers did not introduce the units related to Chance and Probability, basing on the tradition in mathematics teaching, scientific determinism and lack of time to conclude the curriculum. The third teacher introduced these units, from a classical-laplacian perspective, influenced by the use of the textbook.

We conclude from our results:

- The potential of "Teacher Professional Knowledge" framework to connect different fields: probability, sources of information and the planning of teaching and learning process.
- The necessity of distinguishing between sources of information and sources of knowledge.
- The usefulness of analysing the text structure and the mathematics and probabilistic content to identify tendencies in the textbook subjacent didactic models
- The usefulness of content analysis of textbooks activities to produce information about the capacities that students can develop, the interactions between students, and possible obstacles in the learning of probability.