A UNIVERSITY INSTRUCTOR'S ORCHESTRATION FOR SUPPORTING HIS STUDENTS' PROGRAMMING FOR MATHEMATICS

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In our on-going five-year naturalistic research, we analyze how math majors and future math teachers learn to use programming for mathematics investigation. Using the instrumental approach (Trouche, 2004) as a framework, we present some exploratory results on how the instrumental orchestration of an instructor (Bill) supports the activity of his students. Rabardel (1995) describes how people, through their instrumental geneses, appropriate an artifact and turn into an instrument. Trouche (2004), proposed the concept of instrumental orchestration to refer to the teacher's organization: the arrangement and didactic use of artifacts in the class to steer the student's instrumental geneses. As an extension to this concept, Drijvers et al. (2010) consider three instrumental orchestration's components: (i) the *didactical configuration* – "an arrangement of artifacts in the environment; (ii) the *exploitation mode* – "the way the teacher decides to exploit a didactical configuration for the benefit of his or her didactical intentions"; and (iii) the *didactical performance* – which "involves the ad hoc decisions taken while teaching" (Drijvers et al., 2010; p. 215). Bill's data includes the course syllabus and the assignment guidelines; assessment grading rubric and 6 instructor interviews.

Bill's **didactical configuration** involved mathematical and social considerations and a web of ideas and actions that provide a creative structure for drawing connections between programming and mathematics (Buteau et al., 2020). The choice of programming technology and the general guidelines of their use was established in 2000 by the mathematics department at his university. Bill follows this didactical configuration.

The **exploitation mode** relates to his aims and the didactical design of the assignments, which involve modeling, problem-solving, simulations, and explorations; and where "mathematics is for programming", and "programming is used to do and understand mathematics". Bill provides his students with guidelines for each assignment including, in written form: worksheets guiding them through several steps or parts. For Bill, the mathematical content should be interesting for his students, related to computing and real-life phenomena. Bill's **didactical performance** aims at supporting and empowering his students while also taking into account and promoting the affective aspects (e.g. motivation, as well as creativity). He supports students by guiding their activity through individual interactions (in the lab mainly) or/and through collective interventions and discussions in lectures (Sacristán et al., 2020). In our on-going work, we analyze how the instrumental orchestration proposed by Bill, in particular the artifacts used in class, the design of the assignments and how he interacted with his students, support the development of his students' instrumental geneses of programming for mathematics. In the poster, we will illustrate the above in the case of a particular student in Bill's class.

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