

DEVELOPMENT OF OPERATIONAL AND DEDUCTIVE COMPETENCES IN A DYNAMIC GEOMETRY ENVIRONMENT

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In this qualitative case study* we have focused on the relationship between the use of dynamic geometry software (DGS) and the acquisition of mathematical operational and deductive competences. We study the deductive competence widely analysed and we develop the operational competence which is a term we have chosen to refer to those mental processes which guide a student in the resolution process, namely in what we call proof search. To do so, we have designed a dynamic instructional design taking into consideration a students' hypothetical learning trajectory (HLT) like Simon and Tzur (2004). The HLT is implemented with the help of DGS and the teacher who has managed the teaching experiment.

The theoretical framework supporting the design of the teaching experiment had three major and interrelated focuses: 1) the instrumental, 2) the cognitive; and 3) the instructional focus. Our aim in this research has been to understand how the integration of DGS and adequately designed teacher-managed tasks can help students to improve each competence. Our main data come from the solving strategies represented in twelve students' written protocols and their DGS files, as well as the audio and video-taped interactions centred on student-teacher interactions.

There are two main findings: a) the emergence of three prototypical behaviours (non-confident, confident and autonomous students) and b) a new kind of dragging that we call structural dragging. In the presentation, we will describe the three prototypical behaviours and we will share examples of structural dragging.

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References

- Simon, M.A., & Tzur, R. (2004). Explicating the role of mathematical tasks in conceptual learning: An elaboration of the hypothetical learning trajectory. *Mathematical Thinking and Learning*, 6(2), 91-104.