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Solving techniques of future mathematics teachers: the case of reflection

Nicolas Grenier-Boley¹, Elann Lesnes¹, and Edith Petitfour¹

¹ Univ Rouen Normandie, Université Paris Cité, Univ Paris Est Créteil, CY Cergy Paris Université, Univ. Lille, LDAR, F-76000 Rouen, France, nicolas.grenier-boleyn@univ-rouen.fr

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INTRODUCTION

The work presented in this poster is part of a research project aimed at equal access to quality learning opportunities for all learners, particularly those defined as having special educational needs, in line with the principles of inclusive schooling promoted by UNESCO (2017). Two secondary school mathematics teachers taking part in this research designed and implemented a mathematical task in their class (grade 6, 11-12 years old). This task involves using prescribed materials to construct an instrument that can be used to determine the symmetric of a given point with respect to a straight line. We proposed the same task to first-year and second-year Master's students intending to teach mathematics in secondary schools in order to compare their knowledge involved in solving the task with that of the pupils.

We position our study in relation to Klein's second transition (Winsløw, 2020), which occurs for future mathematics teachers between their university studies and the time when they obtain a teaching position in secondary education. To quote Felix Klein (2008), an important aim of didactic research dedicated to this transition is to enable future teachers to adopt “a higher standpoint on mathematics”. At the very least, the aim is to enable them to see to what extent the mathematical knowledge they have acquired at university may (or may not) be relevant to their future profession, in dedicated courses – called “capstone courses” – such as geometry (Hoffmann & Biehler, 2020). In our case, these objectives are relevant, since on the one hand the notion of reflection is present at primary school and during the first years of secondary education in France, and on the other hand students have approached symmetries (reflection or not) or isometries from different points of view (affine space, vector space, complex numbers) in the course of their university studies.

MAIN ISSUE AND THEORETICAL FRAMEWORK

In order to compare them, we have chosen to model the mathematical activity of pupils and students in terms of praxeologies (Bosch et al, 2019), based on the process of didactic transposition (Chevallard & Bosch, 2014) linked to the secondary and higher education curricula.

In this poster, our main issue is to determine the (components of) praxeologies that are mobilised by pupils and students in carrying out the task under consideration.

More specifically, to what extent do the students supplement the pupils' praxeologies with elements of a technological or even theoretical nature?

In addition to a more precise presentation of the context and process, the aim of the poster will be to present the results of our study (in progress) with respect to this main issue. In order to enable a more detailed comparison of the activities of pupils and students, we will highlight the identification of possible mute, weak or strong praxeologies among students (Barquero et al, 2019), and we will report on the semiotic analyses of their activities (Petitfour & Houdement, 2022).

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