

ZMATH 2014d.00985

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A qualitative analysis of students' factorization of $x^n - 1$ using a CAS application.

J. Korean Soc. Math. Educ., Ser. A, Math. Educ. 52, No. 3, 271-301 (2013).

Summary: The purpose of the study was to investigate how students generalize and prove the factoring of $x^n - 1$ using a computer algebra system (CAS) application and the role of a CAS in this process. The theoretical framework consists of the anthropological and the instrumental approach. In particular, the basis of the task-technique theorization frame adapted from Chevallard's anthropological approach of didactics is utilized. We found that technique theorization emerges in mutual interaction between paper-and-pencil techniques and computer algebra techniques. And this interaction led to the students' theoretical reflection and conceptual understanding. In this process, we could identify three epistemic roles of a CAS: the role of checking the result, the role of cognitive stimulation and the role of extending thinking. Therefore a CAS plays on a epistemic role of checking the result of a task, stimulating the student' cognition and extending their thinking as well as pragmatic role of producing the result of a input.

Classification: U74 H24

Keywords: computer algebra system; CAS application; task-technique theorization