A HYPOTHETICAL LEARNING TRAJECTORY FOR TRIGONOMETRIC EQUATIONS WITH INFINITE SOLUTIONS

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This research focusses on new forms of learning through the design and assessment of a hypothetical learning trajectory (HLT) on trigonometric equations with infinite solutions at university level. The research considers as the theoretical basis the instructional design heuristic of emergent models (Gravemeijer, 1999) and the conception of the HLT (Simon, 1995). Design-based research is used as a methodology. During the teaching experiment phase, the HLT was applied in a geometry course for the first year of an engineering. Audio recordings and the written protocols of the tasks were analysed.

The results provide evidence that the HLT contributed for students to learn how to solve trigonometric equations with infinite solutions. We observed that the students progressed from a known model-of mathematical activity (locating angles in the cartesian plane and the values of the trigonometric functions of known angles) to a more formal model-for reasoning (concept of trigonometric equations with infinite solutions). We recognize where the "model-of" and "model-for" are visible in the data, which is fundamental in Gravemeijer's work. However, the students showed drawbacks when interpreting the results in a real context.

This HLT may have some implications for the design of tasks in Geometry, as it provides a way to design a sequence of tasks for concepts that are difficult to learn due to their high level of abstraction. We hope to serve as a guide to design other HLTs that help students advance their learning in the area of geometry.

Acknowledgment

References

Gravemeijer, K. (1999). How emergent models may foster the constitution of formal mathematics. *Mathematical thinking and learning*, *1*(2), 155-177.

Simon, M.A. (1995). Reconstructing mathematics pedagogy from a constructivist perspective. *Journal for Research in Mathematics Education*, *26*, 114-145.