

A HYPOTHETICAL LEARNING TRAJECTORY FOR TEACHING VECTOR SUBSPACE CONCEPT

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Vector subspace concept is known for its high level of abstraction, and for this reason, many students have difficulty in its construction. Against this background, this exploratory research aims to evaluate a hypothetical learning trajectory (HLT) for teaching vector subspace concept. The vector subspace teaching process was started using the solution set of a system of linear equations (SLE) with infinite solutions. The research methodology was design research that consisting of three phases: preparation and design, teaching experiment, and retrospective analysis (Gravemeijer & Van Eerde, 2009). In the first research phase, we designed an HLT composed of four tasks on vector subspace concept in terms of the instructional design heuristic of emergent models (Gravemeijer, 1999) and the mechanism of reflection on the activity-effect relationship (Simon et al., 2004). In the second phase, corresponding to the teaching experiment, the designed HLT was used as a teaching tool in a Linear Algebra course composed of 30 first-year engineering students. In the third phase, we analyzed audio recordings and the written protocols of the tasks developed by the students to evaluate the designed HLT. The results show that the HLT on vector subspace concept helped students identify when a set was or was not a vector subspace. In particular, several students moved from their model of solution set of 2x2 SLE with infinitely many solutions that are vector subspaces to a model for identify which sets (other than vectors of \mathbb{R}^n) are vector subspaces.

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References

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