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Author
Halbherr, Tobias Moritz

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Knowledge-Gap Awareness as Mediating Cognitive Mechanism in Tool-Mediated Learning in Computer Science: A Multi-Method Experimental Study

Tobias Halbherr
ETH Zurich, Zurich, Zurich, Switzerland

Abstract

Interaction with environmental resources such as technological tools facilitates conceptual learning and preparation for future learning. Writing and compiling code, failing, and trying again fosters deep understanding of computational concepts. This study investigates knowledge gap awareness as potential mediating cognitive mechanism in the learning process from situated interaction with a technological tool to internalized conceptual understanding. Students engaged in a tool-mediated or tool-dissociated learning activity on functional programming and were subsequently assessed on their learning again under tool-mediated or tool-dissociated conditions. Students' assessment performances were triangulated with their open comments and questionnaire responses on the study's learning and assessment activities. The findings support the assumption of tool-mediation facilitating knowledge gap awareness, which in turn facilitates conceptual learning.