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Touch arithmetic: a process-based computer-aided assessment approach for capture of problem solving steps in the context of elementary mathematics.

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Summary: Technology today offers many new opportunities for innovation in educational assessment and feedback through rich assessment tasks, efficient scoring and reporting. However many computer-aided assessment (CAA) environments focus on grading and providing feedback on the final product of assessment tasks rather than the process of problem solving. Focussing on steps and problem-solving processes can help teachers to diagnose strengths and weaknesses, discover strategies, and to provide appropriate feedback. This study explores a method that uses trace links on an interactive touch-based computing tool for the capture and analysis of solution steps in elementary mathematics. The tool was evaluated in an observational study among 8 and 9 year old primary school children ($N = 39$). The approach yielded similar performance scores as compared to paper-and-pencil tests while providing more explicit information on the problem-solving process. The output data was useful for scoring intermediate and final answers as well as feedback information on types and time efficiencies of strategies used. An implication of this study for teachers and researchers is that they can more accurately assess students' understanding of important concepts, and be in a better position to provide rich and detailed feedback while motivating students with interactive tasks.

Classification: U72 D62 D52 F32

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