

Smartglasses as assistive tools for undergraduate and introductory STEM laboratory courses

by Fridolin Wild

Martin P. Strzys, Michael Thees, Sebastian Kapp, Pascal Knierim, Albrecht Schmidt, Paul Lukowicz and Jochen Kuhn

Learning is known to be a highly individual process affected by learners' individual previous experience and self-directed action. Especially during laboratory courses in university Science, Technology, Engineering and Mathematics (STEM) education, all channels of knowledge construction become relevant: students have to match their theoretical background with experimental hands-on experience, leading to an intensive interaction between theory and experiment. Realizing augmented reality scenarios with see-through smartglasses allows to display information directly in the user's field of view and creates a wearable educational technology, providing learners with active access to various kinds of additional information while keeping their hands free. The framework presented here describes the use of augmented reality learning environments in introductory STEM laboratory courses aiming to provide students additional information and real-time feedback while sustaining their autonomy and the authenticity of their action. Based on principles of the Cognitive-affective theory of learning with media (CATLM), we hypothesize that this tool can structure students' hands-on experiences and guides their attention to cue points of knowledge construction.

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