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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 44(44)

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Publication Date

2022

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Peer reviewed

Eliciting Proactive and Reactive Control during Use of an Interactive Learning Environment

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Abstract

The dual mechanisms of control framework describes two modes of goal-directed behavior: proactive control (goal maintenance) and reactive control (goal activation on task demands). Shifts between these modes may explain variations in user performance in computing tasks. Although these mechanisms are relevant to the design of interactive systems, and particularly educational systems, their relation to human-computer interaction (HCI) is under-researched. We propose a manipulation to induce proactive or reactive control in the context of mathematical problem solving on an online tutoring system. We present two experiments where students solved problems using either proactive or reactive control. Study 1 validates the manipulation by investigating behavioral measures that reflect usage of the intended strategy and assesses whether either cognitive control mode impacted learning. Study 2 investigates whether alternating between control modes during problem solving affects student performance.