

# Closing the Affective Loop in Intelligent Learning Environments

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Research on affective intelligent learning environments (ILE), i.e. ILE that include affective elements in the interaction with the student, has become increasingly prominent in the past few years, due to two main reasons. Firstly, there is growing evidence of correlations between affect and learning, fostering the belief that recognizing and responding to student's affect can improve the effectiveness of pedagogical interactions. Secondly, advances in affect recognition make it now feasible to devise interactive tools that can be aware of a user's affective states, and respond accordingly.

The workshop is designed to continue the discussion started during the previous related workshops at ITS and AIED, with a specific focus on how to close what we will call the affective loop, i.e., that ensemble of four phases that together allow for the principled addition of affective elements to an ILE: (i) design the environment so that it can elicit affective states favorable to learning, (ii) recognition/modeling of relevant user's states, (iii) selection of appropriate system responses, and (iv) synthesis of the appropriate affective expressions.

Of the four phases that form the affective loop, phase (ii) and (iv) have seen the most advances in recent years. What we are still lacking are strong theories on how to use affect in pedagogical interactions, and strong evidence that taking affect into account when interacting with students can actually improve learning. There are some qualitative accounts of how affect and learning may interact, as well as some evidence that certain affective states are correlated with learning, but these findings are not sufficient to devise computational models that can be used to influence the affect-sensitive behaviors of computer-based tutors. Similarly, we have initial results on the effect of affect-based ILE, but they mostly report qualitative measures of student satisfaction rather than quantitative measures of learning.

Thus, the main objective of this workshop is to bring researchers in the field together to discuss/define directions for research on the first and third phase of the affective loop, that is the design of system elements and responses that aim at fostering learning by eliciting favorable affective states.