

Seeing emotions: Using visualizations to provide affective awareness in collaborative learning scenarios

Derick Leony, Abelardo Pardo
Department of Telematic Engineering,
Universidad Carlos III de Madrid,
{dleony, abel}@it.uc3m.es

Several studies have addressed the effect of emotions over cognitive processes such as learning (Picard et al., 2004). Emotions and their effects are usually perceived by direct observation in face-to-face scenarios but this is not possible in those cases where communication is computer-mediated. We argue that visualizations within a computer-supported collaborative learning (CSCL) environment are a valid way to provide emotion awareness to learning peers and the instructor.

Visualizations have been proven as a valid mechanism to provide participation awareness in CSCL scenarios (Janssen et al., 2007). This study also showed that participation awareness provokes a positive effect in the collaboration among learners. This gives us a starting point to hypothesize that visualizations can as well provide awareness of emotion among learners participating in a collaborative environment.

Once the learners emotion are visualized, the CSCL environment can foster interventions such as the communication between peers or a change in the orchestration of the activity. As an example of the former, if a visualization presents a learner being confused, a peer feeling motivated could be asked to guide her peer out of her state of confusion. An example of an intervention in the activity orchestration would be a visualization showing all of the learners feeling frustrated; the instructor might choose to rearrange the groups or assign them a different task in order to solve the issue.

Although the focus of our proposal is the provision of visualizations to communicate emotions, we are also working on mechanisms to detect emotions in a learning scenario. Besides of sensing elements common in affective computing such as facial expression and galvanic skin response (Arroyo et al.,

2009), we are analyzing the correlation of emotions with patterns of learning interactions. For example, a learner that fails an assessment repeatedly might become frustrated after a while. The detection of patterns, in combination with body sensors, could result in a higher level of accuracy to sense emotions.

Although the awareness of emotion presents several advantages to improve collaboration, there are several threats that must be considered in a real scenario. First, it is possible to influence the learner emotion negatively; the awareness of peer emotions might generate stress or anxiety over a learner. Another issue is the difficulty to evaluate the accuracy of the emotions detected for a learner, given the fact that even explicit information is not always accurate (Picard et al., 2004). Lastly, privacy issues must certainly be taken into account when disclosing the emotions of a learner to the rest of the class participants. All of these treats can be also generalized into the field of affective computing.

In conclusion, we argue that embedding emotion-based visualizations in the learning environment will provide emotional awareness to learners and instructor. Furthermore, this mechanism is able to provoke a direct effect in the collaboration between learners and in the orchestration performed by the instructor or the supporting environment. Our proposal is directly related to the focus of emotion awareness in CSCL on how to present emotions in a collaborative situation. This proposal can also be related to the focus affective computing and CSCL by analysing and discussing the presented threats.

References

- I. Arroyo, D.G. Cooper, W. Bursleson, B.P. Woolf, K. Muldner, and R. Christopherson. Emotion sensors go to school. In *Proceeding of the 2009 conference on Artificial Intelligence in Education: Building Learning Systems that Care: From Knowledge Representation to Affective Modelling*, pages 17–24. IOS Press, 2009.
- J. Janssen, G. Erkens, G. Kanselaar, and J. Jaspers. Visualization of participation: Does it contribute to successful computer-supported collaborative learning? *Computers & Education*, 49(4):1037–1065, 2007.
- RW Picard, S. Papert, W. Bender, B. Blumberg, C. Breazeal, D. Cavallo, T. Machover, M. Resnick, D. Roy, and C. Strohecker. Affective learninga manifesto. *BT Technology Journal*, 22(4):253–269, 2004.