

Commentary: Beyond emotion AI: rethinking affective computing as a pedagogical tool for inclusive learning

Educational innovation is most impactful when it meaningfully transforms teaching and learning practices rather than merely introducing new technologies. As artificial intelligence (AI) becomes increasingly embedded in educational environments, affective computing – AI systems designed to adapt feedback, pacing or instructional support based on learners’ emotional or behavioral cues – has been proposed as a way to address the affective dimensions of learning. Originally defined as computing that relates to, arises from, or deliberately influences human emotions (Picard, 1997), affective computing has gained traction in educational research and practice. However, its pedagogical value lies not in the precision of emotion detection but in how effectively it supports instructors in responding to learners’ needs.

Learning is inherently emotional. Motivation, engagement and persistence are shaped by learners’ affective experiences, particularly during cognitively demanding or unfamiliar tasks. D’Mello and Graesser (2012) demonstrate that emotions such as confusion or frustration can either hinder or support learning depending on how instruction responds to them. Within this context, AI-supported systems that provide adaptive dialog, formative feedback or scaffolded support may help mitigate unproductive frustration and sustain engagement (Firat, 2023). In higher education, where instructors often manage large and heterogeneous classes, such systems may complement teaching by offering timely instructional adjustments when individualized attention is constrained.

Nevertheless, improving teaching requires more than automated emotion recognition. Many affective computing applications infer emotional states from facial expressions, vocal characteristics or behavioral patterns. While such indicators may offer partial insights into learners’ experiences, they provide limited pedagogical value if they merely label students as disengaged, confused or frustrated. A central limitation of current approaches is the insufficient translation of affective data into actionable instructional strategies. Without clear pedagogical alignment, emotion recognition risks becoming an end in itself rather than a means to enhance learning.

A more productive direction involves shifting emphasis from identifying emotions to responding pedagogically to learners’ needs. Rather than diagnosing or labeling emotional states, affective computing systems can be designed to enhance instructional adaptability by offering alternative explanations, scaffolded resources, reflective prompts or adjustments to pacing. For example, in a higher-education learning platform, repeated incorrect quiz attempts or extended inactivity could trigger recommendations for optional review modules, guided practice or instructor check-ins – without explicitly assigning an emotional label. Such designs support differentiated instruction while preserving instructors’ professional judgment and autonomy.

This pedagogical reframing is particularly critical in inclusive learning environments. Emotional expression, engagement and help-seeking behaviors vary across cultural contexts, socioeconomic conditions and neurodiverse learner profiles. Equity-oriented scholarship in higher education emphasizes that student success is shaped less by individual traits than by institutional practices, relational support and inclusive teaching conditions (Kezar and Holcombe, 2021). Affective computing systems that rely on standardized emotional signals risk misinterpretation and deficit-based assumptions, particularly for students whose affective expressions deviate from dominant norms. There remains a significant research gap



concerning how such systems function across diverse learner populations and within large, heterogeneous higher-education settings.

Ethical considerations further underscore the need for pedagogically grounded design. Although AI systems do not possess genuine empathy, they can be structured to respond in ways that are instructionally supportive and transparent. At the same time, over-reliance on affective technologies risks reducing complex student experiences to decontextualized data points. As Iskender (2023) cautions, sustained instructor involvement, clarity about system capabilities and ethical data practices are essential to prevent the erosion of trust and relational dimensions of teaching.

Moving beyond emotion AI therefore requires viewing affective computing primarily as a pedagogical tool rather than an emotion-detection technology. When guided by inclusive design principles, ethical safeguards and clear instructional purposes, affective computing can contribute to more responsive, equitable and humane learning environments. Future research should examine how educators integrate such systems into instructional design, how learners experience AI-mediated support across diverse contexts and how institutional policies can ensure that affective technologies enhance – rather than constrain – educational equity and innovation.

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