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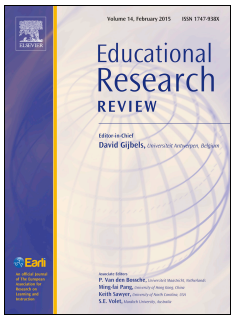

The impact of pedagogical agent gesturing in multimedia learning environments: A meta-analysis

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The impact of pedagogical agent gesturing in multimedia learning environments: A meta-analysis

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Abstract
A meta-analysis consisting of 20 experiments (N = 3841) on the influence of pedagogical agent (PA) gesturing in multimedia environments revealed that gestures have a small-to-medium impact on near transfer of knowledge (g = 0.39), retention of learning (g = 0.28), and agent persona (g = 0.44), but a minimal impact on reducing cognitive load (g = 0.13). Moderator analysis discovered humanoid agents had a small effect on decreasing cognitive load (g = 0.24), while character agents had a minimal to small effect on increasing cognitive load (g = - 0.18). Interestingly, deeper analysis found the differences in effect sizes for near transfer and retention might be due to the learning outcome measured, not the design of the PA. Overall, the findings revealed that PA gestures are beneficial for student learning and perception in multimedia learning environments.

Highlights

- Effect sizes for near transfer and retention were connected to the learning outcome, not the agent.
- Agent gesturing is more beneficial to transfer and retention than control conditions.
- To maximize agent persona, videos should be kept under 6 minutes in length.
- Gestures performed by humanoid agents decrease cognitive load, while character agents slightly increase cognitive load in participants.

Keywords: meta-analysis; pedagogical agents; gesture; persona; cognitive load

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