

From Page to Podcast: AI Audio and the New Learning Experience (Poster)

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Abstract

Recent advances in audio-based technologies such as AI-generated podcasts, audiobooks, and variable playback speeds are reshaping the way people consume educational content (Jafarian & Kramer, 2025). Learners increasingly engage through listening rather than reading, raising important questions about comprehension, efficiency, and enjoyment. This study examines how three variables; learning modality (reading vs. listening), content elaboration (full texts vs. AI-generated summaries), and playback speed (1x, 1.5x, 2x), influence cognitive and affective learning outcomes.

The research is grounded in three complementary frameworks. The **Aptitude–Treatment Interaction (ATI)** model (Lehmann & Seufert, 2020) highlights how instructional modality interacts with learner characteristics. The **Levels of Processing (LoP)** theory (Craik & Lockhart, 1972) links depth of cognitive engagement with retention, emphasizing that meaning-based processing enhances long-term memory (Peng et al., 2024; Dubravac et al., 2025). Finally, **Vygotsky's Zone of Proximal Development (ZPD)** (Vygotsky, 1978) conceptualizes how scaffolding supports learners' comprehension of complex materials. Together, these frameworks allow examination of whether simplified AI-generated summaries act as scaffolds that enhance learning within the learner's ZPD and whether summaries and increased audio speed reduces cognitive load or exceeds processing capacity (Tran et al., 2024; Chen et al., 2024).

The study employs a **mixed-methods design** consisting of two quantitative experiments complemented by qualitative interviews. **Experiment 1** (N = 120) examines the interaction between instructional modality (reading vs. listening) and content elaboration (full text vs. AI-generated summary) in a 2x2 factorial design. **Experiment 2** (N = 90) investigates the effect of playback speed (normal, 1.5x, 2x) within the listening condition. In both experiments, participants complete a modality-preference survey (Lehmann & Seufert, 2020), a knowledge test (Tran et al., 2024), and questionnaires measuring perceived learning (Caspi & Blau, 2008), enjoyment, and cognitive load (Chen et al., 2024). Time-on-task is recorded as an indicator of learning efficiency.

The **qualitative phase** consists of semi-structured interviews (n = 30) exploring participants' subjective experiences, comprehension strategies, and perceived efficiency. Thematic analysis will integrate these insights with quantitative results.

This research contributes theoretically by extending ATI and LoP models into the emerging context of AI-supported listening-based learning and by incorporating ZPD to frame summaries as digital scaffolds. Practically, it aims to inform the design of adaptive AI audio-learning tools and guide educators in selecting optimal modality, content depth, and playback speed for diverse learners.

Keywords: AI-generated audio, learning modality, playback speed, content elaboration.

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