Assistive Technology and AI-Driven Narration: ADHD Adults' Experiences in Digital Reading Environments

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AI-Driven Narration for ADHD Adults

Cognitive Load Management in ADHD Individuals

Text-to-Speech Tools in Digital Reading Environments

This study examines the experiences of ADHD adults using an AI-powered text-to-speech (TTS) tool to improve reading comprehension in digital contexts. Reading comprehension is particularly challenging for ADHD individuals due to difficulties in working memory and attention, which are further strained by digital distractions. Recent advances in generative AI have enabled TTS tools to produce more human-like narration, potentially reducing cognitive load. Guided by the Cognitive Theory of Multimedia Learning (CTML), this study employs a phenomenological approach to investigate participants' experiences. Data from journals and interviews revealed seven key themes, including usage preferences, enhanced attention, cognitive load management, benefits of natural narration, and personalization. Results show the TTS tool supports ADHD adults by aiding focus and comprehension, especially for complex texts. Findings suggest

that incorporating similar assistive tools in educational and professional settings could provide meaningful support for ADHD adults.

Introduction

Reading comprehension, a complex cognitive skill, is particularly challenging for individuals with Attention-Deficit Hyperactivity Disorder (ADHD) due to difficulties in working memory and sustained attention (Butterfuss & Kendeou, 2018; Jacobson et al., 2011; Miller et al., 2013; Miranda et al., 2017; Segal, 2023). The shift to digital texts (Rainie, 2012) introduces distractions like social media and advertisements, further competing for attention (Copeland et al., 2016; Liu, 2022).

Assistive technologies such as text-to-speech (TTS) tools support reading comprehension for struggling readers, including those with ADHD (Bone & Bouck, 2017; Fichten et al., 2020; Floyd, 2012; Hecker et al., 2002; Wood et al., 2018). Recent advancements in generative artificial intelligence (AI) have improved TTS technology, enhancing natural prosody, dynamic intonation, and adaptive narration (Bandi et al., 2023). Traditional TTS tools relied on robotic voices, increasing cognitive load and reducing effectiveness in learning contexts (Atkinson et al., 2005; Mayer, 2017; Mayer et al., 2003). Generative AI may bridge this gap by making narration more engaging and intuitive.

Despite the potential benefits, research on TTS tools primarily focuses on children, with no documented studies exploring AI-powered TTS tools for ADHD adults. This study addresses these gaps by examining how AI-driven TTS technologies support ADHD adults, offering insights into their role in assistive reading.

Theoretical Framework

The Cognitive Theory of Multimedia Learning (CTML; Mayer, 2014) posits humans process visual and auditory information through separate channels, each with processing limits. Humans engage in cognitive processing using these channels by managing sensory, working, and long-term memory stores and cognitive resources. Three types of demands impact cognitive capacity: extraneous (irrelevant to the task), essential (inherent difficulty of the material), and generative processing (actively making sense of information) (Mayer, 2014). To address these demands, Mayer also describes twelve principles for designing multimedia environments, including the signalling principle, the redundancy principle, and the voice principle (Mayer, 2017).

Integrating CTML insights with ADHD-related reading comprehension challenges and TTS tool implementations suggests a promising intersection that may benefit ADHD adults.

Methodology

This study employs a phenomenological approach to explore ADHD adults' lived experiences with an AI-powered TTS tool in digital reading environments. Participants had a confirmed ADHD diagnosis, were over 18, and frequently engaged with digital text for academic, informal learning, or professional purposes. Recruitment occurred via ADHD-related subreddits and listservs.

Data was collected through journal entries and semi-structured interviews. Participants documented their experiences after using the TTS tool for reading at least one digital text. Interviews provided deeper insights into their usage patterns. A phenomenological analysis identified shared experiences, and thematic analysis (Nowell et al., 2017) was used for data coding.

Findings

This study examined ADHD adults' experiences with AI-powered TTS for digital reading comprehension. Participants included a 22-year-old male transitioning to a professional career and a 57-year-old female with extensive academic and professional experience. Neither had comorbid diagnoses; both worked in higher education and read regularly.

Seven themes emerged from interviews and journals (Table 1), highlighting shared experiences.

Table 1

Emergent Themes and Their Key Insights

Theme	Key Insights
Usage Characteristics	Participants found the tool most useful for dense, complex texts, such as academic articles or long emails. For shorter readings, they typically found it unnecessary.
Reading Comprehension Difficulties	Both participants reported longstanding struggles with organizing and retaining information from text due to ADHD. They often used workarounds, like skimming or seeking summaries, which led to missed details. The TTS tool helped address these issues by pacing their reading and reducing the need for such strategies.
Enhanced Attention and Focus	The steady, guided pace of the TTS narration helped anchor participants' attention, making it easier to stay on track without skipping or losing their place.
Cognitive Load Management	By reducing the effort needed to decode text, the TTS tool helped manage cognitive load, allowing participants to process information gradually. The narration timer also enabled them to anticipate the effort required, improving their approach to challenging texts.
Benefits of Natural Narration	The AI's human-like voice enhanced engagement, making the experience more pleasant and less cognitively taxing than robotic narrations. Participants felt this allowed for smoother comprehension and better focus.
Dual Processing Preference	The synchronous visual and auditory presentation, with word-by-word highlighting, helped participants stay engaged and reinforced retention, making the reading process more effective for their needs.
Personalization and Adaptability	Customization options—such as selecting the narration voice, adjusting reading speed, and enabling highlighting—provided a sense of control that supported sustained attention. Adjusting the speed, in particular, was valuable for maintaining focus.

Navigating Comprehension: ADHD and Reading Challenges

Participants described persistent reading comprehension struggles, leading to compensatory strategies. They avoided dense texts when mentally taxed, preferring to discuss content with others or extract key information. One participant shared:

> *I didn't do a ton of reading if I could help it… I would talk with people who have read it and figure out what I needed to know or if it was important enough to read. I also looked up the important parts sometimes.*

Another relied on audiobooks and skimming when overwhelmed, stating, "I've found over the past, maybe five years, that an audiobook, if it's available, really is the best for me and to actually finish a book, usually, I need the audio."

Participants lacked confidence in retaining key details and found traditional reading ineffective. One participant noted, "Traditional reading alone doesn't work for me very well, and I have to find other ways to retain information." They were prone to distractions and avoided cognitively demanding texts. Their experiences highlight ADHD-related reading challenges and the importance of adaptive strategies, such as audio narration, coordination with others, and skimming.

Implications on Focus: AI-powered TTS Tools as an Attention Aid

Participants found AI-powered TTS tools beneficial in regulating their attention, as the dictated pace prevented skimming and encouraged focus. One participant explained, "It kind of forced me to slow down and go with this predefined pace." The participant also highlighted how the tool minimized internal distractions by compelling them to slow down: "It inherently set a pace that had to be followed or risk getting confused by the voice speaking to me conflicting with the voice in my head." The external pacing mechanism minimized distractions and maintained engagement, as the other participant shared: "It kind of keeps you on task because when you're trying to follow along, you don't want to get behind and then have to rewind and all that."

While CTML suggests redundant text-audio presentation could increase cognitive load, participants experienced the opposite—narration acted as a scaffold, reducing overload and enhancing focus. Word-by-word highlighting provided a visual anchor, reinforcing comprehension, while the natural-sounding AI voice was less mentally taxing than robotic TTS voices.

These findings suggest AI-powered TTS tools not only improve accessibility but also serve as cognitive aids, helping ADHD adults maintain focus through intentional pacing, multi-channel processing, and adaptive narration.

Conclusion

This study explores ADHD adults' reading comprehension challenges and the role of AI-powered TTS tools in mitigating these difficulties. Findings suggest these tools enhance focus, manage cognitive load, and improve comprehension through customizable settings, natural narration, and dual-processing. By addressing an underrepresented population, this research expands discussions on assistive technology and accessibility, filling a gap in literature primarily focused on children or other reading disabilities.

However, the study has limitations. The small sample size restricts generalizability, as ADHD traits, career paths, and reading habits may influence TTS tool effectiveness. Additionally, recruitment from ADHD-related forums may introduce selection bias,

as engaged users may differ from the broader ADHD population. Future research should explore diverse participants and assess TTS tool impacts across workplaces, academia, and daily life.

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