Reducing Zoom Fatigue:
Improving the Online Classroom through Andragogical and Technological Enhancements

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Abstract

Zoom fatigue and its underlying contributors are examined. Next-generation video-conferencing teaching and accessibility strategies to improve the student and faculty experience during live sessions are shared. An affordable next-generation video and audio setup demonstration is linked for review.

Keywords: Accessibility, next-generation video-conferencing, Zoom fatigue
With the advent of the COVID-19 pandemic, online learning grew exponentially and is now a permanent feature of higher education. Online learning has undoubtedly improved over the last several years. Faculty can now communicate with students using live, interactive audio and video instruction. Despite the improvements over the last several years, video conferencing sessions are still challenging.

One challenge is Zoom fatigue (Deniz et al., 2022). This phenomenon is a growing topic of study, with the Zoom Exhaustion and Fatigue Scale (ZEFS) recently developed to measure its effect (Fauville et al., 2021). The 15-item ZEFS assesses the five dimensions of general (mental and physiological), visual, social, motivational, and emotional fatigue.

There is growing evidence that Zoom fatigue is real and negatively impacts many online learners (Nesher Shoshan & Wehrt, 2022; Charoenporn & Charernboon, 2023; Oducado et al., 2022b; Phakey et al., 2023; Salim et al., 2022; Zarandi et al., 2023). Addressing Zoom fatigue is especially important for less privileged individuals without a long history of access to required technologies that support the online learning process. Students living with disabilities may be unaware of the accessibility features available on Zoom, exacerbating Zoom fatigue. Fortunately, there are design concepts and technological enhancements that faculty can adopt to reduce Zoom fatigue and improve the learning experience.

These proceedings examine the contributing factors to Zoom fatigue. We provide curricular adjustments to help reduce Zoom fatigue. Finally, we link to a demonstration of an improved video and audio setup to reduce Zoom fatigue. Our objectives include understanding the primary contributors to Zoom fatigue; developing insights into how current online teaching practices may exacerbate the problem; exploring design concepts and technologies to improve the audio and visual experience for students; understanding the benefits of a next-generation Zoom teaching studio to improve student engagement; and demonstrating a next-generation Zoom teaching setup, including a live stream audio/video mixing board, controlling multiple HD cameras and different camera angles and perspectives.

*Zoom Fatigue Research.* According to Fauville et al. (2021), video conference fatigue consists of five components: visual, social, emotional, motivational, and general.

1. **Visual fatigue** is the physiological component of tired eyes after prolonged staring at a computer screen.

2. **Social fatigue,** especially for more introverted persons, is a sense of tiredness from being on camera with so many others for a prolonged period (Montag et al., 2022).

3. **Emotional fatigue** consists of emotional exhaustion after prolonged video conference participation (Montag et al., 2022).

4. **Motivation fatigue** includes needing more psychic energy to do more work after video conferences.

5. **General fatigue** is an overall sense of tiredness following prolonged meetings.
Preliminary research has explored Zoom meeting components that create more cognitive load (Brown, n.d., Whitenton, 2013, Siregar et al., 2023). Nadler (2020) argues that Zoom fatigue is not a simple result of staring at a computer screen for too long; he argues that, in contrast to in-person meetings, the artificially flattened, two-dimensional world creates more cognitive load. Depending on the camera and monitor quality, students' non-verbal features and interactions will be less clear. Generally, you cannot see the entire person- they are often reduced to talking heads. The series of “picture frames” or boxes move around on the screen. Students are not easily seen during presentations and may even turn off their cameras, sometimes leaving the room. These issues make it extremely challenging for faculty to teach and monitor students for signs of engagement and learning (Altuwairqi et al., 2021).

The clarity of the sound coming from speakers and headphones may also be lacking. Even with improved sound output, it is often unclear where sound originates. In contrast, live classrooms allow a sense of spatial awareness where we can naturally identify where sounds originate.

During a Zoom presentation where videos, graphics, or informational slides are shared, most other “boxes” move to the background and/or become hidden. In contrast, live classroom sessions allow a more complete view of the room where students hold fixed positions. Faculty can more easily present materials while quickly noting student expressions for signs such as interest or boredom, understanding or confusion, agreement or disagreement, and emotional comfort or apprehension. This accumulation of challenges in compensating for reduced visual and auditory cues contributes to increased cognitive load and what is increasingly called Zoom Fatigue (Logan, 2021).

More experience in the online teaching medium may help faculty and students learn and adapt, reducing the cognitive load (Robinson, 2022). Developing best practices begins with understanding how personal anxieties, technological distractions, and teaching practices further exacerbate the cognitive load. Personal anxieties include issues such as reduced mobility; feelings of being trapped; mirror anxiety; facial dissatisfaction; and hypergaze. Technological distractions include background noises; poor camera quality; poor camera perspective and angles; poor lighting; poor sound; and Internet connection issues. Poor teaching practices include: starting late; meeting too long; forgetting to have breaks; distracting sounds and activities in the background; and over-reliance on static versus dynamic content.

Andragogical innovations to reduce Zoom fatigue.

A review of the literature found that there are suggestions to help address the above concerns (Amosa et al., 2023; DeGrande et al., 2020; Digital, 2023; Fiorella et al., 2019; Flores, n.d.; Hanwen, 2023; Hariharan & Merkel, 2021; Kassens-Noor et al., 2023; Kushlev & Epstein-Shuman, 2022; Montelongo, 2020; Production Techniques, n.d.; Tayar, 2022; Team, 2018; Vitale & Blumberg, 2021; Wiederhold, 2020). The evidence for their effectiveness is lacking for some due to their novelty. Therefore, the authors share them as innovations to pilot and seek student feedback.

A high-definition, multi-camera installation using three different perspectives and angles can be purchased for less than a thousand dollars. It will demonstrate an improved focus on non-verbal cues (4 Best Lighting Strategies for Multi-Camera Production, 2017; Enhancing the Visual and Audio Experience in Online Learning, 2022; Maximize Engagement with Multi-Camera Live Streaming Setup, 2023; Using Multi-Camera mode in Zoom Rooms, n.d.). It
will also demonstrate how faculty can seamlessly integrate dynamic activities such as sand tray training into their teaching (Authors, 2024).

Faculty members can collaborate with the accessibility services office to learn more about Zoom features available. For individuals with disabilities, leveraging Zoom's built-in tools such as closed captioning, screen reader support, and keyboard accessibility can alleviate cognitive load and fatigue by enhancing the virtual experience's inclusivity (Hankerson & Brown, 2020).

Hypergaze refers to the intense and excessive eye contact that participants experience due to the inherent nature of video calls, where they tend to look directly into the camera rather than slightly off-center as in in-person interactions (Bailenson, 2021). Unlike face-to-face interactions, this continuous, direct eye contact can feel unnatural and uncomfortable, contributing to Zoom fatigue (Bailenson, 2021). One strategy is to take Zoom out of full-screen view; another is to enable “focus mode” on the primary speaker. An external keyboard also expands the personal space within the video grid.

Mirror anxiety describes the self-conscious feelings experienced during videoconferencing due to having one’s image continuously displayed on the screen, which produces negative emotional consequences (Bailenson, 2021; Ngien & Hogan, 2023). A possible solution is to hide the self-view option in Zoom. To do this, right-click on your image or photo, check that you are correctly positioned within the frame, and disable self-view.

Zoom fatigue is exacerbated by participants’ reduced mobility during conference calls (Oducado et al., 2022b). Patton and Tuke (2022) recommended integrating brief movement breaks. Stretching exercises or standing up and moving around counteract fatigue and enhance focus.

Faculty may share these recommended adjustments with students to reduce cognitive load and implement suggested enhancements to improve student engagement. Pre-and-post-testing with the ZEFS across program courses and sharing student feedback may help programs determine which adjustments are most useful for their student body. Providing faculty training and applying for teaching innovation funds to purchase equipment may help more faculty develop next-generation video conferencing studios that reduce Zoom fatigue and enhance online student engagement across their programs.
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