

## Developing a Framework for Designing Digital Assessments for Middle-school Aged Deaf or Hard of Hearing Students in the United States

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**Abstract :** Research on digital assessment for deaf and hard of hearing (DHH) students is negligible. Part of this stems from the DHH assessment design existing at the intersection of the emergent disciplines of usability, accessibility, and child-computer interaction (CCI). While these disciplines have some prevailing guidelines —e.g. in user experience design (UXD), there is Jacob Nielsen’s 10 Usability Heuristics (Nielsen-10); for accessibility, there are the Web Content Accessibility Guidelines (WCAG) & the Principles of Universal Design (PUD)— this research was unable to uncover a unified set of guidelines. Given that digital assessments have lasting implications for the funding and shaping of U.S. school districts, it is vital that cross-disciplinary guidelines emerge. As a result, this research seeks to provide a framework by which these disciplines can share knowledge. The framework entails a process of asking subject-matter experts (SMEs) and design & development professionals to self-describe their fields of expertise, how their work might serve DHH students, and to expose any incongruence between their ideal process and what is permissible at their workplace. This research used two rounds of mixed methods. The first round consisted of structured interviews with SMEs in usability, accessibility, CCI, and DHH education. These practitioners were not designers by trade but were revealed to use designerly work processes. In addition to asking these SMEs about their field of expertise, work process, etc., these SMEs were asked to comment about whether they believed Nielsen-10 and/or PUD were sufficient for designing products for middle-school DHH students. This first round of interviews revealed that Nielsen-10 and PUD were, at best, a starting point for creating middle-school DHH design guidelines or, at worst insufficient. The second round of interviews followed a semi-structured interview methodology. The SMEs who were interviewed in the first round were asked open-ended follow-up questions about their semantic understanding of guidelines— going from the most general sense down to the level of design guidelines for DHH middle school students. Designers and developers who were never interviewed previously were asked the same questions that the SMEs had been asked across both rounds of interviews. In terms of the research goals: it was confirmed that the design of digital assessments for DHH students is inherently cross-disciplinary. Unexpectedly, 1) guidelines did not emerge from the interviews conducted in this study, and 2) the principles of Nielsen-10 and PUD were deemed to be less relevant than expected. Given the prevalence of Nielsen-10 in UXD curricula across academia and certificate programs, this poses a risk to the efficacy of DHH assessments designed by UX designers. Furthermore, the following findings emerged: A) deep collaboration between the disciplines of usability, accessibility, and CCI is low to non-existent; B) there are no universally agreed-upon guidelines for designing digital assessments for DHH middle school students; C) these disciplines are structured academically and professionally in such a way that practitioners may not know to reach out to other disciplines. For example, accessibility teams at large organizations do not have designers and accessibility specialists on the same team.

**Keywords :** deaf, hard of hearing, design, guidelines, education, assessment

**Conference Title :** ICDD 2023 : International Conference on Disability and Diversity

**Conference Location :** Boston, United States

**Conference Dates :** April 17-18, 2023