Título: **Usability Scaffolding for Evaluating Multimodal Video Games for Learners who are Blind**

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Resumo:

Serious multimodal video games based on audio and haptics have been used to help developing new skills and to stimulate cognitive improvement for learners who are blind. In this scenario, the presence of usability issues in the gaming interaction may jeopardize the development and enhancement of the target cognitive skills, once focusing on usability issues rather than on learning would be frustrating and undesirable. Administering an accurate usability evaluation is hence a necessary step towards assisting learners who are blind in the construction of cognitive skills while playing video games. Nevertheless, the usability evaluation of serious multimodal video games for learners who are blind lacks reasoning, in regard to what game aspects to evaluate and how to proceed with the assessment. To avoid scenarios where usability evaluation relies on individual experience and expertise, the identification of evaluation principles to assess the usability of these games is a necessary step, which also helps to establish guidance for usability evaluation in this field. Hence, the main goal of this work is to provide scaffolding to guide researchers and practitioners to employ the most appropriate combination of Usability Evaluation Methods (UEMs) to assess such games in particular usage contexts, given the characteristics of the target users and game interaction modalities. To achieve that, the present work proposes principles for usability evaluation (PLUMB), two instruments to support identification of usability problems (SLUP and CLUE), and a descriptive model to guide the choice of UEMs and the steps of usability evaluation in this field. The validation of the proposal includes experiments involving learners who are blind playing video games and evaluation by experts in the field. Our expectation is that forthcoming multimodal

video games designed to improve cognition of learners who are blind take into consideration their broadly different abilities and disabilities and provide them with usable and pleasurable gaming interfaces, benefiting of our findings.

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