

Overcoming Usability Challenges of Educational Math Apps: Designing and Testing a Mobile Graphing Calculator

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Abstract : The integration of technology in educational settings has gained a lot of interest. Especially the use of mobile devices and accompanying mobile applications can offer great potentials to complement traditional education with new technologies and enrich students' learning in various ways. Nevertheless, the usability of the deployed mathematics application is an indicative factor to exploit the full potential of technology enhanced learning because directing cognitive load toward using an application will likely inhibit effective learning. For this reason, the purpose of this research study is the identification of possible usability issues of the mobile GeoGebra Graphing Calculator application. Therefore, eye tracking in combination with task scenarios, think aloud method, and a SUS questionnaire were used. Based on the revealed usability issues, the mobile application was iteratively redesigned and assessed in order to verify the success of the usability improvements. In this paper, the identified usability issues are presented, and recommendations on how to overcome these concerns are provided. The main findings relate to the conception of a mathematics keyboard and the interaction design in relation to an equation editor, as well as the representation of geometrical construction tools. In total, 12 recommendations were formed to improve the usability of a mobile graphing calculator application. The benefit to be gained from this research study is not only the improvement of the usability of the existing GeoGebra Graphing Calculator application but also to provide helpful hints that could be considered from designers and developers of mobile math applications.

Keywords : GeoGebra, graphing calculator, math education, smartphone, usability

Conference Title : ICET 2019 : International Conference on Educational Technology

Conference Location : New York, United States

Conference Dates : December 09-10, 2019