Educational Software Design for Mobile Technologies: Research and Development of a Literacy App

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Research into mobile technologies and the design and development of 'appropriate' educational software is still in an emergent phase. Attempting to understand across the multitude of products available 'what works and why' can be problematic for many educators. This paper will discuss the design and development of software used in an intervention study concerning reading comprehension and mobile educational technologies in the field of developmental disorders. Relevant elements of design and functionality will be discussed based on an overview of recent literature and research regarding the use of iPads and tablet computing in educational settings.

Introduction

Mobile technologies such as Apple's iPad and other tablet computer devices are now not uncommon across mainstream and special education settings. Despite the obvious advantage of anytime anywhere learning with the rapid deployment of new computing technologies, empirical data concerning educational effectiveness of such products has struggled to keep pace. In addition, some inconsistencies appear in understanding what constitutes best practice in the design and development of educational software between developers and educators. Through the process of developing a literacy application (App) for a research study, it became necessary to consider recent research concerning factors to consider within the design process. Early within the design process it was obvious that it was not enough to simply embed the face-to-face teaching strategies employed to improve reading comprehension into a digital format. Considerations regarding what functions to include and in many cases what to omit, became important decisions. This paper will discuss some of the key points that were necessary to consider in the design and development of a literacy App.

Motivation, Engagement and Gaming

Studies often report qualitatively on the benefits of mobile technologies through frequent accounts from observational or perception-based evaluation (Hutchison, Beschorner, & Schmidt-Crawford, 2012; Lynch & Redpath, 2012; Saine, 2012). These mostly consist of teacher or user accounts concerning motivation or engagement. However, motivation and engagement may not always equate to academic gains (Arthanat, Curtin, & Kontak, 2013). Sheppard (2011) reported an increase in engagement for primary school aged children when using eBooks on iPads over traditional texts however, no corresponding rise in student achievement was achieved. Similarly, findings by Armstrong and Hughes (2012) showed no difference to gains in comprehension levels between traditional texts and e-books in five primary school aged students diagnosed with high functioning autism.

As many children spend several hours per week engaged in digital gaming either at home or at school (Su & Draper Rodriguez, 2012), developers have included functional elements of software to promote motivation, engagement and learning through the creation

of ‘educational games’. Despite research demonstrating that digital learning games can be an effective means to motivate many learners (O'Malley et al., 2013), some researchers continue to raise concerns regarding their actual learning benefits (Sheppard, 2011; Tsai, Yu, & Hsiao, 2012). In many instances the functionality of such software can often be basic, such as ‘drill and practice’ (Murray & Olcese, 2011). Su and Draper Rodriguez (2012) examined gaming features in software across curriculum areas of literacy and maths. In two separate studies with pre-school children in mainstream education they concluded that the more entertaining games reported less academic growth than the less engaging learning games. Findings were similar from a mainstream education study examining 45 different Apps categorised as educational (Falloon, 2013). The content examined in this study ranged from basic problem solving skills to focussed curriculum areas. Fallon noted that in many instances, the absence of appropriate parameters to guide and maintain a focus on learning allowed students to deliberately manipulate characters and content to elicit amusing feedback as opposed to staying on track with learning tasks. Therefore, the incorporation of other key elements in the design of educational software must be considered over and above pure motivation and engagement.

Evaluative Frameworks

Recently some models have emerged in an effort to effectively evaluate mobile technologies as a learning tool in order to assist parents and educators choose appropriate educational software. One of the most notable is that of Walker (2014). The rubric evaluation tool was developed in consultation and collaboration with more than 90 Subject Matter Experts (SME’s) who through an iterative research process, provided feedback on each rubric domain and their relevant rating descriptors. The key domains identified from this study consist of:

- Curriculum Connection, and how well the targeted skill or concept is directly taught through the App.
- Authenticity, where targeted skills are practiced in an authentic format/problem-based learning environment.
- Feedback that is specific resulting in improved performance and data that is available electronically to student and/or teacher.
- Differentiation, where the App offers complete flexibility to alter settings to meet students’ needs.
- User Friendliness, where students can launch and navigate within the App independently.
- Motivation and how highly students are motivated to use the App.
- Student Performance, where students show outstanding improvements in performance as a result of using the App.

Although these domains are similar to other suggested evaluative frameworks (Draper Rodriguez & Cumming, 2012; Murray & Olcese, 2011), functions which allow appropriate time for tasks requiring an active response and explicit learning goals that are free from distraction (Falloon, 2013) should have equal relevance. In the same way as Nikolopoulou (2007) recommended that “software be integrated into the classroom with appropriate pedagogic approaches” (p. 178), it is important to consider how software can ideally replicate the pedagogy of a classroom teacher (Falloon, 2013). Although this replication is not specifically mentioned in the framework presented by Walker (2014), functions that

are pedagogically appropriate and can scaffold learning, provide timely and appropriate feedback, and guide and maintain a focus on learning content, should be emphasised when developing or considering software to promote positive educational outcomes.

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Michelle Somerton B. Ed (Hons) is a PhD candidate in the Faculty of Education, University of Tasmania, as well as the author of iTunes App: Billy Possum's Interactive Comprehension. She has a strong interest in children's language and communication development and academic development of students with Autism Spectrum Disorders (ASD).

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