Chapter 4
Children’s Interaction with Mobile Touch-Screen Devices: Experiences and Guidelines for Design

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ABSTRACT

In this article, the authors investigate the usability of mobile touch-screen devices for children. This is a growing area, and as such there is currently a lack of definitive guidelines for mobile device designers. This article reports two studies that investigated input methods for touch-screens with children aged 7-10, concentrating on the interaction between the child and the devices. In the first study, a range of devices were observed in use, in order to gather overall impressions of interaction styles and user experience. In the second study, a more controlled comparison between stylus and finger input is made. The article concludes by offering a set of general design guidelines for the design of mobile devices for children.

INTRODUCTION

Touch-screens are undoubtedly becoming more and more prevalent in society, and particularly in the domain of mobile computing. The growing inclusion of touch-screens in mobile phones, as well as popular devices such as the iPhone, iPod Touch and the Nintendo DS, has led to the argument that touch-screens are becoming the standard rather than a niche market, with a recent BBC news article claiming that it was a “certainty” that “the days of the mouse keyboard and desktop graphical interface are numbered” (Waters, 2009).
With more touch interfaces set to be released for Windows and MacOS operating systems in the near future, the increased use of this technology over the next few years seems inevitable.

Despite this, the existing literature on interaction methods for mobile devices is limited, particularly concerning child users. While it is clear that many mobile applications are being designed for children and it is becoming a growing field of research (see for example Druin, 2009), studies of usage mostly tend to consider issues of performance and task efficiency rather than the experiences of users and their attitudes towards the devices (e.g., MacKenzie, Sellen, & Buxton, 1991; Chang, 2008). Other studies commonly consider only a single specific function, for example text entry, whereas mobile devices are often used for a wide variety of tasks. While these issues are important, it is also important to understand why errors occur and whether they affect the overall user-experience. Since children are highly adaptive, they may be able to overcome many usability problems and reduce error rates significantly over time, but will not be motivated to do so if they do not enjoy using the technology given to them. Therefore it seems particularly useful to study the first-time problems encountered by children using technologies that are new to them, rather than allowing them to adapt to the device. Issues such as the initial impressions of the devices and how ‘fun’ they are also become important in assessing their preferences, and the devices they are likely to adopt. Considerations of the errors encountered should always be placed in this wider context.

Guidelines are attractive to designers as they offer achievable goals to attain ‘good’ system design. They also help to make available ideas that may seem common knowledge to some, but may have been overlooked by non-expert designers or newcomers to the field. In general they can offer sufficient guidance on how to avoid high-level usability problems but are less effective at uncovering more specific usability problems. Guidelines themselves tend to be intrinsic properties of the system, developed to address a particular design problem on a particular system in a particular context. When designing for mobile devices we need to look at properties of the actual ‘interaction’ rather than properties of a given system. Clearly, when designing for mobile devices the number of contexts of use is greatly increased. Environmental factors may affect a system’s performance in terms of output. This can be seen in the case of children when a device is used in a school context. In a noisy classroom children may be unable to hear audio output, and in a playground sunlight may affect the visibility of the on-screen display. We must also remember children are a special user group and mobile device design guidelines formed from research based on adult participants may not transfer all that well to children. It would therefore be helpful to begin to develop guidelines specifically concerned with the design of technology for children, and which take these issues into consideration.

Mobile devices also vary in size, shape and screen size. Sometimes this is dictated by the hardware that is being used and cannot be helped. Guidelines for one system design may not transfer that well to another. We must accept these limitations, yet it is still important to offer guidelines to designers as they can serve as a good starting point for design before other evaluation methods such as in-context empirical testing is carried out. The onus must be on the designer to select the most relevant set of design guidelines for their product, users and context of use.

This article will therefore aim to identify some of the key issues that will affect the usability of touch-screen devices for children based on existing literature, observations of devices in use and reports from children. A series of resultant guidelines for the design of child-friendly touch-screen interfaces will then be presented.
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