

# Chapter XXV

## Human Factors and Innovation with Mobile Devices

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### ABSTRACT

*Advancements in technology are a significant driving force in educational innovation, but a strong focus on technology means that human aspects and implications may not be given the attention they deserve. This chapter examines usability issues surrounding the use of mobile devices in learning. A key aim is to empower educators and learners to take control of personal devices and realise their potential in relation to teaching and learning. The background section reviews the development of usability studies and explores why mobile device usability presents specific new challenges. The impact of changing requirements in education, and new visions for ways of thinking and competences that learners should be acquiring, are also examined. Finally, the chapter provides a set of concepts that can inform conversations between educators and learners, mobile system engineers, developers, support staff, and others.*

### INTRODUCTION

Every new wave of technological innovation poses fresh challenges with regard to its compatibility with the people who are to make use of it and with existing social and cultural practices. The widespread, rising ownership of mobile devices is one key development that educators need to examine and reflect on as it starts to make its mark in all types of teaching and learning activity, both formal and informal. Advancements in technology are

acknowledged as being a significant driving force in educational innovation and new technologies are often explored as a way to enhance teaching and learning, but a strong focus on technology inevitably means that human aspects and implications are often relegated to second place. It is only by raising levels of understanding and awareness of human factors that we can work towards achieving some kind of balance.

Mobile learning--using portable devices such as cell phones, personal digital assistants, per-

sonal media players, and ultra-portable PCs--is rapidly becoming a popular way of accessing and producing digital information on the move, and communicating and collaborating with others. The majority of mobile learning activity takes place on devices that were not designed with educational applications in mind, however, and furthermore, an assumption is frequently made that users know their personal device so well that it is not necessary to give them much support or training. This may contrast with experience of support and development that both instructors and learners receive in connection with the use of their desktop computer. As we start to experience 'the third wave of computing' (Dix et al., 2004, p. 184), in which devices far outnumber people, the device will become less personal again, although user interactions and content could become more personal.

Despite decades of usability research, problems with understanding the user interface and with performing essential tasks are still often reported by users, both on desktop and mobile systems. Arguably, the situation may be even getting worse, as open source software is not always tested for usability, and ever-changing interfaces put constant demands on users, who perceive that they have less and less time to keep up with the latest developments. What is more, in mobile scenarios users may have difficulties getting access to specialist technical support or to people with similar devices who can offer friendly help. They may also be relying on continuous online access to learning networks and resources, which in reality can be difficult to achieve. Therefore, new factors come into play that must be identified and analysed.

## **AIMS AND SCOPE**

This chapter reflects critically on progress in usability and on recent developments in human-computer interaction, with particular reference to

findings from studies of mobile learning. Usability cannot be considered in a vacuum: requirements specific to education have to be taken into account, but bearing in mind that educational goals and methods are constantly being redefined (e.g. Beetham & Sharpe, 2007; Laurillard, 2002). Accessibility and personalisation, which address the match between a user's individual (possibly special) needs and the device they are using, are also important. User skills and competences must be taken into account. Increasingly, there is a need to paint a more detailed picture of the circumstances in which electronic tools are used, and the factors impacting on the quality of the experience for the human user.

The aims of this chapter are to present the issues in such a way as to empower educators and learners to take control of personal devices and to realise their potential in relation to teaching and learning, and second, to provide a set of concepts that can inform conversations with mobile system engineers, developers, and support staff. Over time, a holistic understanding of user experience can emerge from these conversations. An initial set of factors impacting on the usability of mobile devices in education has been documented by Kukulska-Hulme (2006). Placing human factors at the centre, the longer term ambition is to develop a set of concepts with reference to user skills and competences, giving greater clarity to discussions around the human needs of mobile technology users in activities connected to education, frequently undertaken whilst travelling and in other situations involving mobility.

## **BACKGROUND: USABILITY AND MOBILE DEVICES**

Although much of the work in usability focuses on the evaluation of a user interface, over a decade ago Nielsen (1993) explained usability in terms of a system's overall acceptability, which included social aspects and practical aspects

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