ABSTRACT

With perceptual capabilities, computers can intelligently function as a part of our everyday lives, helping us to make sense of what is happening and joining in with us as we experience and navigate through many different types of situations. In this way, computing systems can be situated when they combine machine perception with background knowledge to observe, explore, and interpret human and environmental activity in a way that supports decision making. Many of the current, prominent situated computing solutions are consumer-focused in nature. But these systems will, in time, change the way we work as well as how we learn. Many disciplines are adapting and changing in the process, and many opportunities remain, including the use of situated computing systems for workforce education. There are many opportunities to innovate and improve workforce education by leveraging the power and affordances of mobile-device technology to turn everyday situations into everyday learning opportunities.

INTRODUCTION

In the mid-1990s, a group of researchers at MIT experimented with wearable technology. This assembly of researchers, eventually named the MIT Media Lab Wearable Computing Group, carried computers and radio transmitters around in backpacks, stored keyboards in their pockets, and wore eyeglasses with digital displays integrated into the frames (Turkle, 2006, p. 220). By lugging around what was still at that time big computing equipment, these innovative researchers were exploring the future of personal-device technology—technology that is wearable, mobile, and convenient for modern use.

Much later, after many years of futuristic ideas and overly ambitious but underwhelming commercial attempts by many companies, Apple changed the landscape—accessibility, application, and use—of personal-device technology by putting extraordinary computational power and the information affor-
dances of the Internet literally in our hands to use anywhere we might be, even on the go. There are many mobile-computing devices that pre-date the iPhone. Some, most notably the BlackBerry, designed and marketed by Research in Motion Limited [now BlackBerry Limited], profoundly impacted workforce productivity, especially for remote communication with email. But in 2007, when Apple released the iPhone, it was a seminal moment in, what is still, our brief history of computing.

For the first time, the physical capabilities of a mobile device were integrated, improved with affordances like a multi-touch interface, and paired with a robust operating system. The iPhone, importantly, also became a must have consumer technology. But more importantly, this mobile-computing system was significantly enhanced when Apple introduced the App Store, a software development and distribution platform. This platform fueled the proliferation of applications, and thus the many uses for these devices. Similarly, Google, together with several hardware vendors, created a competing commercial mobile-computing system based on the Android operating system.

Although they are not exactly wearable, the collective proliferation of iPhone and Android devices has resulted in a new norm where computing devices are now rarely very far removed from our attention. Now, in workforce settings, because of this device proliferation, nearly every employee has a smartphone—likely an iPhone or Android device—which is well suited for many purposes. This situation is in contrast to just a subset of employees previously having specialized mobile devices like BlackBerrys.

As the capabilities of wireless telecommunication networks have dramatically improved, access to fast, seamless Internet connectivity for mobile devices has increased dramatically. This improvement in network access and speed has opened up many possibilities for developing mobile computing systems backed by cloud computing infrastructure and, especially, very powerful data analysis technologies based on artificial intelligence. At the time of this writing, Google, Facebook, and many other companies are developing innovative situational and contextually aware solutions using these technologies.

This chapter begins with a primer on the contemporary technologies needed for developing situated computing systems. It then reviews situated learning and informal learning theories to develop an educational context for situated computing. Then, the chapter aims to provide a conceptual roadmap for developing situated computing solutions for workforce education using existing technologies, leveraging examples from commercial product offerings where these technologies are just now beginning to be effectively used.

**CONTEXTUAL AND SITUATED COMPUTER-MEDIATED SYSTEMS**

**Perceptual Computing**

Similar in the ways that the personal computer made computing “personal,” the affordances of the class of mobile devices the iPhone and Android achieved unleashed the ability to make computing “perceptual.” Perceptuality is an aspect of human-centric computing systems—systems that sense, measure, and monitor data about what a particular individual in a specific context is doing, and then those still external systems react to that person’s physical, cyber, and social realms to, in many cases, intimately support decisions and actions (Sheth, Avantharam, & Henson, 2016, p. 64). With perceptual capabilities, computers can intelligently function as a part of our everyday lives—part of our everyday experiences—helping us to make sense of what is happening and joining in with us as we experience and navigate through many different types of situations.