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Problem solving, confidence and frustration when carrying out familiar tasks on non-familiar mobile devices

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ABSTRACT

Smart mobile devices, which are hand-held electronic devices with an advanced operating system (such as the Android platform) connected via a wireless protocol, have become an integral and essential part of our everyday life, and support both social and workplace activities. However, adopting mobile technology within the workplace setting can give rise to challenges that impact user behaviour and performance. A study was carried out amongst 90 participants located in two countries, using internet connectivity as a case study. Confidence and frustration have previously been connected with technology competence, but this was not applied to a workplace scenario during problem-solving, when users are assigned an unfamiliar smart mobile device. This research focuses on identifying the link between workplace users' levels of confidence and frustration when seeking to independently solve problems whilst completing familiar tasks on new smart mobile devices. A detailed video analysis of users' attitudes and behaviour during problem-solving was conducted, emphasising a correlation between attitudes and behaviour towards completing a task.

1. Introduction

Information and communication technologies form an integral aspect of almost all aspects of our life and are required for many work-based tasks. As a result, technology has become an essential tool for employees. As a consequence, the need for IT support has grown.

Over the last decade smart mobile devices (SMDs) have become increasingly available and are shaping new ways of communication and fostering ubiquitous working practices—that is, being able to work from different locations where there is internet connectivity. New technologies—or, indeed, new features within existing technologies—are being released at a fast pace, and if they were to be adopted in the workplace at the same pace they could affect employees' productivity, in addition to users' perceptions of self-confidence. Lazar, Jones, and Shneiderman (2006) investigated how users felt when they did not have the correct competence to fully and efficiently use technology in the workplace. They found that the lack of competence limited the opportunities for interactions with co-workers through such devices. Therefore, there is an increased need for continuous learning and for providing training support to users in the workplace.

According to Giannakouris and Smihily (2012), 48% of enterprises in the EU and nine out of ten large companies provided staff with portable devices that allowed a mobile connection to the internet for business use. Smart mobiles are becoming more accessible in terms of price and availability and more and more users own devices that support pervasive computing technology, although there continues to be a lack of knowledge about users' behaviours and attitudes, especially with regards to their confidence and frustrations when using a new mobile. In addition, further insights are needed with regards to users' behaviour in the workplace, especially when they are faced with problems. More specifically, internet connectivity is one of the main pillars underpinning smart mobile platform usage and is, therefore, one of the first challenges a user encounters when adopting a new device.

The work presented here further investigates attitudes and behaviours when attempting to solve problems independently. A study was carried out focusing on the challenges arising from performing a familiar task on an unfamiliar device. These can occur,

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for example, when the user acquires a new device at work, either on a permanent or temporary basis, or otherwise needs to learn new ways of using the device due to changes or updates in technology (such as in the case of a new operating system release or a new mobile model). It was assumed that the adoption of mobile technology takes place within, and is supported by, the workplace environment.

The study attempts to establish how users would overcome the obstacles in their work environment. In particular, it examines how SMDs offer opportunities for self-directed problem solving. We assumed that users would attempt to overcome the obstacles in line with their own level of progression and knowledge base and be able to determine the manner in which they should tackle the various obstacles as well as the challenges they encounter due to their different roles within the organisations, their confidence and attitude, frustration and success rate.

More specifically, the objective of the work presented in this study was to observe and examine the relationship between the length of time it took for the IT helpdesk to provide support and the way in which participants tackled problems in an independent manner. The aim was also to establish if the issues and problems experienced by workplace users differed according to their job roles and skills.

The main concepts considered in relation to the study and technology adoption in the workplace are discussed below.

2. Usability issues during problem-solving when using SMDs

Despite the fact that the use of SMDs has increased, and fundamentally changed how people work together, learn and communicate, there is a need to establish a greater awareness of the attitudes and behaviours of users when facing problems in the use of SMD devices. Users must not only learn about the content and procedures, but also how their abilities and soft skills can be developed in such a way to help them to solve problems and to reach their goals.

A report published in 2012 by *Eurostat* (Giannakouris & Smihily, 2012) identifies a number of obstacles limiting the usage of portable devices for mobile connection to the internet. For example, approximately 21% of all EU27 enterprises reported connectivity problems as a barrier; 17% of them considered technical obstacles or high costs as problematic when integrating internet mobile connections within business applications; and 30% of all EU27 enterprises identified at least one obstacle, such as problems related to connectivity, cost of proper infrastructure and technical difficulties that limited or prevented their business from using portable devices for internet mobile telephony (Giannakouris & Smihily, 2012).

The process of problem-solving, in itself, has the advantage that it can contribute to learning. For example, Kleanthous Loizou and Dimitrova (2012) present the findings from a novel computational research study of community-tailored support, adopting the objective of helping knowledge-sharing that could be transferred throughout communities. Through a validation study, the research examined the effects of community-adapted notifications and, accordingly, showed that notification messages can improve members' awareness and perceptions of how they relate to others.

Kravcik and Klamma (2012) specifically examined the support of self-regulation through a personal learning environment. Their aim was centered on providing learners with the freedom to design and compile the learning environment in line with their required personal preferences. However, although the study involved students with a high level of education, the feedback collected showed that most of the learners found self-regulation to be challenging. The proposed personal learning environment did not consider how users might tackle problems. Accordingly, more research is needed in an effort to gain a deeper insight into, and a better understanding of attitudes and behaviours when users face difficulties.

Usability is an important aspect of SMDs. Although SMDs have become more useful, in some ways, this comes at the expense of the usability of such devices (Harrison, Flood, & Duce, 2013). Nielson identifies five attributes of usability, namely, efficiency, satisfaction, learnability, memorability, and errors (Nielsen, 1994).

The proposed experiment investigated various challenges associated with a range of attributes identified in the existing models of usability. In this vein, this paper particularly focuses on the last three of the attributes of usability, whereby users were observed whilst solving problems by considering learnability, memorability, and errors.

Efficiency can be defined as how well a user achieves his/her goal in relation to accuracy and completeness. Satisfaction is the fulfilment of one's expectations or the pleasure derived from using a piece of software. For Neilsen (1994), learnability is related to the ease of use of systems and to the rate at which users can achieve the intended outcome. Memorability is an attribute of systems that are easy to remember, where their cognitive load impacts on the usability when configuring or using software. The last attribute investigated by Neilsen (1994) and Harrison et al. (2013) is 'errors', which can be identified when performing an evaluation process, capturing how well the user can complete the desired tasks without making mistakes, and further establishing the nature of errors and the frequency with which they occur.

Learning takes place at the learner's initiative when s/he adopts a self-directed learning approach. Such individuals have primary responsibility for planning, implementing, and evaluating the effort (Hiemstra, 1994). In this study, a learner who can self-direct his/her progress with regards to the learning of IT technology is defined as an *independent IT user*. Other learners who are initially dependent can progress and become independent, moving from dependency to independency (McAuliffe, Hargreaves, Winter, & Chadwick, 2008).

Problem-solving is recognised as part of the learning process. For example, Schmidt and Braun (2006) investigated a learning process in a structured way, examining how different individuals in their workplace can make use of the immediacy of purpose and real-world context learning. They argue that optimal solutions should smoothly integrate context-aware learning support systems. Additionally, such systems should consider the awareness aspect *of knowing* about and *taking into account* the learning context of the user.

Sense-making, the process that connects data, creates a hypothesis and, accordingly, develops reasoning based on what is being observed when performing a task-based activity, has also been investigated in an effort to achieve a better understanding of the potential offered by learning on SMDs (Rogers, Connelly, Hazlewood, & Tedesco, 2010). The authors argue that key aspects requiring further research are centered on investigating how users react when facing a problem, their attitudes and behaviour, and their awareness of obstacle-solving strategies. They also argue that in order to efficiently complete a task, the design of an application should help users to recover quickly from errors; as such the use of error messages and system status icons have also been investigated.

Researchers adopt techniques to collect data and evaluate their findings by creating controlled experiments and questionnaires. The latter have been adopted from research methods to evaluate users' attitudes and behaviour and have also been used in usability research (McGuffin & Balakrisha, 2005). Once data is collected using these techniques, the use of statistics in usability research creates the opportunity to deal with numbers, allowing the research to