

# Faculty of Informatics

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This document is a working paper, summarizing author's PhD. research problem. It has been edited for basic grammar and accuracy. Kindly consider this document as a working paper, to be used for basic referencing. It could be useful for research in the field of Mobile User Experience.

## Investigation of the process of learning touch-screen mobile applications

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**ABSTRACT**

With the recent expansion of the mobile industry, applications for mobile devices are quickly becoming more complex, empowering people to perform more advanced tasks. However, current mobile user interfaces introduce several challenges, such as direct manipulation, gesture control, solely visual feedback, or limited screen size. These factors affect the learnability of mobile applications.

The primary objective of this research project is to investigate how people learn to use mobile applications and how this process can be supported. This needs to be done so that people can perceive the value of the application, accomplish basic tasks and gradually learn new features in a natural way.

A pilot study will consist of observation of users' behavior in the context of skill acquisition within mobile user interfaces. Patterns in users' behavior and links between behavior and background information will be investigated. It is anticipated that the study will demonstrate the correlation between learning strategies and personal information about users. The results of this study will aid in creating learning profiles of representative user groups. Further examination of these profiles should lead to the design of support mechanisms that will encourage various types of application learners in the process of continuous learning of mobile applications.

## 1. INTRODUCTION

In recent years, applications for mobile devices have become more complex and allow people to perform more advanced operations. On the other hand, modern mobile user interfaces introduce several challenges, which affect learnability of mobile applications. For example:

- **Gestural interactions:** Gestural interactions are engaging and intuitive for simple tasks. However, they are less practical for more complex operations, since the range of possible interactions and the precise dynamics of execution is often difficult to discover (Norman, 2010).
- **Small screen size:** Mobile screens provide significantly less real estate for displaying information comparing to desktop computers. Therefore, prioritization of content and features is essential. This approach leads to reducing discoverability of advanced features (Norman, 2010).
- **Solely visual feedback:** Touch screen mobile user interfaces rely heavily on visual feedback. The lack of other forms of responses prevents activation of cognitive mechanisms, for example muscle memory, which would aid in skill acquisition process.
- **Context of use:** Sessions with mobile applications are short (Böhmer, 2011; Oulasvirta, 2005) and variable in the context of use (Oulasvirta, 2005). User's attentional resources are hardly ever reserved exclusively for a mobile device. It results in the breakdown of fluent interactions with mobile applications and affects the process of learning.

All these factors affect learnability not only during the first interaction with mobile application, but during the whole lifecycle of application usage.

The objective of this research project is to investigate how people learn to use mobile applications, and how this process can be supported in different phases of application usage. This needs to be done so that people can quickly perceive the value of the application, accomplish basic tasks, and gradually learn new features in a natural way.

## 2. RELATED RESEARCH

### 2.1 The process of learning

Learning is a long-term process. Individual's strategies and needs are changing over time. Traditional theories on skill acquisition (Anderson, 1982) identify three stages of

learning (via Oulasvirta, 2011). In *the initial phase*, beginners focus on understanding the activity and achieving immediate goals. They make perceptually salient mistakes with immediate consequences and they often have someone, such as a parent or teacher, helping them to overcome initial difficulties. *The middle phase* of learning is about practice and gaining experience. Mistakes become less frequent and serious and the activity can be performed with reduced concentration. In this phase, individuals achieve acceptable level of performance. In *the last phase* of learning, performance becomes autonomous. Since the performance does not need to be actively controlled, most people do not perceive an urge for further improvements. With the minimum amount of regular practice, they are able to maintain the same level of accuracy for months, or years.

## **2.2 The process of learning mobile applications**

It is anticipated that this general framework can be applied to the process of learning mobile applications. In the initial phase, individuals focus on understanding the purpose of the application and accomplishing basic tasks. They explore the user interface rather randomly and in case of problems, they often ask more experienced users for help (Oulasvirta, 2011). In the later phase, users continue with familiarization, utilizing mainly ad-hoc problem solving strategies. With practice, they make fewer mistakes and the task completion time becomes shorter. In the last phase, performance becomes autonomous, which allows user to focus on the task instead of the user interface. Users stop learning new strategies and start actively avoiding frustrating, unfamiliar situations (Oulasvirta, 2011).

In the context of mobile application design, each of these phases presents specific challenges. First of all, users are most likely to leave the application in the initial phase. It is expected that the main reason is insufficient onboarding strategies – for example, inadequate communication of application purpose, unclear interaction paths, lack of information, or information overload. In the middle phase, with more experience, users become quicker but not more efficient. Problem solving strategies, which play an important role in learning, differ among various user groups and universal user interfaces tend to fail in accommodating specific users' needs. Eventually, in the last phase, users stop exploring new features and more efficient courses of actions. They tend to stick to familiar strategies and the process of learning stagnates. However, especially in the case of more complex tools, at this point individuals usually do not take

full advantage of the application. Their strategies work, but require more effort in a long run, they do not discover advanced features, or personalization options. In traditional HCI research on skills, this situation is referred to as the *paradox of the active user* (Carroll & Rosson, 1987).

### **2.3 The expert-performance approach**

Traditional theories on everyday skill acquisition are focused on the general process of learning that is aimed at attaining an acceptable level of performance. In contrast, research on expert-performance approach (Ericsson, 2006) studies strategies that lead to the highest possible level of expertise. The main difference between these two concepts is engagement in so called *deliberate practice*. Future experts do not stop learning when they achieve an acceptable level of performance. Instead, they keep practising, and they seek problem solving situations and challenges to achieve ever higher levels of performance. Previous research on the expert performance approach identify six most important qualities of deliberate practice: motivation, concentration, design of practice, feedback, regularity and emotions (Ericsson, 2006).

## **3. RESEARCH PROBLEM**

A literature review suggests that the body of knowledge on the expert-performance approach might be valuable in encouraging a continuous process of learning mobile application user interfaces. Mobile devices are highly personal tools and accumulate a wide variety of data about owner's usage patterns. As individuals improve their performance, their needs evolve and information about their history might be utilized in tailoring their learning experience.

## **4. METHODOLOGY AND EXPECTED RESULTS**

This research project will consist of several steps. First, a literature survey on learning interactive systems and aspects of mobile user interfaces that influence learnability will be done. Next, a pilot study will be conducted. It will consist of observation of users' behavior in the context of skill acquisition within mobile user interfaces. Patterns in users' behavior and links between behavior and background information about users will be investigated. It is anticipated that the study will demonstrate the correlation between learning strategies and personal information about users. The results will aid in

creating learning profiles of representative user groups. Further examination of these profiles should lead to the design of support mechanisms that will encourage various types of application learners in the process of continuous learning of mobile applications.

## 5. CONCLUSION

This research project is still at the initial stage. A literature review on learning in human-computer interaction needs be completed. After that, an empirical study on skill acquisition within mobile application user interfaces will be conducted. As indicated earlier, it is expected that the study will demonstrate the correlation between learning strategies and personal information about users. In that case, the relation will serve as a basis for the design of support mechanisms that will encourage various types of application users in the process of continuous learning.

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