

# The Ubiquitous Device Transition Experience of the Mobile User

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## ABSTRACT

It is now common for users to move from one device to another when interacting with a service that is available across platforms. In addition, not all usage contexts involve being seated, potentially leading to usability issues that have not been tested. In this study, we tested the transitioning experience of mobile users while interacting with cross-platform services, across different contextual settings (seated-moving, and seated-seated). Our study findings showed that in each test setting, users were sensitive to the same cross-platform user experience (UX) elements, such as consistency and fluency. However, the seated-moving setting consistently resulted in a larger number of inter-usability issues.

## CCS CONCEPTS

• **Human-centered computing** → Ubiquitous and mobile computing design and evaluation methods. • **Human-centered computing** → HCI design and evaluation methods.

## KEYWORDS

Cross-Platform UX; Ubiquitous UX; Interusability; Mobile UX.

## 1. INTRODUCTION

It is currently common for people to use multiple devices, including desktops and mobile phones, to perform a single task or interrelated tasks, migrating tasks from one device to another as required [2]. There is a growing demand for such *cross-platform* interaction, as users adopt multiple devices for different kinds of needs [2; 3; 6].

Previous studies on cross-platform user experience (e.g., [1; 5; 7; 8]) have not adequately addressed transitioning experience of mobile users while using cross-platform services across different contextual settings. Traditionally, testing in a specific context of use may lead to a different UX. In terms of cross-platform usability (or inter-usability) testing, it is still unclear whether evaluating a cross-platform service that involves a mobile user interface (UI) in a single context of use where users interact with all UIs while seated (e.g., in a lab environment)—is different from evaluating it in multiple contexts of use—in which users interact with interfaces in different contexts (e.g., using a desktop UI while seated in a lab and using a mobile phone

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application while moving outside the lab). In this paper, our aim is to investigate the differences in testing inter-usability of services encompassing mobile UIs in different contextual settings.

Cross-platform interactions can occur in different modes: sequential where a user moves from one device to another at different times, and simultaneous where a user interacts with more than one device at the same time [2]. In this study, we focus on cross-platform sequential interaction as a common interaction mode [2].

## 2. METHOD

We called for volunteer users to attempt a set of inter-related tasks using cross-platform services in two testing settings: seated-moving and seated-seated. We used ‘seated-moving’ and ‘seated-seated’ to refer to the contextual testing settings in our study. In the seated-moving context, the cross-platform interaction involved switching between a laptop device in a seated situation (in a lab environment) and a mobile device in a moving situation outside the lab (in an educational institute environment). This means that switching between the two devices in the seated-moving setting also involved changing the context of use. In the seated-seated context, the cross-platform interaction involved switching between a laptop and a mobile device in a seated situation (in a lab environment).

Data were collected using a combination of techniques including think-aloud protocol, observations, and questionnaires.

Forty-five volunteers (11 female) participated in this study. All participants had basic computer skills and had been using the Internet for more than 3 years. The participants also had previous experience with the devices used in the study.

For this study, we selected five services: Youtube.com, Jeeran.com, Jarirreader.com, Hotels.com and Panda.com.sa. These services are from different domains (media and video, travel, books and online shopping). Most of these domains are popular among users who conduct cross-platform activities [2]. The devices used in this study were a MacBook Pro (15 inch) and an Apple iPhone.

Participants were divided into ten main groups. Five groups attempted their inter-related tasks using the services via laptop and mobile phone in the first experiment setting (seated-moving). The other five groups attempted their tasks using services accessed via laptop and mobile phone in the second experiment setting (seated-seated).

In both settings, each group performed tasks on a single cross-platform service. Each participant attempted two horizontal tasks (HTs), (a HT = two related subtasks). Users of the same service, but in different settings, received the same HTs. The first HT was attempted with the order: laptop UI and then mobile UI. The second HT used reverse device order. In the

following section, we summarised only the combined results across both directions due to the space constraints.

### 3. RESULTS

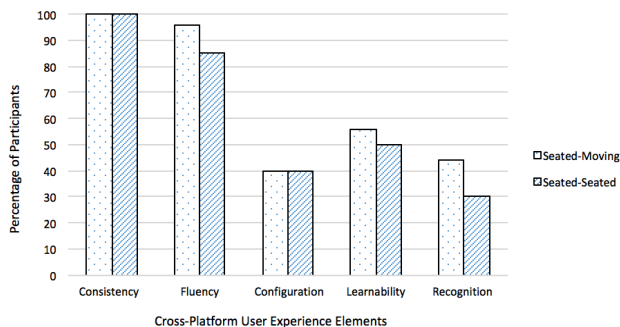
Participants in both settings (seated–moving and seated–seated) reported cross-platform UX issues under the same following UX elements identified via the open coding analysis approach:

- Consistency (how consistent are the system components across platforms),
- Fluency (how fluently can users resume interrupted tasks after transferring from one device to another),
- Configuration (how appropriate is the organisation of devices and content),
- Learnability (the extent that each UI needs to be learned separately),
- Recognition (the extent to which the UIs support recognition of elements rather than forcing users to remember information from one device to another to be able to continue on interrupted task).

An example of issues under the consistency element is ‘inconsistency of labelling system components across devices’, which was reported by three participants in the seated–moving setting, and three participants in the seated–seated setting.

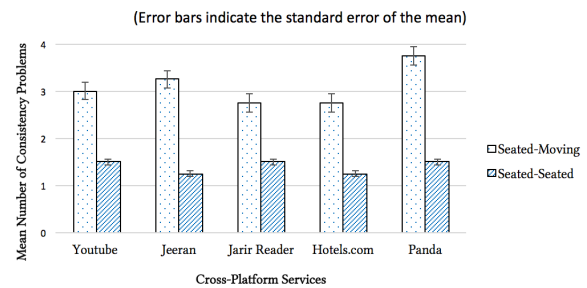
Our findings of consistency, fluency and configuration confirmed the importance of these cross-platform UX elements, which were identified in previous research [1; 4; 8].

Consistency and fluency were the most sensitive elements across all the tested cross-platform services in both settings. That is, consistency issues were reported by all participants in both settings and fluency issues were reported by 96 per cent of participants in the seated–moving setting and 85 per cent of participants in the seated–seated setting (see Figure 1).



**Figure 1. Percentage of participants who encountered issues under each UX element in the two settings.**

Consistency appeared to be a more frequent issue for users in both settings. We calculated the mean number of unique consistency issues reported by participants for each tested service in the two testing settings. Figure 2 shows the mean number of consistency problems encountered by users of each tested service across the two settings. It is clear that there were differences in the number of consistency issues reported by participants between the two settings for the tested services. We interpret this to mean that the testing in seated–moving setting generated more consistency issues than the seated–seated setting.



**Figure 2. Mean number of consistency issues encountered by users of each service in the two settings.**

### 4. CONCLUSION

In this paper, we investigated cross-platform UXs that involve using mobile UIs in two different settings (seated–moving and seated–seated). We found that participants in both settings reported cross-platform UX issues related to consistency, fluency, configuration, learnability and recognition elements. Consistency and fluency were the most sensitive elements in both settings. Testing in seated–moving setting allowed the identification of more cross-platform UX issues (e.g., more consistency problems) than in a seated–seated setting.

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