

PAPER • OPEN ACCESS

Investigation of the role of individual's gender in the design of graphical user interface for mobile learning device

To cite this article: Thong Chee Ling *et al* 2020 *J. Phys.: Conf. Ser.* **1529** 032021

View the [article online](#) for updates and enhancements.



IOP | ebooks™

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

Investigation of the role of individual's gender in the design of graphical user interface for mobile learning device

Thong Chee Ling¹, Taqbir Alam¹ and Amir 'Aatieff Amir Hussin¹

¹ Faculty of Business and Information Science, UCSI University, Jalan Menara Gading, 56000 Cheras, Kuala Lumpur, Malaysia

chloethong@ucsiuniversity.edu.my

Abstract. Nowadays, the mobile phones are making life easier which can do almost anything. Although the concept of mobile learning is not new, there are still studies undergoing about improvement so that users can study using their mobile phones. This project was a study of Graphical User Interface of m-learning applications. The study aimed to investigate whether different genders have different User Interface preferences when came to learn on mobile phones. This project conducted surveys to understand the patterns of User Interface that the users preferred for mobile learning application. The responses had pointed in develop an application based on the survey results which was a unified User Interface design preferred by both males and females. After the application development have been completed, another survey was conducted to evaluate whether the preferred User Interface designs on the application was satisfying them or not. The reviews were mostly positive and thus, a concept or theory of User Interface customization was derived from this project.

1. Introduction

The mobile technologies usage become a trend and importance tool for nowadays [1]. ISO 9241-210 is defines User experience (UX) as a person's perceptions and responses resulting from the use and or anticipated use of product, system or service [2]. UX is a sequence of events for user interaction with software [3]. UX takes a broader view of the user's interaction with an included product, moving beyond usability and towards an emotional relationship between the user and the product [4]. UX plays an important role when performing tasks using a mobile device application. For example, the device itself and context are a grate factors that enhance the QoE (Quality of Experience) of the user [5]. The user experience is affected by the personal characteristics of the end user, the designed system characteristics, and the content of which the application interacts [6].

Mobile learning is defined as a new learning tool that uses mobile devices [7]. Mobile learning as learning that occurs by using in-house wireless devices such as mobile phones [8]. In addition, some of the studies mentioned in m-learning relate to e-learning or an extension of e-learning [9]. Mobile phone learning can be difficult for users if developers ignore the UX in m-learning interface design. In m-learning, users are looking for a pleasure and are engaging experience along with application usability [10]. In addition, content of m-learning courses should also be organized in a manner of efficient learning that will influence learners to use mobile devices [11]. Content design can be achieved by considering personal features in the design process. The gender that is an important



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

feature of a person plays an important role in their overall learning process [12]. Teachers would know how to improve their users' learning experience if teachers understood gender differences in user behavior towards designing components of certain platform [13]. For example, male users might want their favorite color background while female users might want an exotic art. However, not all preferences will be the same; it is mostly based on the perspectives of individuals.

Yusri et al. [14] had studied teacher perceptions of mobile learning to determine their readiness to engage in mobile learning for training in Indonesia. The sample sizes in Indonesia were 308 high school teachers. The finding shows that Indonesian teachers had a positive perception of mobile learning and looked forward to engaging in the mobile environment [14].

Thus, this work was therefore aimed at investigating the role of embedding gender (as a user's personal feature) in the design of the m-learning application's graphical user interface.

2. Methodology

The system methodology used for this project is Rapid Application Development (RAD): Throwing Prototype. This method was used because the project was structured in a way that it prioritizes the data set obtained from the survey for GUI and the Throwing Prototype leaves room for going back to the previous stage to make changes and/or fix errors. Figure 1 showed the structure of RAD Throwing Prototyping.

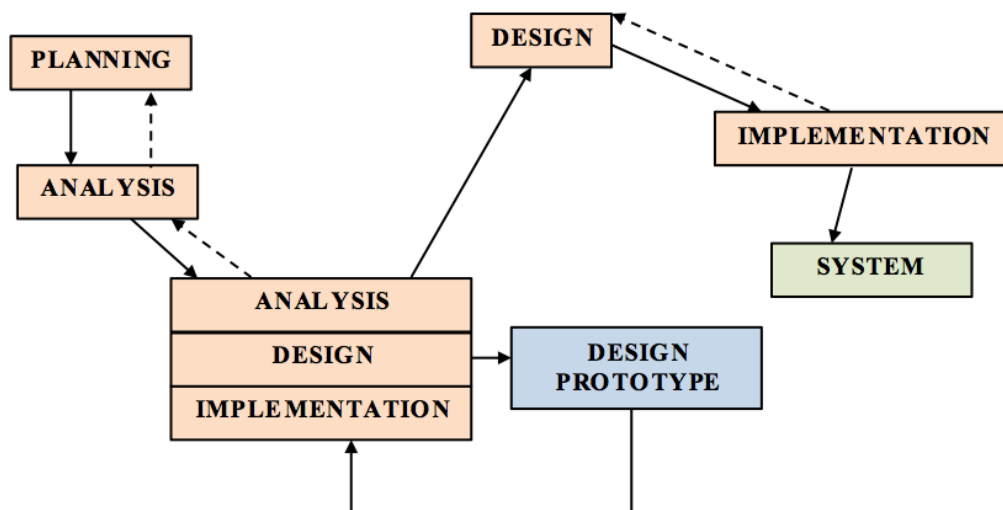


Figure 1. RAD Throwing Prototyping.

With RAD Throwing Prototyping, any changes required in the previous stage can be re-done with ease and then continue with the current phase. Figure 1 had described a loop between design prototype and analysis which provides a flexibility in implementing the application and make sudden changes where needed. This is the reason why the model has been changed from waterfall to Throwing Prototyping.

2.1. Synthesis

Figure 2 shows activity diagram. The application displayed the main menu after the user clicked on the proceed button. Following this, the user simply selected topics and sub-topics and the application plainly displayed the selected topic. At the end of a topic, user had an option to click the exercises button. If user clicked the button is true, then the application gave exercises for the user to complete. There were no additional screens after the exercises for one specific topic. Therefore, the arrow hits the end of the Activity diagram regardless of whether the user clicks exercises button.

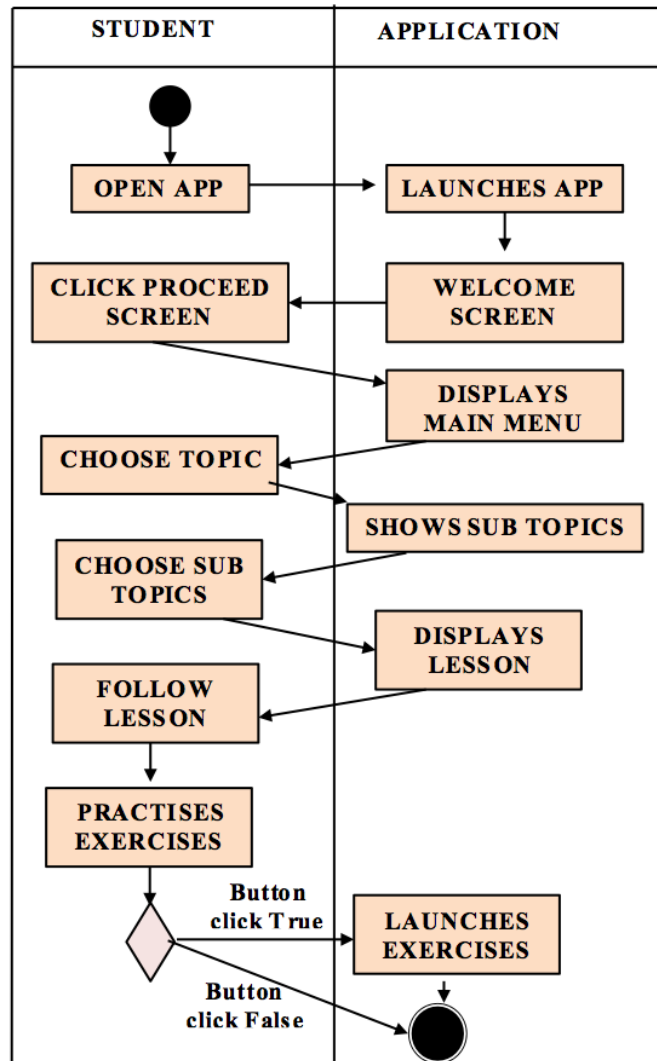


Figure 2. Activity diagram of user used m-learning application

3. Interface Design

For this project and application, a specific user interface had been chosen according to popular demands by the users of UCSI. Figure 3 shows first screen that a user sees during opening the application. This screen only displayed an introduction to the application and a proceed button to continue to main menu. The main menu screen consisted of four image buttons which took the users to the designated topic for learning purpose. In additions, pressing back button from the main menu screen exits the application as the developer programmed the first page to not stack behind the main menu. Therefore, the application did not navigate back to the welcoming screen as the welcome screen’s purpose is to display only on application launch.

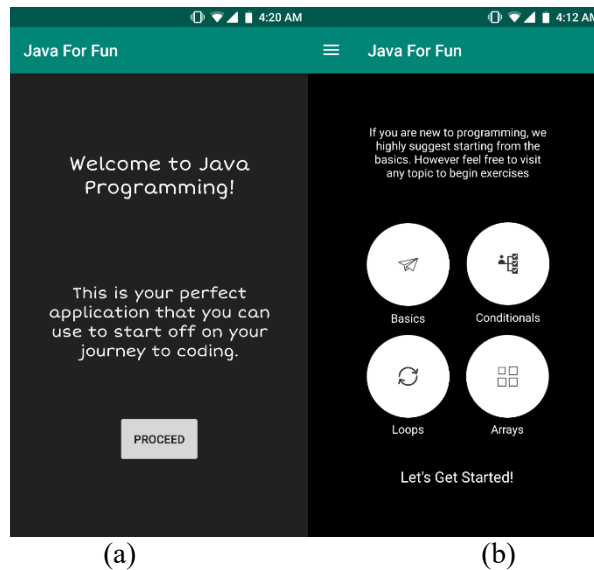


Figure 3. (a) Welcome screen; (b) Main menu screen.

Figure 4(a) showed a typical screen when navigating within a topic. A list view of sub-topics was displayed as the list view had the second highest percentage on the survey report. The hit box for each and every sub-topic has been changed to the entire row height and width to increase the clickable / touchable area for a specific sub-topic on the screen. Finally, a regular button that navigated to the exercises screen for the user to practice and, of course, the navigation drawer at the top left as it is consistent throughout most screens. Figure 4(b) shows that a sub-topic contained a small description of the topic. An activity was a component used in Android Studio to create screens for users to interact with. The Activity requires a Fragment layer on top of it for a navigation drawer to work properly as navigation drawers were an overlay that is slid from the side of the screen. Therefore, lessons contained in video tutorials are created using Activity and thus the limitation arises that these screens can not have a navigation drawer.

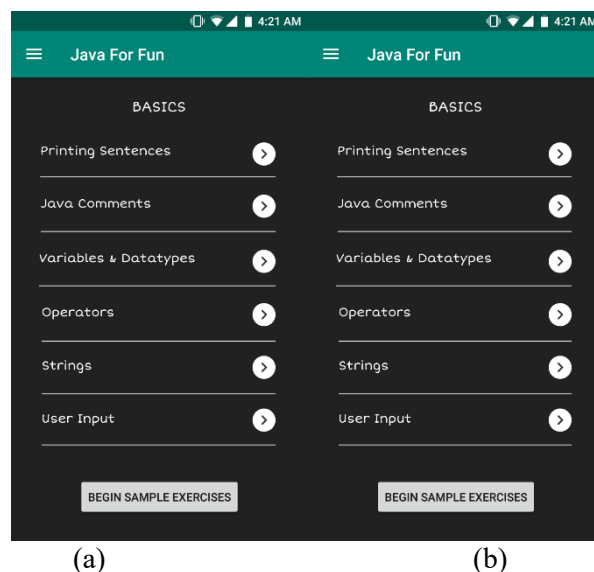


Figure 4. (a) Basic topic screen; (b) Printing lessons screen.

Figure 5(a) represents the exercises page made using Fragments since the navigation drawer button exists. This screen provided easy problem-solving questions for beginners to learn more about programming. The submit button prompts a "Correct" toast if the user is correct and "Incorrect" if the user is not correct. The response button displayed in the missing areas in case a user finds it difficult to solve problems. Figure 5(b) showed the navigation drawer on top of the Fragment as an overlay. The application had a Rate Us for the user to rate the application and a screen showing the developer's description.

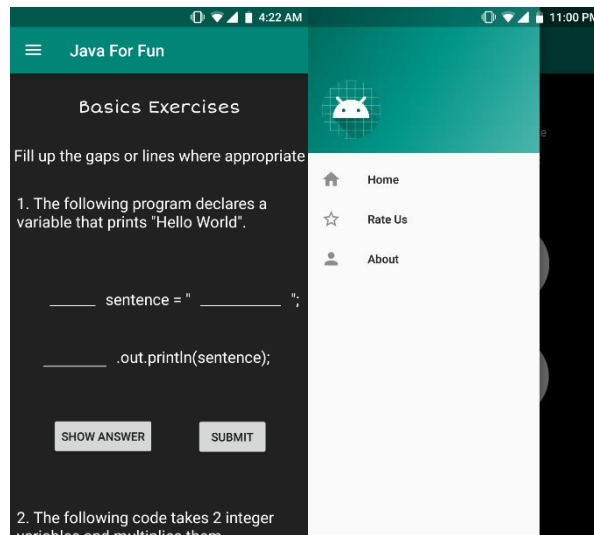


Figure 5. (a) Exercise screen; (b) navigation drawer.

4. Evaluation

The users who evaluated the application were the same respondents who conducted the first GUI preference survey. The application is built as a .apk file and has been given to 8 users divided into 4 males and 4 females to evaluate and send answers to a user experience survey feedback form. In Figure 6, 8 respondents evaluated Java learning application with 4 respondents being males and 4 respondents being females.

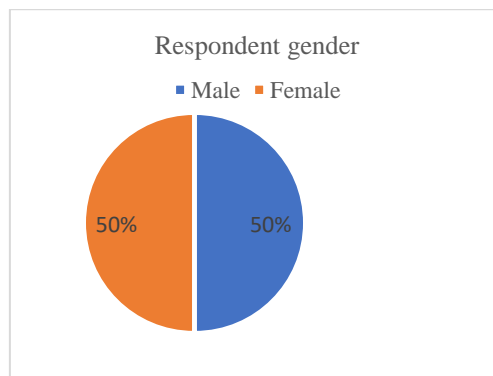


Figure 6. Respondent distribution based on gender.

Figure 7 shows that a bar chart with mostly positive reviews with ratings above 5.

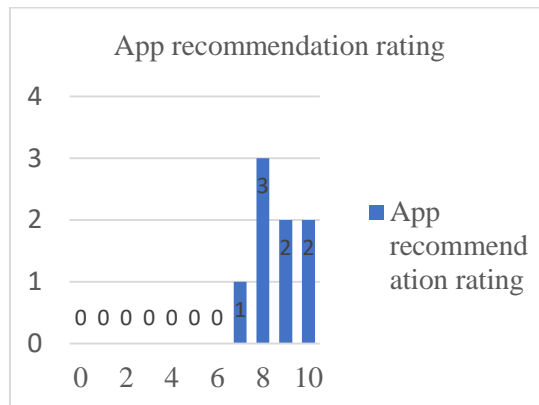


Figure 7. App recommendation rating.

In Figure 8, 3 respondents had found layout issues on their phone due to different screen size and dots per index on their smartphones.

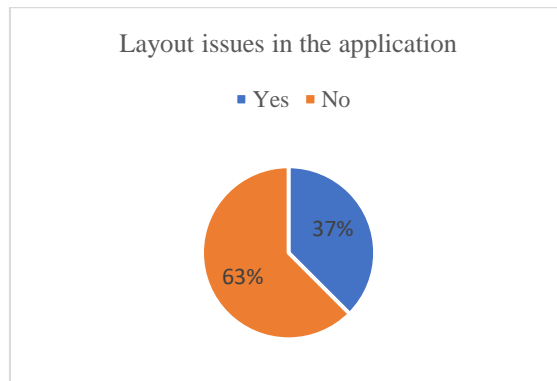


Figure 8. Layout issues in the application.

In Figure 9, with 6 and above, 8 respondents had somewhat positive ratings. Most respondents rated 8 out of 10. Since the application had been designed based on the results of the survey, most of respondents have checked a UI similar to the application UI and thus after evaluation, the respondents gave positive ratings. The result showed that almost all respondents were satisfied with the user interface, but with slight changes preferred by the respondents to be monitored by reading user comments.

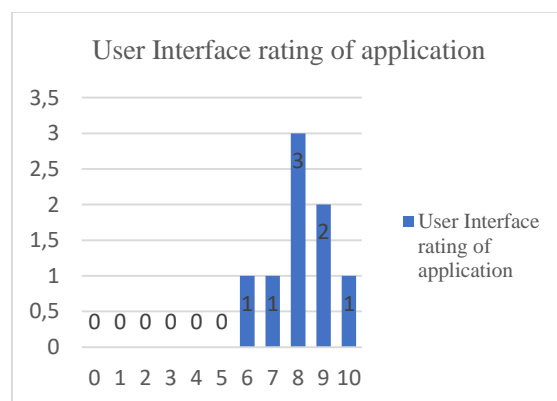


Figure 9. User interface rating of application.

5. Conclusion

In conclusion, the expected results were positive and the actual results were also positive as the UI was designed on the basis of their preference in the pre-implementation survey. Although the reviews were positive and there were minor changes that the users would have preferred in the application that might not have been surveyed or notified before the application was implemented. In addition, the application was usable and had a UI that met the minimum user satisfaction criteria.

References

- [1] Kalimullah, K., & Sushmitha, D. (2017). Influence of design elements in mobile applications on user experience of elderly people. *Procedia Computer Science*, 113(2017), 352-359.
- [2] Zheng, P., Yu, S., Wang, Y., Zhong, R.Y., & Xu, X. (2017). User-experience based product development for mass personalization: a case study. *Procedia CIRP*, 63, 2-7.
- [3] Nagalingam, V., & Ibrahim, R. (2015). User experience of educational games: a review of the elements. *Procedia Computer Science*, 72(2015), 423-433.
- [4] Kourouthanassis, P. E., Boletsis, C., & Lekakos, G. (2015). Demystifying the design of mobile augmented reality applications. *Multimedia Tools and Applications*, 74(3), 1045-1066.
- [5] Korhonen, H., Arrasvuori, J., & Väänänen-Vainio-Mattila, K. (2010, December). Analysing user experience of personal mobile products through contextual factors. In *Proceedings of the 9th International Conference on Mobile and Ubiquitous Multimedia* (p. 11). ACM.
- [6] Hassenzahl, M., & Tractinsky, N. (2011). User experience- a research agenda. *Behaviour and Information Technology*, 25(2), 91-97.
- [7] Al-Hunaiyyan, A., Alhajri, R.A., & Al-Sharhan, S. (2016). Perceptions and challenges of mobile learning in Kuwait. *Journal of King Saudi University- Computer and Information Sciences*, 30(2), 279-289.
- [8] Al-Emran, M., Elsharif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior*, 56, 93-102.
- [9] Teodorescu, A. (2015). Mobile learning and its impact on business English learning. *Procedia Social and Behavioral Sciences*, 180, 1535-1540.
- [10] Ahn, T. Y., & Lee, S. M. (2016). User experience of a mobile speaking application with automatic speech recognition for EFL learning. *British Journal of Educational Technology*, 47(4), 778-786.
- [11] Huynh, L. N., Lee, Y., & Balan, R. K. (2017, June). Deepmon: Mobile gpu-based deep learning framework for continuous vision applications. In *Proceedings of the 15th Annual International Conference on Mobile Systems, Applications, and Services* (pp. 82-95). ACM.
- [12] Terzis, V. and Economides, A.A. (2011). Computer based assessment: gender differences in perceptions and acceptance. *Computer in Human Behavior*, 27(6), 2108-2122.
- [13] Bao, Y., Xiong, T., Hu, Z. and Kibelloh, M. (2013). Exploring gender differences on general and specific computer self-efficacy in mobile learning adoption. *Journal of Educational Computing Research*, 49(1), 111-132.
- [14] Yusri, I.K., Goodwin, R., & Mooney, C. (2015). Teachers and mobile learning perception: towards a conceptual model of mobile learning for training. *Procedia Social and Behavioral Sciences*, 176(2015), 425-430.