

# Incorporating Design Thinking Process in Redesigning the Existing Student Performance Monitoring Mobile Application

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**Abstract** – With the rapid advancement of mobile technology and the increasing popularity of smartphones, mobile applications have become an integral part of modern life. The success of a mobile application is no longer solely dependent on its features and functionalities; instead, usability has emerged as a critical quality dimension that significantly impacts user satisfaction and adoption rates. Multiple domains have gained benefits from the usage of mobile applications such as education, logistics, transportation, and security sector. Apart from these domains higher educational institutes such as universities use mobile applications for educational purposes. The Faculty of Humanities and Social Sciences (FHSS) at the University of Sri Jayewardenepura (USJ), Sri Lanka has implemented a performance evaluation system for students, alongside the introduction of a mobile application aimed at enhancing mobility, efficiency, and user engagement through effective interfaces. However, during usability testing, the mobile application exhibited significant usability issues, including readability challenges, a lack of trending gamification features, and an absence of notification pop-ups. This concept paper examines the issues of existing mobile applications and demonstrates the significance of the design thinking process in the redesign of the mobile application for the Faculty of Humanities and Social Sciences at the University of Sri Jayewardenepura. By employing user-centric methodologies, involving users, and integrating trending features, the mobile application's usability was substantially improved. The concept paper provides valuable insights and practical guidelines for educational institutions seeking to leverage design thinking to enhance their mobile application's usability, user engagement, and overall effectiveness.

**Keywords:** Design thinking approach, mobile application, performance evaluation

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## Introduction

The Faculty of Humanities and Social Sciences (FHSS) at the University of Sri Jayewardenepura caters to a diverse student body of approximately 4000 individuals. To effectively monitor academic progress, examination results, and attendance records of every undergraduate, the university has implemented a system called the Performance Evaluation System (PES). While PES serves as a valuable tool for academic management, there is a growing need for a more efficient and engaging platform to provide access to this essential information. In response, the FHSS App mobile application was developed to enhance the effectiveness and efficiency of the PES system, ensuring seamless communication and improved student engagement. The previously followed mobile application is designed to facilitate access to academic information for the undergraduates of the Faculty of Humanities and Social Sciences (FHSS) at the University of Sri Jayewardenepura. The mobile application had become an essential tool for undergraduate students. However, the users were encountering various issues, particularly when attempting to access their academic results. The most mentioned problem was the inability of the mobile application to calculate the Semester Grade Point Average (SGPA), resulting in reduced undergraduate motivation. However, during usability testing, the mobile application exhibited significant usability issues, including readability challenges, a lack of trending gamification features, and an absence of notification pop-ups. Furthermore, the existing mobile application lacks a streamlined process for academic staff to review students' performances, resulting in a notable gap between the functionality and the customary requirements of both academic staff and undergraduate students. This deficiency has raised challenges in effectively monitoring and assessing student progress, hindering educators' ability to provide timely feedback and support, and limiting students' access promptly. To address these limitations, there was a need for an improved mobile application that empowers academic staff with a comprehensive and user-friendly review process while enhancing students' engagement and understanding of their academic performance. We@FHSS is a transformative mobile application, representing the redesigned and enhanced version of the previously used mobile application that was developed alongside the Performance Evaluating System (PES) for the Faculty of Humanities and Social Sciences (FHSS) at the University of Sri Jayewardenepura. The We@FHSS mobile application not only empowers students but also the academic staff.

## Objectives

1. To redesign the mobile application to cater to the desired needs of undergraduate students at FHSS, providing an engaging and customised user experience.
2. To develop a user-centric mobile application for FHSS, applying the design thinking process to ensure the app aligns with the preferences and requirements of undergraduate students.

## Methodology

This study followed a qualitative approach incorporating a series of iterative and collaborative steps, aligning with the five stages of Design Thinking: empathise, define, ideate, prototype, and test the prototype with undergraduate participants. Design Thinking allows designers to collaborate with clients, users, and non-designers in the design process ( Bjögvínsson & Ehn, 2012). The concept paper provides an overview of Design Thinking, emphasising its

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human-centred approach that seeks to understand the needs, preferences, and challenges of end-users. The objectives of this concept paper are to redesign the mobile application to cater to the desired needs of undergraduate students at FHSS, providing an engaging and customised user experience, and to develop a user-centric mobile application for FHSS, applying the design thinking process to ensure the app aligns with the preferences and requirements of undergraduate students.

The researcher reviewed relevant literature on the design thinking process and best practices in mobile application development, gaining insights into successful case studies and innovative approaches. After conducting the questionnaire, the researcher defined the specific needs and preferences of undergraduate students and academic staff at the Faculty of Humanities and Social Sciences (FHSS) through interviews and focus groups.

The researcher started to follow the design thinking process to redesign the previously used mobile application. In the empathise stage, the researcher employs a questionnaire to perform data collection. Undergraduates of level three and level four from the Faculty of Humanities and Social Sciences (FHSS) were incorporated into the selection process as the target group. Using the random sampling method 100 undergraduates were selected and instructed by particular instructions to answer the questions. Following the questionnaire, the problems with present mobile applications and the functions that must be incorporated in the redesigned mobile application were highlighted. Furthermore, the development requirements were identified through in-depth interviews with 15 undergraduates randomly selected from the same selected sample group. The development requirements were defined through in-depth interviews. After that, the researcher created user personas and user journey maps to visualise the typical interactions and pain points of the app's users.

In the define stage, the researcher has successfully identified pertinent research problems and developed user personas, which represent a subgroup within the target audience. According to the empathy map Gibbons, (2018) has been created, serving as a comprehensive synthesis of insights gained through interactions with individuals involved in design research. This map delineates four primary domains that warrant concentrated attention, thereby offering a holistic understanding of an individual's experiential landscape.

The following are the problems identified by the user during the define stage. The previously used mobile application incorporates a notice board, hence the notice board lacks utility in its current state. The previous mobile application is not possible to modify the profile details of students. One of the main problems was that the mobile application and Performance Evaluation System provide identical features. There was a failure to access crucial information regarding the university, as well as the overall GPA was not visible. During the ideation phase of the design process, considerations were made regarding the selection of appropriate fonts for the application. The font "Poppins" was chosen as the base font due to its accessibility features. Additionally, the university's branding guidelines were taken into account, and the application incorporated the university's designated colours in order to align with the university's identity and resonate with the university student population.

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During the implementation of the prototype process, the ideas that were generated were translated into wireframes, allowing for testing. At this stage, the researchers successfully resolved the challenges encountered during the ideation phase through the development of an application design. Specifically, a UI/UX application was designed using Mockups Classic to facilitate the review of student results. The initial step of the mobile application design involved creating an information architecture schema, which served as a valuable tool for streamlining the UI/UX design process. Subsequently, the user flows within the application were identified to ensure optimal functionality and user experience.

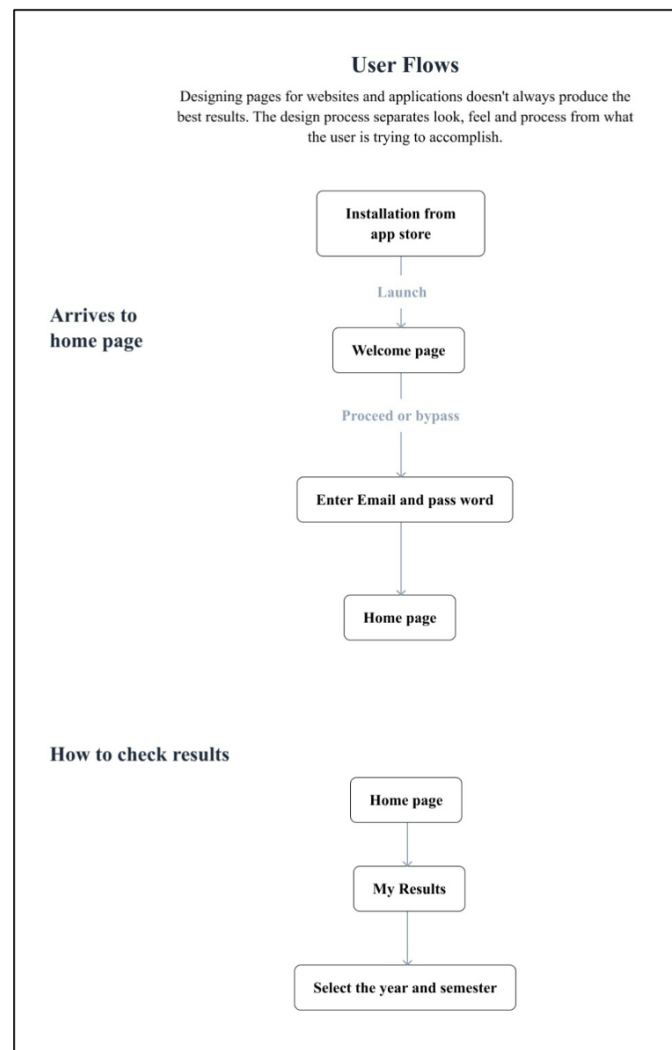


Fig.1 - User Flow of the application

Wireframing is an essential process in design whereby designers create visual representations of interactive products to establish the structure and flow of potential design solutions. The initial step involves drawing sketches that serve as the foundational design for an application. These sketches play a crucial role in reducing errors during the subsequent digital visualisation of wireframes. Following the description of the wireframe sketches, the researcher further describes and translates them into a wireframe visualisation. The visualisation is devoid of images and colours, focusing solely on the structural elements and functionality of the design. This study encompasses an exploration of various design elements in the creation of an

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application user interface, including the comprehension of concepts, sitemaps, application sketches, low-fidelity wireframe mockups, icons, and typography. The design process adhered to established visual design principles and incorporated gamification techniques to optimise the user experience of the mobile application, by integrating these elements, the author enhances the overall usability, engagement, accessibility, and satisfaction of users interacting with the application interface. For undergraduates, the platform now offers a new Push Notifications System, providing customised and relevant news based on their academic year. They can also access the University phone directory to find official phone numbers conveniently. Furthermore, undergraduates can now manage their profiles and log in using Faculty Email Credentials, ensuring streamlined access. The platform now adheres to W3C Accessibility Standards, promoting inclusivity and accessibility for all users. Additionally, undergraduates can easily track their academic performance. Academic members benefit from a search function that allows them to review students' academic performance using their AR/AF numbers. For freshers, who are undergraduates without AR/AF numbers, the platform offers a Virtual Tour of the University, providing an immersive experience to get acquainted with the campus. It also offers Fundamentals to learn about the University and Faculty, facilitating a smooth transition into university life. These new features enhance the platform's usability, functionality, and user experience for each specific user group, making it a more comprehensive and user-friendly online hub for the university community.

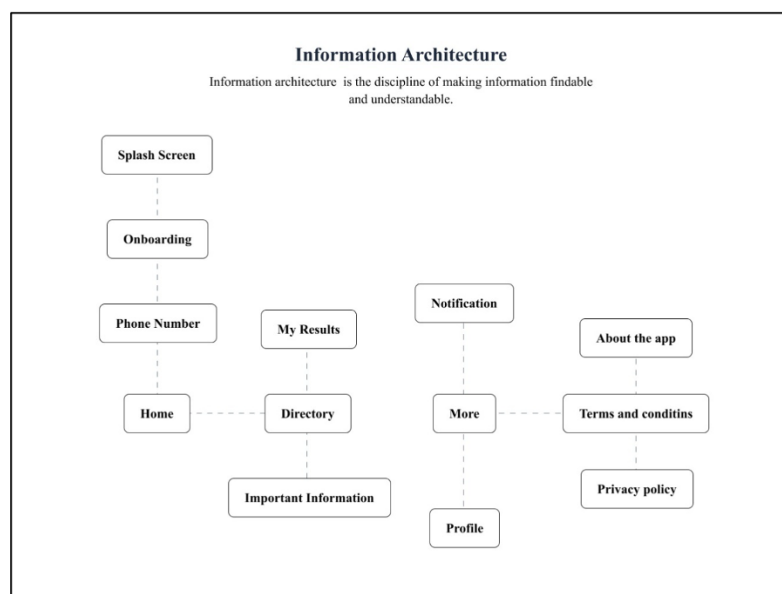


Fig.2 -  
Information Architecture

A survey and usability test were conducted in the final testing stage incorporating the previously selected sample group to gather their opinions on the prototype design. Following is the feedback: 1. Profile Picture: Students encountered difficulty in identifying the option to change their profile picture. This finding highlights the need for clearer and more intuitive design elements. 2. Accessibility Issues: Participants with visual impairments faced challenges in navigating the interface due to the icons' design. Enhancing accessibility features for visually impaired students emerged as a crucial aspect of the redesign. 3. Missing Facebook Icon: The absence of a Facebook icon was noted by users, indicating the importance of including

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recognizable and commonly used social media icons to improve user engagement. 4. University Logo Interaction: Some students attempted to interact with the university logo, expecting it to redirect them to the home page. This finding underlines the need to align user expectations with design functionalities. 5. GPA Confusion: Certain students expressed confusion about the nature of the GPA, whether it pertained to individual semesters or the entire academic year. Addressing this confusion by providing clear and concise explanations is essential for enhancing user comprehension. The usability test aimed to assess the user experience of a prototype design for a university's online platform. The test involved students who interacted with the interface, and their feedback provided valuable insights for the redesign process.

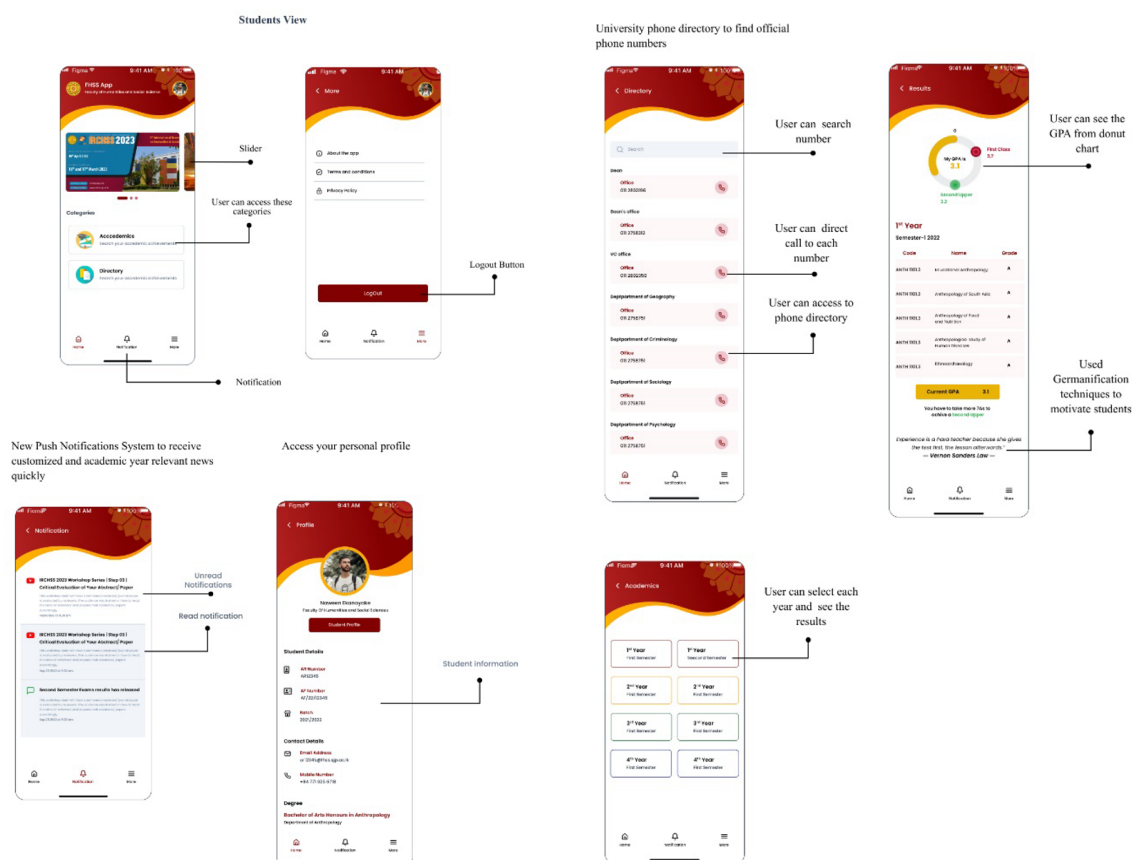


Fig. 3 - User Interface Development

## Results

The redesigned mobile application simplifies and enhances the process of reviewing by offering a user-friendly interface, seamless functionality, and high usability to ensure an optimal experience for all users. Using the design thinking process offers several advantages for designing a product, service, or experience. Design thinking places the user at the centre of the design process. By empathising with users and understanding their needs, desires, and pain points, designers can create solutions that truly address real-world problems and deliver meaningful experiences. Further encourages a divergent and iterative approach to

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problem-solving. It fosters a culture of creativity and innovation, allowing designers to explore a wide range of ideas and concepts before converging on the best solutions. Design thinking promotes collaboration among multidisciplinary teams. By bringing together individuals with diverse expertise and perspectives, designers can leverage collective knowledge to develop more comprehensive and holistic solutions. The design thinking process emphasises rapid prototyping and iterative testing. By creating early prototypes, designers can quickly validate and refine their ideas based on user feedback, reducing the risk of developing a product or service that does not meet users' needs. Through the iterative nature of design thinking, potential risks and challenges are identified and addressed early in the design process. By actively involving users throughout the design process, design thinking helps the researcher gain a deeper understanding of the target audience. More over design thinking process in the redesigning process of a mobile application, could be considered a powerful methodology that encourages designers to think outside the box, and create solutions that positively impact the undergraduates and the academic staff of the Faculty of Humanities and Social Sciences of the University of Sri Jayewardenepura.

## Conclusion

The research study focused on the design elements of the user interface as well as the functionality and usability of the application itself. Finally, the research paper documents how to incorporate the design thinking process into a redesign of a mobile application related to academic institutes that view by a bunch of students regularly.

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