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Advancement in ICT: Exploring Innovative Solutions (AdICT) Series 3/2025



Editors

Elin Eliana Abdul Rahim

Noor Azura Zakaria

Dini Oktarina Dwi Handayani

Ahmad Fatzilah Misman

KICT Publishing

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INNOVATIVE SOLUTIONS
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Preface

It is our great pleasure to present Advancement in ICT: Exploring Innovative Solutions (AdICT), Series 3/2025. This publication brings together diverse and forward-looking ideas in ICT, showcasing innovative approaches that not only address current challenges but also shape future opportunities. The contributions in this volume reflect the dedication, creativity and perseverance of KICT lecturers and students, whose hard work continues to push the boundaries of knowledge and application. Their commitment highlights the spirit of innovation that drives both academic inquiry and practical solutions in the ever-evolving field of ICT.

We would like to extend our sincere appreciation to all authors, reviewers, editors and the organising team for their invaluable efforts in making this series possible. It is our hope that this volume will serve as both an inspiration and a useful reference for scholars, students and professionals. By sharing these innovative perspectives and solutions, we aim to contribute meaningfully to the ongoing discourse in ICT, offering fresh insights and encouraging further exploration in advancing the discipline for the benefit of society.

Editors

Elin Eliana Abdul Rahim

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It's that Time of the Month!: Development of Digital Intervention for Adolescent Menstrual Health Education

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Abstract— Adolescents worldwide face significant challenges in understanding and managing their menstrual health due to stigma, misinformation, and a lack of accessible, age-appropriate educational resources. Existing period tracking apps often fail to address the unique needs of younger users, offering limited educational content and complex interfaces that do not cater to their developmental stage. To bridge this gap, FemHealth is designed as a digital educational platform that provides adolescents with accurate cycle tracking, symptom management, and predictive algorithms for personalized insights. The platform integrates comprehensive, evidence-based educational content on menstrual health, hygiene, cycle irregularities, and emotional well-being, fostering menstrual literacy. Developed using the Agile methodology, FemHealth incorporates continuous feedback from adolescents and parents to ensure usability and relevance. By offering a confidential and supportive environment, FemHealth seeks to empower adolescents with the knowledge and confidence to navigate their menstrual health with greater autonomy and awareness.

Keywords—*mHealth, menstrual health education, period tracking app, digital health intervention, health informatics, adolescent*

A. Introduction

Adolescent menstrual health is a critical public health issue, with challenges such as period poverty, stigma, and inadequate education adversely affecting young individuals' well-being and educational outcomes. Period poverty, defined as the lack of access to menstrual products and hygiene facilities, affects millions globally, leading to health risks and social exclusion. Additionally, cultural taboos and misinformation surrounding menstruation contribute to feelings of shame and hinder open discussions, further exacerbating the problem. While digital solutions like period-tracking apps have gained popularity, many lack age-appropriate resources and user-friendly interfaces tailored to adolescents, limiting their effectiveness in addressing these challenges. To bridge this gap, there is a pressing need for platforms that not only provide accurate menstrual tracking but also offer comprehensive educational content and support, empowering adolescents to manage their menstrual health confidently [1].

FemHealth is an educational platform designed for adolescents and women to enhance their understanding of their bodies and manage their menstrual health. The app features a simple, minimalist interface that provides educational facts and tools for tracking menstrual cycles. FemHealth offers reliable information and practical tools to

improve menstrual health education, supporting users in learning about and managing their reproductive health effectively.

B. Problem Statement

Developing a period tracking app specifically for adolescents is essential to support their early experiences with menstruation. Most existing apps are designed for adults and often lack accessible, age-appropriate resources, leaving younger users without effective tools to track their cycles or manage related symptoms. The limited availability of menstrual health education further contributes to confusion, anxiety, and misinformation among adolescents. A dedicated app tailored to this age group could offer accurate cycle predictions and personalized educational content, equipping users with the foundational knowledge needed to understand menstrual health and hygiene. Additionally, such an app would provide a safe and confidential platform for discreet tracking and community support, ultimately enhancing adolescents' menstrual health experiences and fostering greater confidence and awareness during this critical stage of development.

C. Project Objectives

The primary objectives of this project are as follow:

- 1) To develop a usable and age-appropriate interface suitable for children and teenagers.
- 2) To evaluate the usability and effectiveness of FemHealth at monitoring menstrual cycles and improving adolescents' understanding and knowledge about reproductive health.

D. Project Scope

This project aims to develop FemHealth, a period tracking app specifically designed for adolescents. It will feature an intuitive and engaging user interface for easy navigation, menstrual cycle tracking, symptom recording, and predictive algorithms for accurate cycle forecasts. Additionally, the app will integrate educational content on menstrual health, covering topics like hygiene, cycle irregularities, and emotional well-being. The goal is to provide adolescents with a valuable tool that helps them track their periods effectively while educating and empowering them to manage their menstrual health confidently.

V. REVIEW ON RELATED WORKS

In recent years, there has been increasing recognition and awareness of the importance of women's health, particularly among adolescents. Access to information concerning women's health and well-being is crucial. Given the prevalence of technology in modern society, the development of adolescents' health education platforms has become essential to address any issues effectively. Prior to the development of any new application or system, thorough research is vital to gain insights from similar projects.

Accordingly, for this project we had reviewed and examined four (4) comparable mobile applications, analyzing their respective features, advantages, disadvantages, strengths, and limitations. The review will discuss the pros and cons of each application's design and functionalities, recognizing and considering any existing strengths and weaknesses.

Flo Health (Fig. 1) is a user-friendly app that not only tracks women's period cycles but also offers educational articles and insights about women's health. Over 350 million people around the globe use Flo Health as their period tracker app, fertility calendar, and pregnancy assistant. The application is generally for women to track their period cycles and ovulation cycles to achieve/prevent pregnancy. It includes a variety of educational content as well as a section that functions like a blog, where users can discuss numerous topics among themselves. [2,3]

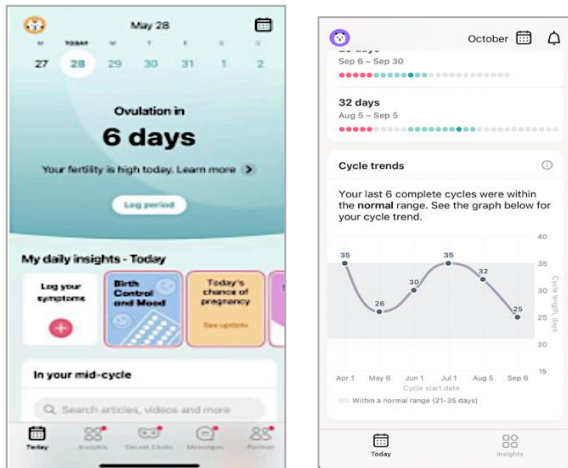


Fig. 1. Flo Health user interfaces [2]

One notable advantage of Flo Health is its highly accurate tracking of users' period cycles, complemented by tailored predictions and analyses based on individual input. Additionally, the app enables users to monitor diverse aspects of their health, including period symptoms, mood, sleep patterns, and physical activity. Facilitating user interaction, Flo Health features a platform for communication and insights sharing among its users.

Furthermore, the app offers a virtual assistant to address users' inquiries regarding their bodies. Noteworthy is its blog-like section, providing a space for users to share experiences and access menstruation FAQs. Flo Health also has a feature "Flo for Partners", where users can link with their partners through the app. Moreover, Flo Health delivers educational

content on topics ranging from sexual activity to women's reproductive health.

Beyond these core functionalities, the app aids users in organization through timely reminders for upcoming periods and medication intake. Ensuring user privacy and security, Flo Health offers options to safeguard sensitive data with fingerprint or face ID and a custom access code. Finally, the app has a feature known as "Symptom Checker" where users are able to do self-assessments where they are provided with a symptom checklist for users to check as well as educational content about illnesses related to menstruations.

The existing disadvantages notable in FloHealth include the app includes mature content which may not be suitable for users under the age of 18. Another clear drawback of the app is the limited features available in the free version, users would need to make payment before they can have access to the content FloHealth provides. This may prompt users to purchase the premium version for full access.

The second application is My Calendar - Period Tracking (Fig. 2). My Calendar - Period Tracking is an application primarily designed for women to monitor their menstrual cycles and predict fertile days. Users can easily log their periods, ovulation, and symptoms, receiving timely reminders for upcoming periods. The app offers customizable alerts, fertility tracking, and accurate predictions of period timings and ovulation dates based on user data. Additionally, it includes a feature allowing users to generate reports for their doctors based on inputted data. Notable features also include medication reminders, daily logging prompts, and contraception alerts

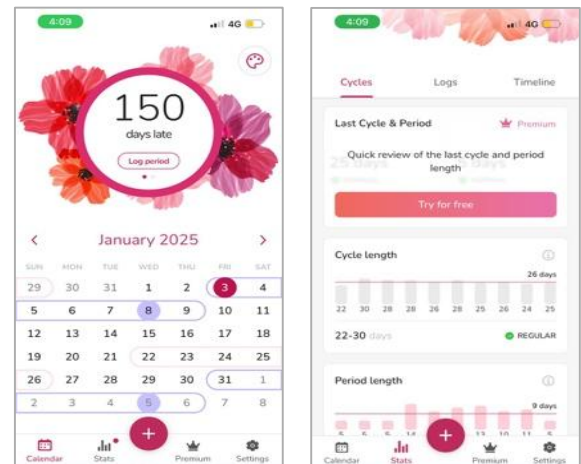


Fig. 2. My Calendar - Period Tracking UI

Period Tracker My Cycle is a simple period tracking application utilized for monitoring menstrual cycles, predicting fertile days, and tracking symptoms. It records users' cycle duration and periods. The app also offers a feature allowing users to customize the theme with a variety of background images. However, aside from this feature, there are no other notable functionalities on Period Tracker My Cycle.

The advantages of this app are, it enables users to accurately monitor their menstrual cycles and provides predictions of ovulation dates, aiding in the identification of fertile days for both conception and contraception. Additionally, users can log symptoms such as mood swings

and cramps, contributing to a deeper understanding of their cycle patterns. Moreover, the app allows users to generate reports based on their tracked data, which can then be shared with healthcare providers. Another notable advantage of the app is its provision of reminders, including those for contraception, daily logging, and medication.

Unfortunately, similar to Flo Health, My Calendar – Period Tracking also requires users to purchase the premium version to have access to wide range of features including education content. Furthermore, the app gives pop-up advertisements, making users feel annoyed with the user interfaces leading to an unpleasant user experience.

The third similar application is Period Tracker - My Cycle (Fig. 3), which is a simple period tracking application utilized for monitoring menstrual cycles, predicting fertile days, and tracking symptoms. It records users' cycle duration and periods. The app also offers a feature allowing users to customize the theme with a variety of background images. One notable important feature of this app is that all of its functionalities are completely free without any pop-up advertisement. However, the disadvantages are, the Period Tracker My Cycle app lacks many notable features, which limits users' ability to do much beyond tracking their period and ovulation cycles. Moreover, the app lacks feature for community bonding and does not provide any educational content for its users.

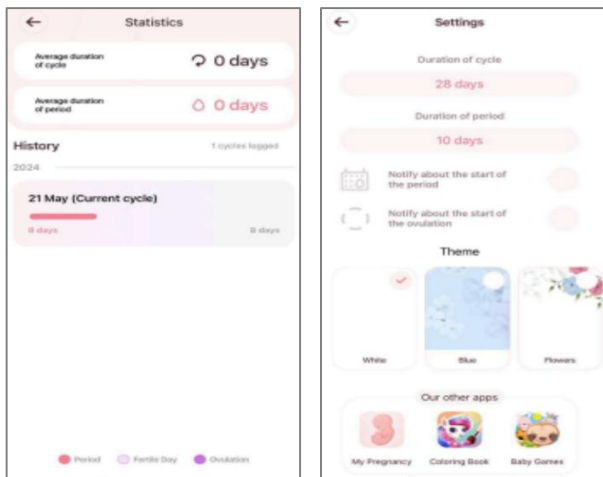


Fig. 3. Period Tracker – My Cycle [4]

Another app we include in our review is Ovia (Fig. 4), an app designed to assist users in tracking their menstrual cycles, predicting ovulation, and monitoring fertility. Through partnerships with health plan providers nationwide, the app offers quick health assessments for users. Ovia fosters community engagement by allowing users to interact with each other on topics related to women's health. Additionally, it provides educational content about women's health and sends reminders to users to prioritize their well-being [5].

Similar to other apps, Ovia notable advantage lies in its comprehensive tracking of users' menstrual and ovulation cycles. Ovia also offers personalized insights and recommendations based on users' recorded data, providing tailored guidance throughout pregnancies or menstrual cycles and educational content on topics related to women's health, pregnancy, childbirth, and parenting. The app also fosters

community support, allowing users to share experiences, advice, and tips with one another.

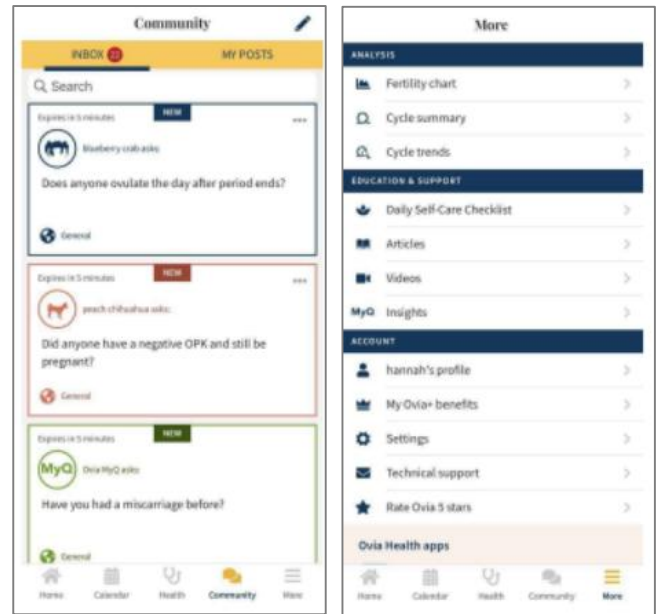


Fig. 4. Ovia user interfaces [6]

However, as presented in the above Figure 4, the color palette of the user interfaces seems to be quite dull and plain causing the app's appearance unattractive to the target users. Besides, the app also includes too many features in one page making the interface looks cluttered and overwhelming to users.

Our review on these relevant applications help us to determine features and improvement that could be implemented into the design of FemHealth. The following Table I summarized features available in these existing applications and proposed features that would be adopted into FemHealth.

TABLE I. COMPARISON OF APPS FEATURES

No.	Features					
		Flo	My Calendar	My Cycle	Ovia	FemHealth
1	Period tracker	√	√	√	√	√
2	Community discussions	√	X	X	√	X
3	Educational content	√	X	X	√	√
4	Health assessments	√	√	X	√	√
5	Reminders and alerts	√	√	√	√	√
6	User-friendly interface	√	√	X	X	√
7	Free usage for all features	X	X	√	X	√

From Table 1, it can be seen that the Flo Health app has all features necessary for a menstrual health education. However, the content that they provide not age-appropriate and suitable for adolescents to access. Similarly, Ovia also have important features integrated into the app however, the user interfaces are not user friendly. For My Calendar and My Cycle apps, they provide both period tracking and cycle history features but both apps are lacking in terms of the educational content feature. For our FemHealth, we implemented all the required features for menstrual health education targeting at adolescents which are period tracker, educational content, health assessment and reminder and alerts. The user interfaces for our app also would be highly usable and contribute to overall positive user experience.

VI. METHODOLOGY

In this section of the report, interviews were conducted directly with the target users, primarily adolescents and the parents. Engaging in these feedback sessions will give insights into the specific needs, preferences, and challenges that adolescents face regarding menstrual health education and period tracking. By interacting directly with the audience, the goal is to gather information that will guide the development and improvement of the period tracking app. This feedback is crucial for refining the app's user interface, educational content, and features to ensure it meets the unique needs of adolescents effectively. The insights gathered from these interviews and surveys will play a vital role in shaping the app's design and functionality. Ultimately, the intended aim is to create a user-friendly and impactful tool that supports adolescents in managing their menstrual health with confidence.

A. Development Approach

In developing the period tracking app for adolescents, it will be approached using the Agile Development Method (see Figure 5). The Agile methodology breaks down the development process into smaller and manageable tasks called sprints, where incremental updates and improvements to the app can be done to ensure that it evolves in response to users' needs and preferences.



Fig. 5. Agile Development

B. Requirements Specifications

The interviews with adolescents and parents highlighted several key requirements for the FemHealth app. Adolescents aged 10-15 showed awareness of menstruation but largely did not track their cycles, with education on menstrual health primarily coming from mothers and, to a lesser extent, schools. Both adolescents and parents rated the accessibility

of healthcare information as low, and there was general discomfort in discussing menstrual health topics. However, adolescents were familiar with and comfortable using health-related smartphone apps and expressed strong interest in using an app to track periods. They preferred features such as educational articles, symptom management tips, and menstrual product recommendations. Due to privacy reasons, the participants requested to stay anonymous.

Parents confirmed their children's knowledge of menstruation but were often unsure if their children actively tracked their periods, with only a few using apps. Education at home focused on menstruation, menstrual hygiene, and puberty-related body changes. Parents supported the idea of a period tracking app, emphasizing the need for information privacy, security, and age-appropriate content. They desired features like educational content on menstruation and hygiene, information on body changes during puberty, and remedies for managing period symptoms. While parents preferred moderate involvement in their child's use of the app, they believed it could significantly benefit their child's ability to track cycles and learn about menstrual health comfortably.

C. Logical Design

FemHealth's system design helps to define the system's architecture and components. The system design involves potential users' inputs into the design of the application to ensure the system meets their needs and requirements in order to achieve high user satisfaction.



Fig. 6. Use Case Diagram

Figure 6 above is the use case diagram for the FemHealth app includes two primary actors: the User and the Admin. Users can track their menstrual periods by logging the start and end dates, log symptoms they experience, with options to add new symptoms, update existing ones, or remove symptoms that are no longer relevant, set reminders. Users are also able to view their cycle history educational content

related to menstrual health, including topics like menstrual hygiene, cycle irregularities, and emotional well-being.

D. Database Design

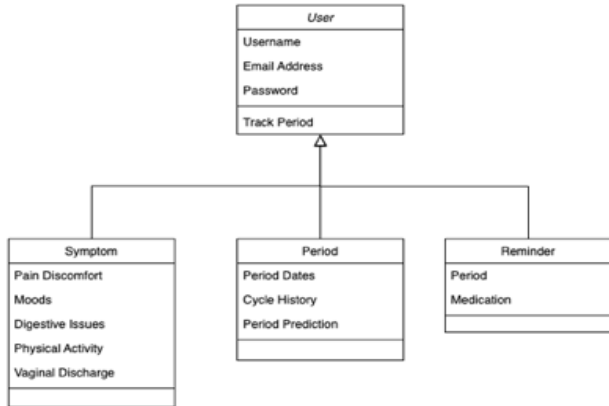


Fig. 7. Class Diagram

Figure 7 above displays the Entity Relationship Diagram (ERD) for the FemHealth app. The entities include:

User: The ‘User’ table contains the information about users that use the system, including a unique user ID, user’s name, user’s username, user’s password, and user’s email address.

Period: The ‘Period’ table records data related to users’ period start and end dates which includes a unique period ID, the start date, and the end date.

Symptom: The ‘Symptom’ table holds details about users’ symptoms, including a unique symptom ID, the date the symptom was added, type of symptom, and the severity level of the symptom.

Reminder: The ‘Reminder’ table contains recorded data of users’ reminders which includes a unique reminder ID, the message of the reminder, as well as the date and time the reminder should be set.

VII. RESULTS

This section presents the user interface and the application testing results for the FemHealth app. The UI includes the Sign up page, Login page, Home page, Symptoms page, Cycle History page, and Educational Content page.

A. User Interface

For the Sign up page, a first time user enters email, username, password and confirm password. After successful sign up, the user will be navigated to the Calendar page. For a user that already has an account, the user logs in using email and password in the Login page. After successful login, the user will be navigated to the Calendar page.

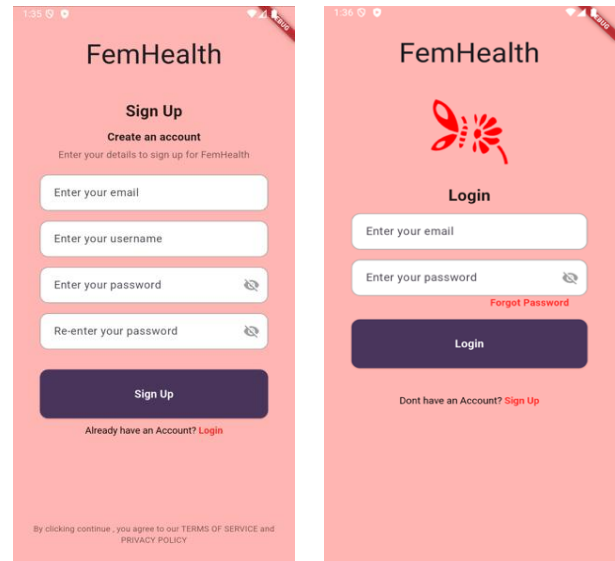
After successful sign up/login, the user proceeds to the Calendar page and select the start date and end date of their period where it will be highlighted on the calendar and displayed in the box decoration below the calendar as well. By clicking on the “Log Symptoms” button, the user will be navigated to the Symptoms page. When the user clicks on “Log Symptoms” button, the user will be navigated to the Symptoms page. The user can add symptoms and it will be displayed on the box decoration in the previous page. The user will be able to update and remove the symptoms as well.

When the user clicks on the History page, it will display the user’s menstrual cycle history and show the current phase they are in. By default, there is no cycle history unless the user adds a start and end date in the main page.

In the Education page is where the user can scroll through educational content and view the content. By clicking on the settings icon, user will be navigated to the Settings page where they are able to update their username or logout. The user can also view FemHealth’s privacy policy and about FemHealth.

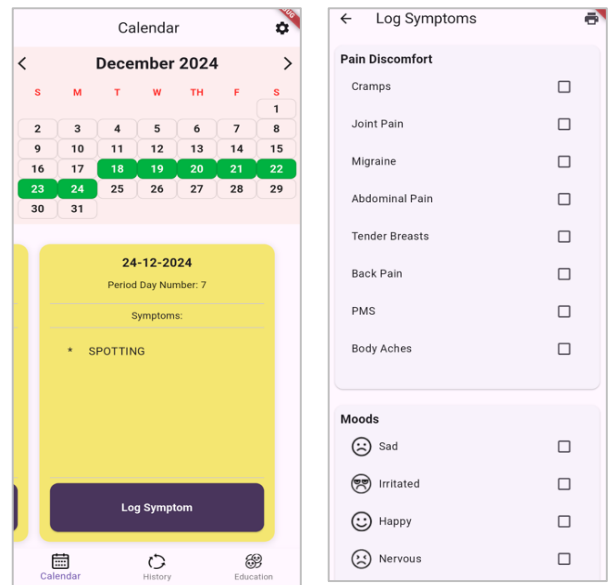
The user interfaces of the Sign Up, Login, Calendar, Symptoms, Cycle History, Educational Content, Settings pages are presented in the following Table II.

TABLE II. FEMHEALTH USER INTERFACES



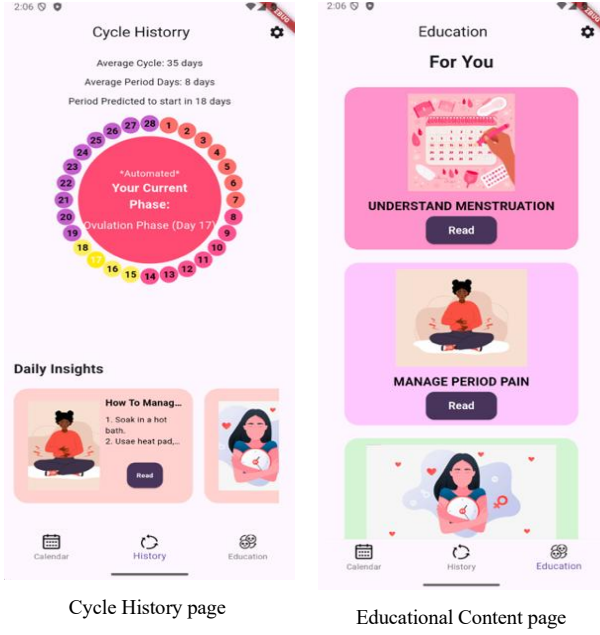
Sign Up page

Login Page



Calendar page

Symptoms page



B. Application Testing

The application was tested based on four (4) criteria:

- **Functionality:** The FemHealth app successfully functions as it was intended.
- **Security:** The password verification for sign up ensures users have a strong password.
- **Integration:** Successfully performed a seamless interaction between the front-end and back-end of the application.
- **Usability:** Navigation between different pages functions well.

C. User Acceptance Testing

In order to assess the functionality of the application, we conduct a user acceptance test with end users. Two (2) adolescents (P1 and P2) were approached for the application to be tested. The following Table III presents the results of user acceptance testing on system functionality and features.

TABLE III. RESULT OF USER ACCEPTANCE TESTING ON SYSTEM FUNCTIONALITY

No.	System Functionality	Result	
		P1	P2
1	Sign up / login / log out	Pass	Pass
2	Textboxes are functioning	Pass	Pass
3	Can navigate to other pages from navigation menu	Pass	Pass
4	Menstrual dates can be added, updated and deleted	Pass	Pass
5	Periods can be tracked	Pass	Pass
6	Systems can be selected to be added, updated, and deleted.	Pass	Pass
7	Cycle phase are tracked according to period dates recorded	Pass	Pass
8	Notifications can appear when reminders are turned on	Fail	Fail
9	Educational content can be viewed	Pass	Pass
10	Username can be updated	Fail	Fail

Meanwhile, the following Table IV presents the results of usability evaluation based on the user interfaces of the app (based on Likert Scale agreement – from Strongly Disagree (1) to Strongly Agree (5)).

TABLE IV. RESULT OF USER ACCEPTANCE TESTING ON SYSTEM FUNCTIONALITY

No.	Usability Evaluation Criteria	Result		
		P1	P2	Average rating
1	The system is easy to use without any problem.	4	3	3.5
2	The system is easy to navigate.	5	5	5
3	The system feedback is interactive and understandable.	4	5	4.5
4	My overall interaction with the system is satisfactory.	3	4	3.5

The overall results of the test revealed several key findings. First, the user experience was generally positive; users reported that the application was easy to navigate and that all buttons functioned as intended. Second, while the educational content within the app was considered insightful, it was somewhat limited. Expanding this content by offering a broader range of information relevant to adolescents could significantly enhance the application's value. Lastly, although the user interface was deemed acceptable overall, participants encountered some difficulties with the cycle history section, indicating that improvements to this specific interface are necessary. Given that the target age group is 10 to 17 years old, simplifying this part of the interface would help ensure it is more intuitive and accessible for younger users.

VIII. CONCLUSION

This study presents the development and evaluation of FemHealth, a digital menstrual health intervention designed specifically for adolescents. Through an analysis of existing period tracking applications and feedback gathered from both adolescents and parents, the project identified critical gaps in age-appropriate educational content, usability, and design suitability. FemHealth addresses these gaps by integrating intuitive user interfaces, accurate cycle tracking, personalized symptom logging, and comprehensive menstrual health education tailored to young users. Application testing demonstrated that the app functions reliably across core features such as sign-up, period tracking, and content delivery. While the overall user experience was positive, the evaluation also revealed areas for further refinement—particularly in improving the usability of the cycle history interface and expanding the educational content library to better meet adolescents' needs. User acceptance testing affirmed the app's potential to enhance menstrual literacy and support self-management in a secure and supportive environment. In conclusion, FemHealth offers a promising approach to addressing menstrual health education among adolescents by combining accessible technology with relevant, developmentally appropriate content. Future work will focus on scaling the app's capabilities, enhancing content depth, and conducting longitudinal studies to measure its long-term impact on users' knowledge, behavior, and well-being.

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