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Hedhi Help

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DEPARTMENT OF COMPUTER ENGINEERING

Date: June 15, 2018

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ENTITLED

Hedhi Help

BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND ENGINEERING

Thesis Advisor

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Hedhi Help

by

Sarah Pagnani
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Brandon Smith
Sarek Sotelo-Jimenez

Submitted in partial fulfillment of the requirements
for the degree of
Bachelor of Science in Computer Science and Engineering
School of Engineering
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Abstract

A culture of social taboos and silence leaves many young women beginning menarche in isolation, without complete understanding of the changes occurring in their bodies. There is a widespread stigma surrounding menstruation all around the world. These stigma impose significant barriers to education and proper hygiene for young girls during a critical time in their lives. Not having the proper support and resources to manage this process, 1 in 10 girls in sub-Saharan Africa miss school during their period, and therefore are more likely to drop out altogether. In Kenya specifically, menstruating girls miss an average of 4.9 days of school each month, contributing to 37% of Kenyan girls completing secondary school compared to 46% of boys. This problem is compounded by financial barriers to accessing sanitary pads, especially for low-income Kenyan women, since only 35% of Kenyan women can afford sanitary pads independently. Recognizing this disparity, in June 2017, the Kenyan government pledged to provide free sanitary pads to all Kenyan schoolgirls.

Our team has utilized this opportunity to develop a culturally appropriate, Android-based menstruation education mobile application using Googles Android Studio- Hedhi Help. Aiming to empower Kenyan girls with the knowledge, support, and resources needed to take charge of their menstrual cycles and understand their bodies, the application has been developed with two end-users in mind: girls who have begun menstruating, and those who have not yet begun. The application features four components: (i) a period tracking calendar, (ii) a Facebook discussion forum, (iii) a resource connection page, and (iv) a menstruation education component.

The period tracker calendar utilizes the Google Calendar API to enable users to track the dates of their periods and predict future periods based on past entries. The Facebook discussion forum will be a dedicated Facebook page where girls can connect and communicate with others. The resource connection page uses the Google Maps API to find health clinics near the users current location to increase access to healthcare resources. The menstruation education component is comprised of three modules that utilize a storybook approach focusing on how the body changes prior to menarche, the purpose and process of menstruation, debunking myths and stigmas, and explaining proper menstruation self-care. The app does not require any internet connection after the initial download because users can create a personalized profile to use the educational modules and calendar functions without network connectivity. The core logic and all visual elements were coded using the Java and XML languages, respectively. Information regarding the users profiles is stored and managed with Google Firebase, and version control is managed with Github. This mobile app provides a frugal platform for delivery of menstruation education and access to healthcare resources to a large audience, empowering young women with the tools and knowledge to properly manage their menstruation and stay in school. This is an example of how mobile technology can be impactful when the appropriate app is developed for a specific population.

Acknowledgements

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We would like to thank Dr. Silvia Figueira, Associate Professor of Computer Engineering and Director of the Frugal Innovation Hub for trusting us with this project and for her assistance in its development.

Additionally, we would like to thank to our Public Health student partners, Arbelina Bebla, Mira Diwan and Elizabeth Smith who helped to develop the curriculum for our lessons and our phenomenal graphic designer, Kitty Kenyon, who worked on the graphic for each of our lessons.

Finally, we would like to acknowledge Esther Gatuma, the founder and president of the non-profit, Woman of Paradise, who partnered with us at the beginning of our development and helped us to narrow the scope of our project. She ensured we continually worked to meet our requirements.

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0.1 Introduction

Our goal was to create an interactive Android application aimed to young women. We believed this application could be used in an educational or community setting to teach these young Kenyan women about womens health, more specifically menstruation.

The application creates a platform for women to have discussions with each other and professionals regarding womens and their own health. Our intention is to eradicate the stigma associated with menstruation as well as to teach these young women about their strong and capable bodies.

Kenya was chosen as our focus point because the government is currently working on issues relating to women including the inability to pay for pads. Also, within the communities in Kenya there is a lack of womens education as well as misconceptions about menstruation and sex.

In order for our application to be successful, there were a couple organizational changes that we foresee. First, it may be necessary for the users to have a brief training on how to use the application. We also need connections within Kenya to help connect us to a local community or school and be in charge of the deployment of the application. Ideally, these connections could also work on training the users.

The community can benefit from the application through increased health education, return rate of female students, and decreased stigma of menstruation. We predict there will be costs and risks associated with this endeavor. We anticipate that the application has the potential to not integrate into society as effectively as we would hope. There is also the chance that there are negative reactions to the deployment of our application due to cultural differences and strong stigmas associated with menstruation. As well, we do realize that there is a language barrier between many of the women we hope to connect with through our application and our team. We hope that through the training and careful research we have done, we can minimize these risks.

Our main users are young women; preferably between the ages of 10 to 15, since this is the common age range girls begin menstruation. Within this category, we will split our users into girls who are menstruating and girls who are not menstruating. Each user category will interact in a slightly different way. Both user categories will learn important information through a number of lessons. The lessons we focused on are menstruation and reproduction. Within the menstruation lesson we address why women menstruate, what menstruation is, the benefits of menstruation, and the side effects of menstruating. The reproductive lesson focuses on the connection between menstruation and reproduction, warnings of pregnancy, causes of pregnancy, and teen pregnancy. This application also includes resources specific to womens health, such as sanitation resources and local clinics, based off the users location. In order to facilitate discussion between our users, we have also created a closed facebook group and linked it to our application.

In order to ensure the project was successful, there were a variety of criteria by which we evaluated our end product. First, we needed to make sure that the project was versatile and able to be developed and deployed in a variety of environments and platforms. By the same token, we also needed to ensure that the project was extensively tested in all these environments. Additionally, we needed to provide the proper documentation that detailed certain edge cases and described how to install, modify, and use the project.

0.2 Requirements

We have established three types of requirements to make sure that our system works and meets our client's criteria: functional requirements, which describe how our system will work; non-functional requirements, which describe how a system should behave; and design constraints, which provides limits on how our system operates.

0.2.1 Functional requirements

The system will:

- have a secure login portal for users
- have a storyline of accessible lessons explaining menstruation
- have a calendar to track menstrual cycles
- have resources detailing nearby clinics
- have support forum

0.2.2 Non-functional requirements

The system will:

- be intuitively usable for Kenyan audience
- have a pleasant visual design that soothes the user

0.2.3 Design Constraints

The system must:

- work on Android devices
- have a majority of functionality that works offline due to limitations in regard to internet access
- have ability to be in both English and Swahili

0.3 Use Cases

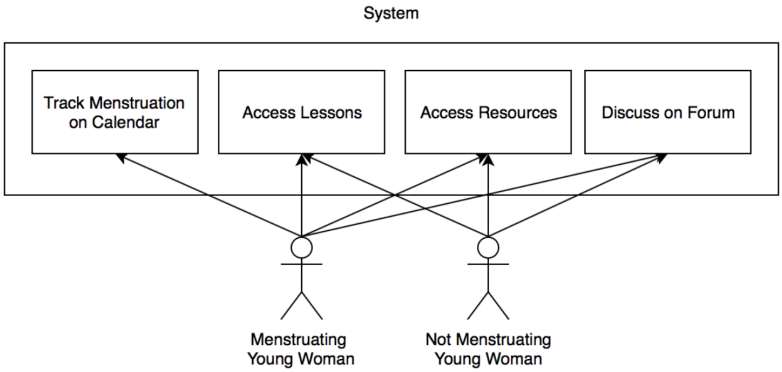

Figure 1: Use case diagram for the application showing the different actions different users can take.

0.3.1 Track Menstruation on Calendar

Goal: To track personal menstruation length and cycle length on calendar and predict future menstruations.

Actors: Menstruating Young Woman

Pre-condition: Current SCU COEN courses are updated on the database

Post-condition: The user is logged into the application

Steps:

1. Open app
2. Click on calendar module from home screen
3. Click settings or click start/stop menstruation button
4. In settings, edit cycle and menstruation lengths

Exceptions: If the user has noted that they are not yet menstruating they will not have access to this module.

0.3.2 Access Lessons

Goal: To learn valuable information related to the female body and menstruation

Actors: Menstruating and Not Yet Menstruating Women

Pre-condition: The user is logged in

Post-condition: The user now has access to the lesson plans in the application

Steps:

1. Open app
2. Click on lessons module from home screen
3. Click on lesson to explore
4. Tap through lesson
5. Return to lessons module home page

Exceptions:

1. N/A

0.3.3 Access Resources

Goal: Allow users to have access to nearby clinics and sanitary resources

Actors: Menstruating and Not Yet Menstruating Women

Pre-condition:

1. The user is logged in

Post-condition:

1. The user has access to nearby clinics with phone numbers and addresses accessible

Steps:

1. Open app
2. Click on resources module from home screen
3. Click one of the listed clinics
4. View clinic info
5. Click directions button
6. View directions information in the form of Google Maps

Exceptions:

1. If the user does not have wireless or cellular connectivity they will not be able to access real time directions

0.3.4 Discuss on Forum

Goal: Allow users to discuss potential questions and/or issues with peers

Actors: Menstruating and Not Yet Menstruating Women

Pre-condition:

1. User is logged in

Post-condition:

1. User can access Facebook forum via application and post/answer questions or comments

Steps:

1. Open app
2. Click on discussion module from home screen
3. View Facebook discussion forum

Exceptions:

1. If the user does not have wireless or cellular connectivity they will not be able to access the Facebook forum
2. If the user does not have a Facebook profile they will not be able to access the Facebook forum

0.4 Activity Diagrams

Activity diagrams represent the different actions different users can take.

0.4.1 Menstruating Women

Figure 2 shows the activity diagram for a user accessing the system under the use case of menstruating women. After a woman logs into the application, they will be presented with the application home screen. From the home screen, the user can track her menstruation, access lessons, access resources, and access the discussion forum. If the user decides to track her cycle she can either record her menstruation or view past menstruation information. She can then return to the home screen and access other modules. She can view the discussion forum which will bring her to an external page. If she decides to access lessons, she can view the lesson plan, then open the lesson, and finally complete the lesson. If she views the resources module, she can view nearby clinics, hospitals, or nearby sanitary product locations. From the home screen she can also decide to log out.

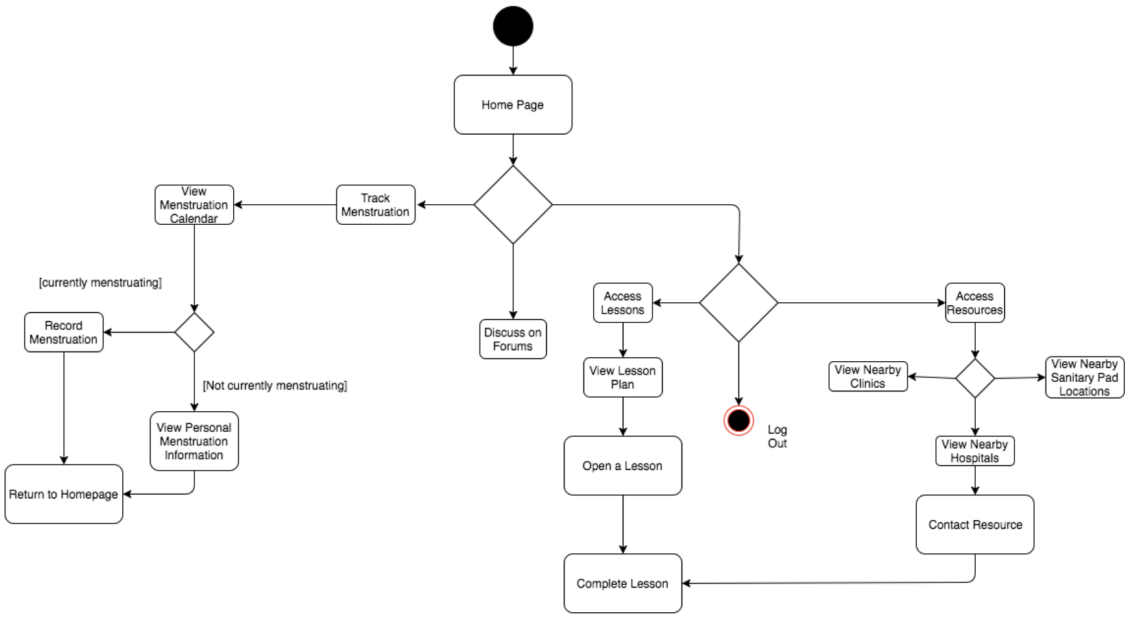

Figure 2: Menstruating women activity diagram for the application.

0.4.2 Not Yet Menstruating Women

Figure 3 shows the activity diagram for a user accessing the system under the use case of not yet menstruating women. Same as the previous use case, a user will be presented with the applications home screen after they login. From the home screen, the user can access lessons, resources, and the discussion forum. She can view the discussion forum which will bring her to an external page. If she decides to access lessons, she can view the lesson plan, then open the lesson, and finally complete the lesson. If she views the resources module, she can view nearby clinics, hospitals, or nearby sanitary product locations. From the home screen she can also decide to log out.

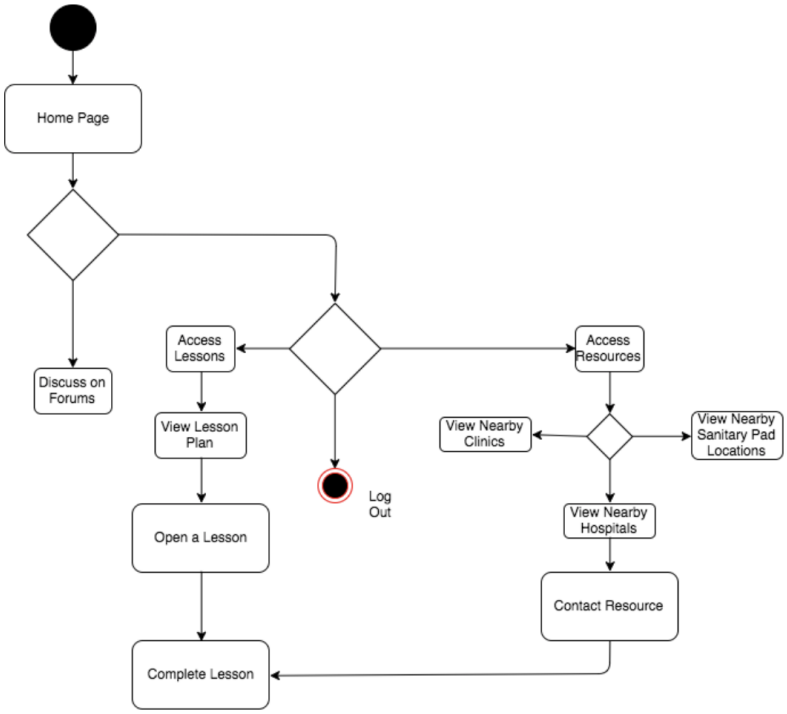

Figure 3: Non-menstruating women activity diagram for the application.

0.5 Technologies Used

- Github: Github is a web-based version control software. It provides the version control functionality of Git in addition to access control.
- Firebase: Firebase is a mobile platform designed by Google to provide high-quality and safe components commonly used in mobile development.
- Java: Java is a class-based, object-oriented language designed for general-purpose use.
- SQLite: SQLite is a relational database management system used to provide local, embedded databases into the final program.
- XML: Extensible Markup Language is a markup language designed to be easily read by humans and machines alike. It provides a set of rules to encode documents.

0.6 Architectural Diagrams

Because our target demographic primarily uses Android devices, we decided to develop a native Android application to ensure that it runs smoothly. In line with standard Android development, we used Android Studio as our main IDE and platform for building, installing, and debugging our application. Our login page and our online database storage is managed using the Authentication package from Google's mobile platform, Firebase. Firebase allows for our app to manage user profiles with a username and password, and have a bit of insight into the users of our app. The rest of our app's functionality is managed using native android components with the exception of mCalendar, which is an open-source project that we used to implement our calendar module. The menstrual information that our calendar module keeps track of is persisted on the device using the SQLite database system, which is native to Android development. In order to cover multiple languages, we provide two resource files for each of the strings displayed in our application: one for users using English as the primary language on the Android device, and one for users using Swahili as their primary language. The users can switch between these languages simply by changing the language of their device, and the app's text will be switched from one resource file to the other.

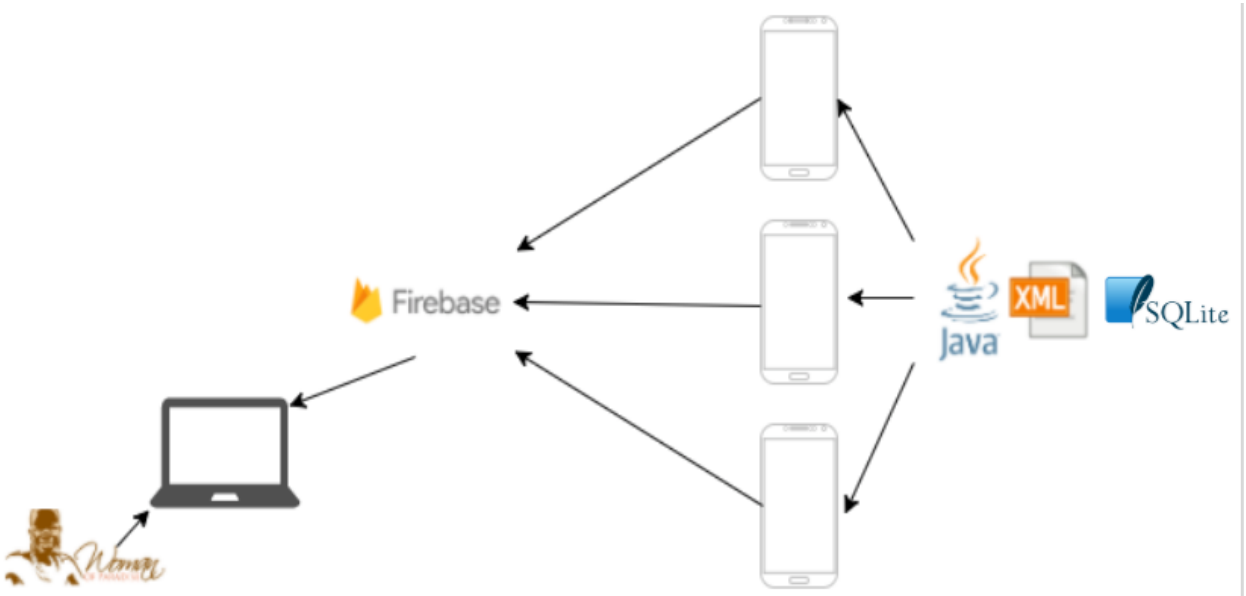

Figure 4: Native system architecture for the application with Firebase connectivity.

0.7 Design Rationale

We have established three criteria as the basis for our Design Rationale: Justification for UI, which describes what led us to our UI design; Justification for Technologies Used, which describes why we use the technologies we're using; and finally, Justification for Technologies Not Used, which describes why we aren't using those technologies.

0.7.1 Justification for UI

- Our project emulates the homepage and login screens found often on mobile applications, drawing influence in particular from the Stanford Healthcare myHealth mobile application. The rest of the screens are designed to convey each module's functionality simply and intuitively to the user.

0.7.2 Justification for Technologies Used

- Github: Github allows us to collaborate on a common codebase across many different computers. This also gives us the freedom to roll back changes made if they introduce more bugs than fixes.
- Firebase: Firebase allows us to collect data from our users in order to give Women of Paradise information on the number of users using our application as well as average age.
- Java: We used Java as to handle our logic since Java is the native language for back-end development on the Android platform.
- SQLite: We used SQLite in order to create local databases on the Android device in order to persist data between sessions without requiring a connection to the Internet.
- XML: We used XML to manage the layout of each one of our screens because it is the native front-end language for Android development.

0.7.3 Justification for Technologies Not Used

- We chose not to use any technologies typically used for Web Applications that work across all mobile platforms because we wanted to ensure a native experience for our target audience, which primarily uses Android devices.

0.8 Description of System Implementation

0.8.1 Original Requirements and Scope Changes

When we first started developing our solution, we believed we had a solid idea of the numerous issues we hoped to solve in the application. We had planned to have two types of users that we were going to cater the application to, young boys and young girls. We thought it important we educate the young boys as well, in order to help reduce the bullying that occurs toward menstruating women. However, these two users vary greatly in needs. The original application was going to just be a education application for the boys with a separate discussion forum and maybe the resources page, as well. And the girls would have access to their education section, as well as the resources page, calendar period tracker, and separate discussion forum. It wasnt until we were introduced to Esther Gatuma and partnered with the non-profit, Women of Paradise, that we began to fully understand the gravity of the issue at hand and we were able to adjust our application design and requirements accordingly. Esther is the founder and President of her non-profit Women of Paradise. Her non-profit focuses on empowering girls and women with the tools they need to protect their families and build healthy communities free from poverty, illiteracy, hunger, disease and abuse of human rights. Esther herself growing up in Kenya was privy to the severity and numerous consequences of the lack of education and support for menstruation. She exposed us to the many hurdles that women in Kenya face when they begin menstruating. Her biggest suggestion was to alter our target users. She informed us that it really wasn't the young boys that were bullying the menstruating girls, it was the not yet menstruating girls doing the bullying. From here we altered the application requirements to look at educating both menstruating and non-menstruating girls in a story like modulus to keep them engaged and put a relatable image to what each women was or would soon be going through.

0.8.2 Final Design

After settling on our final set of requirements we began developing an application that was intuitive to use and had a pleasant design. We also ensured that most of our features work off-line, in order to accommodate for the spare wifi access in many parts of Kenya. The application opens up to a login screen where users can log in to the application. The login page is shown in Figure 5 on the next below.

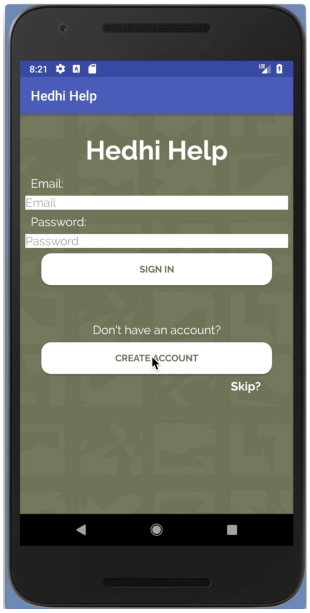

Figure 5: The login page

If a user does not yet have an account there is an option to create an account on that login page as well. The create an account page is shown in Figure 6 below.

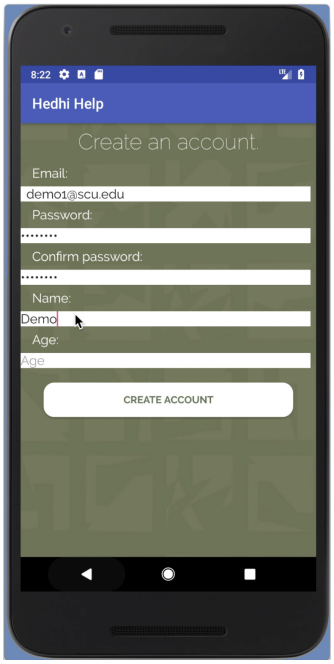

Figure 6: The page where a user can create a new account.

If a user is not in a location with wifi access, but still wants to access the off-line features that are available in the application, there is a skip button on the login page that allows one to bypass the creating an account requirement. After logging-in or skipping, the user is brought to the main menu. From here they can see all the functionality available on our application. The menu screen can be seen in Figure 7 below.

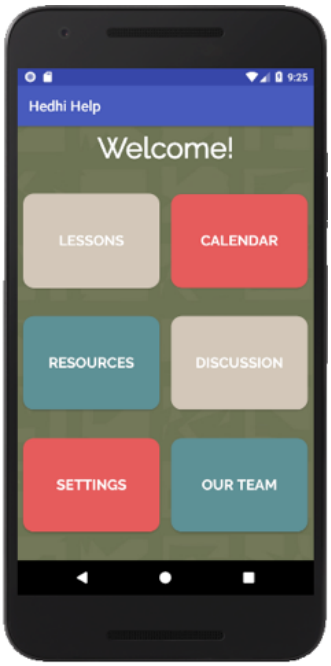

Figure 7: Menu Screen

From the menu screen, each user can select any of the functions of the application. If the user selects the Lessons Button, she will be brought to the lessons menu screen seen in Figure 8 below. Then the user can select a lesson from the menu and proceed to complete the selected lesson. An example of a screen from Lesson 1 is shown in Figure 9.

Figure 8: Lessons Main Menu

Figure 9: An Example of a Page from Lesson 1.

The next component of our application is the calendar period tracker. A user can track their menstrual cycles using the calendar. A user can specify in the calendar settings the length of her typical period and the number of days in her cycle. After completing that information, she simply selects the day on the calendar that she began her period for the month and clicks the ”Start Period Tracking” button. The program fills in the days she was on her period based on her settings. Additionally, a user can scroll to the next month to see the projected start day of her next period again based on her settings. The calendar view can be seen in Figure 10 below.

Figure 10: Lessons Main Menu

The next component of our application is the resources page. This provides the users with information on the top clinics in Kenya. The users will first see a menu which lists all the clinics names and then once they click on a specific clinic, they will be brought to the clinic information page. This will provide them with the name, address and hours of operation for each clinic. If a user is connected to wifi and wishes to get directions to that clinic, they can click the get directions button which will bring them online to a Google Maps page. The resources menu list is shown in Figure 11 and an example of a clinic information page view is shown in Figure 12.

Figure 11: List of all the Top Health Clinics in Kenya

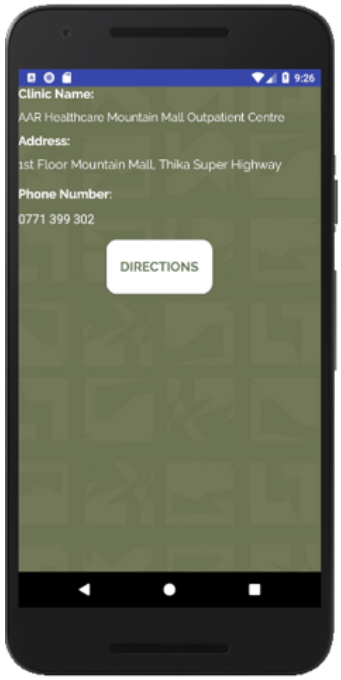

Figure 12: Example of a Clinic Information Page

The final component of our application is the discussion page. This gives the users a place to share stories and ask one another questions. One of our goals was to build a community within our user base and we believe the discussion forum helps to do just that. When a user selects the discussion forum button from the menu screen, she will be brought to a Facebook page that is the platform for the discussion. A view of the Facebook page created for discussion is shown in Figure 13.

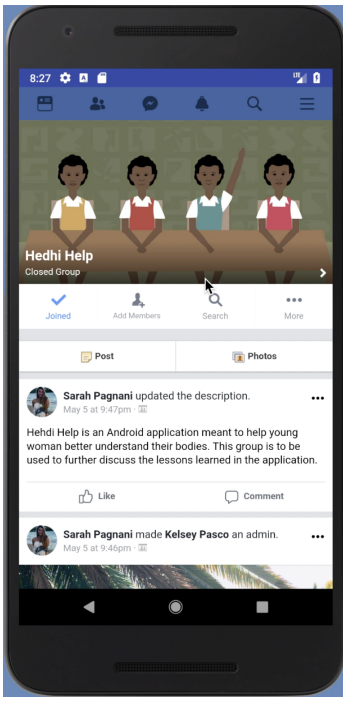

Figure 13: Discussion Forum Page using Facebook Page as the Platform for the Discussion

0.9 Societal Issues

0.9.1 Ethical

Hedhi Help as a culturally appropriate menstruation education app is contingent on the inclusion of considerations of cultural beliefs and practices into the app's content. From the graphics to the wording to the usability of the app, it takes into consideration how the end-user might perceive the content they are using. To do this successfully, app development was guided by the input of professionals in public health, menstrual health, and tech development for populations across Africa. Research and informational interviews were conducted to discover insight which informed app design and included functionalities. Not doing so runs the risk of developing an app lacking relevancy and compromised efficacy, which are important considering the stigmatized nature of menstruation.

0.9.2 Social

The culture of social taboos and silence that exists in Kenya surrounding menstruation, combined with an incomplete understanding of the changes occuring in their bodies, leaves many young Kenyan women beginning menarche in isolation. This stigma imposes significant barriers to education and proper hygiene for young girls during a critical time in their lives. The silence around menstruation starts at home, with 50% of Kenyan girls reporting that they do not feel they can openly discuss menstruation at home, and only 12% saying they feel comfortable receiving menstruation education from their mothers. Knowing this, Hedhi Help provides a frugal interactive platform to deliver needed menstruation education. In addition, it creates an opportunity to reduce menstruation stigma by connecting users together and building a support system within app users. Hedhi Help is designed to empower Kenyan girls with the knowledge, support, and resources needed to take charge of their menstrual cycles and understand their bodies and ultimately encourage them to stay in school. Increasing perceptions of normalcy of menstruation for app users will hopefully, by proxy, extend to their communities.

0.9.3 Political

Hedhi Help can aid in taking full advantage of recent legislation passed by the Kenyan government to improve menstrual health. In June 2017, the Kenyan government pledged to provide free sanitary pads and safe disposal to all Kenyan schoolgirls with the signing of the Basic Education Amendment Act signed by President Uhuru Kenyatta. This pledge is part of the countrys decade-long history of progressive menstrual policies including the repeal to value added tax on pads and tampons in 2004 and budgeting of funds to distribute free sanitary pads to low-income girls in rural communities since 2014. For the 2017-2018 year, it has been reported that $5 million has been budgeted to buy and distribute sanitary pads for low-income girls, which is $1 million more than the 2016-2017 financial year. To be able to do this, the government has partnered with charities and NGOs like ZanaAfrica Foundation to provide these sanitary pads for schoolgirls around the country. Hedhi Helps educational modules and connection to resource pages have the potential to educate Kenyan schoolgirls to utilize their newly acquired access to subsidized pads and connect them to local health resources like clinics. This will not only help to assist low-income women have access to resources that they otherwise couldn't afford, but will also improve the relationship with the government as part of this outreach.

0.9.4 Economic

There is a substantial economic impact that comes as a result of Kenyan women's lack of access to sanitary products and basic menstrual health resources. 96% of working-aged women report that they regularly miss work as a result of having their periods. This a staggering portion of the workforce that must take time off because they don't have the resources that they need. Not only does this hurt the country's economy, but more importantly, it hurts the earning potential of working women. Many factors play into this figure as well, such as the lack of education about period health, as well as the prevalant social stigma. Ideally, Hedhi Help would be able to tackle some of the barriers that exist for women in the Kenyan workforce, and in doing so, allow them to better provide for themselves or their family. By giving women easier access to needed health products, connecting them with other women in their communities, and educating them about proper menstruation health, we hope to empower them to have more control of their economic futures.

0.9.5 Health and Safety

One of the most straight-forward goals of Hedhi Help is to get sanitary products and menstrual health education into the hands of Kenyan women. Beyond any auxiliary effects of the app, the primary goal is to improve women's health in Kenyan, to ensure that they know the best ways to take care of themselves during menstruation. This is the most important objective of the education modules, which will walk the women through the lesson plans describing common health practices. This will enable the women to improve their self care and overall health knowledge. On top of this, a portion of the modules will focus on debunking harmful myths surronding periods. The aim is to make sure the women are equipped with the skills to avoid any unsafe or risky practices of dealing with menstruation that may arise from a lack of knowledge. They will also be able to locate healthcare clinics in Kenya that can put them in contact with experienced healthcare professionals. The professionals, in turn, will be able to pass on even more wisdom regarding health and safety practices. Additionally, the discussion page will hopefully enable them to form a safe and welcoming community of women with similar experiences.

0.9.6 Manufacturability

This is a much less important consideration for our project due to the nature of app deployment. This app is mainly intended to be used on existing Android devices in education centers or health clinics as a part of deployment with Women of Paradise. This means that these locations will be able to easily, and freely, download our app onto their devices, and there will be no manufacturing costs as a result.

0.9.7 Sustainability

One major aspect of sustainability is the longevity and reusability of a product. This has been a key consideration of Hedhi Help, as the longer the app can be used, the more it will increase its impact in the area, and reach a greater number of women. The app was designed with a simple and intuitive design, to attempt to make it accessible across language barriers. Our target language has been Swahili, but this could easily be converted to regional dialects or different languages entirely. The hope is that in future work on this app, we can expand from just the area of Kenya into nearby countries who are possibly facing similar issues. By trying to make the app adaptable for multiple locations, we can extend its lifespan and ensure it can make it into the hands of more women.

0.9.8 Environmental Impact

Similarly to the Manufacturability aspect of our design, the environmental impact was not a focal point of our design. As a mobile application, there is no need for any sort of physical deployment. All that the app will require is to be downloaded to a phone already at the education center. It will not being consuming resources or producing any harmful elements into the environment around it.

0.9.9 Usability

One of our initial requirements for our application was that it be intuitive for the users. We accomplished this my having an easy to maneuver application with a simple menu screen. Additionally, our lessons all followed a storyline and they each relied heavily on images over text to ensure all levels of education can still learn from our application. The final feature that greatly contributes to the usability of our application is the translation function. Our application has the ability to switch between English and Swahili, the two most common languages spoken in Kenya. Depending on the language preferences set in a user's phone, the application will pull the text from the translated text file that corresponds to the phone's language preferences. All of these additional features contribute the usability of our application.

0.9.10 Lifelong Learning

Being an interdisciplinary project by nature, we had to learn from and work with three public health students who helped us develop the curriculum for the application. They helped to educate us on the many challenges that young women in Kenya face as they begin menstruating. Additionally, our engineering team was comprised of two women and two men. Given that the application is predominantly about menstruation and women's health, the two men in the group were able to learn a great deal about women's health throughout the development process. Additionally, on the technology side, none of us had worked in Android development before. We all had to teach ourselves and one another how to develop in this new environment. All of these opportunities for growth in knowledge contributed to a greater understanding of the importance of lifelong learning.

0.9.11 Compassion

Period stigmatization is a significant problem and prevents girls from reaching their full potential. Fearing talking about menstruation, girls receive inadequate information about puberty, menstruation, and proper hygiene management or channels for support. In Kenya specifically, menstruating girls miss an average of 5 days of school each month, contributing to 37% of Kenyan girls completing secondary school compared to 46% of boys. This issue also is worsened due to financial barriers to access sanitary pads and misinformation about menstruation maintenance. Only 35% of Kenyan women can afford sanitary pads independently and many resort to seeking out boyfriends or favors

to obtain their sanitary pads. Those that cannot afford pads may resort to unconventional and unsanitary substitutes for a sanitary pad such as using chicken feather, old mattress stuffing, or newspapers. The recent commitment by the Kenyan government to provide subsidized sanitary pads to its schoolgirls is an important step in the movement to address menstrual health; however, technology has the opportunity to contribute to this movement immensely. A mobile app offers a mechanism for menstruation education and access to health care resources to a large audience in a frugal manner to empower girls with the knowledge and education they deserve.

0.10 Conclusion

0.10.1 Summary

Our group aimed to create a solution to eliminate the stigma associated with menstruation and the female body in rural Kenya. We developed an Android mobile application that would allow young woman to learn about menstruation and their bodies through a lesson plan, track their menstruation cycles, and reach out to others for help or answers to any questions that may arise. We made much of the functionality of the application available offline after the original download in order to ensure continuous access to the material presented to these young woman.

0.10.2 Obstacles encountered

Throughout the course of this project, there were some difficulties encountered. Our team was not familiar with Android Studio, the software used to develop this application, which presented a learning curve. Our greatest obstacle was communication. We were working with many different people and groups to make this application possible; therefore, communication was key to make the development of this project smooth. We overcame this obstacle through weekly meetings, team drives, and biweekly updates. Lastly, within communication, we had to clarify our requirements with Esther who was not always available since she does have a full-time job and is in a different time zone then us.

0.10.3 Lessons learned

We have learned some lessons from the aforementioned difficulties. Firstly, we learned how important it is to have open lines of communication with your teammates. We had three different student teams, two advisors, and Esther to communicate with constantly throughout the process. It was essential that everyone was on the same page and producing the material that was discussed in a timely fashion. We also learned more about project management. We took on this project as a team of computer engineers but had to facilitate an environment of management to ensure everyone was completing tasks and communicating. This application started as an idea and we were able to use our knowledge of project development and management to bring it to life.

0.10.4 Future Work

We plan to continue to collaborate with Woman of Paradise. Esther and her team have been such great mentors to us. They were also one of the reasons we decided to aim our original application in rural Kenya, a place Esther is very familiar with. Through out relationship with Woman of Paradise, we plan to deploy the application in Kenya and gain feedback from the women in this region. Once we receive this feedback and update our application in appropriate ways, we hope to eventually expand into other regions where stigma associated with menstruation and the female body exists.

0.11 References

This section shows a list of our references that we utilized in order to develop the curriculum for our lessons.

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