

Original Article

# Mobile Application for the Treatment of Overweight and Obesity in Persons

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**Abstract** - Overweight and obese is one of the most constant health problems of people showing many difficulties in developing physical activities, contributing to a variety of diseases such as diabetes, hypertension, and gallbladder disease, among others. The main objective is to develop a mobile application so that people can have treatment for overweight and obesity; it was developed with the scrum methodology, which had five phases (meeting planner, sprint backlog, daily meeting, review of the sprint, feedback from the retrospective) this was part of the mobile application. The results of the solution of the five phases were shown, indicating the efficiency of each sprint defined and completed on time; finally, this project will be validated by the seven expert specialists in the areas of Realism, Integration, Adaptability, Technology, Innovation, Functionality, Usability showing high quality in the product, ensuring the satisfaction of the integration of the mobile application with a 94% approval. Finally, the conclusions showed that the project developed with the efficiency of solving the problem of overweight and obesity, being a great contribution to society and allowing to take care of people's health and reduce this disease.

**Keywords** - Figma, Hyperactivity, Mobile application, Obesity, Overweight, Scrum.

## 1. Introduction

Currently, all countries are suffering from overweight and obesity, which has led to a general concern in health, considering that most people do not do physical activities regularly and are not eating correctly. This has been generating an abnormal increase during the last few years.

Being overweight and obese constitute very serious health problems for people, with difficulties performing physical activities and developing diseases such as diabetes, hypertension, gallbladder diseases, cardiovascular diseases, cerebrovascular accidents and others. In the last 30 years, an irrelevant increase generated overweight in the entire population, especially in first-world countries such as the United States and England, indicating that most people have this problem from 5 to 20 years of age. Researchers indicate that obesity and overweight reduce life expectancy by up to 10 years and are associated with cardiovascular and metabolic problems [1][2]. Overweight people have daily stress problems than normal weight people due to discrimination and prejudice and experience emotional eating, so they turn to unhealthy foods to feel good or relieve feelings [3][4].

The rate of obesity and overweight in Latin America has been increasing in recent years, yielding results of epidemiological medical studies that have evidenced most of

the 70% of older adults in Mexico are overweight and obese; this has been bringing consequences to different chronic diseases such as cardiovascular disorders, diabetes, among other diseases. Several studies have reached that one of the problems is that people spend more than 3 hours in front of the TV 10 to 18 years of age; another consequence where this cause also sees it is due to the increased time that people use cell phones, tablets and computers [5][6]. In August 2020, the countries of Brazil, Mexico, Peru, Colombia and Chile were in the top 10 countries with the most confirmed cases of obesity and overweight. With the coronavirus pandemic, patients suffering from this disease were hospitalized mostly from Latin America currently has the highest rate of obesity and overweight [7][8].

In Peru, a demographic and family health survey (ENDES) showed that 35.5% were overweight, but this survey was carried out on all people over 15 years of age, and 18.3% of women had the same disease [9][10]. Some identified problems of overweight and obesity are social factors, dietary behavior, and mental health disorders. In recent years, there has been no monitoring of people suffering from this disease, which can lead to human losses. If overweight and obesity are not treated in time, this can lead to chronic diseases in the future in children, adolescents and older people [11][12].



As a solution, it is proposed to make a mobile application for people with overweight and obesity to improve their eating habits, along with physical activities, will be with the Scrum methodology that will serve to perform the work in an orderly, collaborative and flexible the adoption of new requirements for change and finally be evaluated by experts to indicate the satisfaction of the application.

It is very important to carry out this type of project for society and solve the problems of people, especially people with overweight and obesity, because nowadays it is necessary to have nutritional care to avoid diseases, that is why we have the objective of making a mobile application for people with overweight and obesity. This work will be carried out with the following, section II will show the literature review, section III was the methodology, section IV will show the results of the project developed, section V were the discussions of the project and finally, the conclusions and future work that corresponded to section VI.

## 2. Literature Review

Technologies such as mobile applications are very important to solve the problems of users or make entertainment using their mobile devices, as it is also important for the project to develop applications to solve the treatment of overweight and obesity in order to reduce the data that are very high in recent years and change their eating habits. That is why this author is based on making a mobile application for adolescents aged 12 to 18 years to improve their eating habits and physical activities, showing a 62.6% efficiency in improving their state of life [13]. It is known that through mobile applications have become a potential and useful platform for; this the author develops a mobile application for the control of children and adolescents who have the evaluation as overweight, having the option to contact a doctor for control established for their physical activities and have a healthy diet [14]. This author developed a mobile application with internet access to notify his patients of their weight control with the objective that the doctor is constantly aware of the patient with quick calls and text messages and, as a result, shows the efficiency of weight loss in people and an increase in muscle mass [15]. The author developed a mobile application for a balanced diet, which would help to have more control over their food of people so they do not fall the overweight or obese way it was built with the following tools: Android Studio IDE, Java was the programming language for the program logic, with web services processes and the database that was developed with MySQL [16]. The author mentioned that the priority of developing the mobile application was to have better nutrition for people and to prevent overweight and obesity.

This is why, according to the author, a mobile design was made to be able to see the health intervention of people affected with obesity or overweight so that people can

improve their participation with the mobile application [17]. Mobile designs have become important for users as it is necessary for it to be understandable from the perspective of the user who will use the mobile application, as this will allow end users to understand how it works and what functionalities it will provide [18]. According to the author, mobile designs are important to know how the mobile application will be developed, taking into account that Flutter, React Native, Xcode and Android Studio are also used; this helps us to improve the part of the interface through the responsive and can be accessible to end users [19]. Taking into account the mobile designs proposed by the other authors, it was taken into consideration to make a mobile design through the interfaces according to the needs of the treatment for overweight and obesity, giving solutions for people suffering from this disease.

According to the author, the scrum methodology is more used for an agile environment, allowing more flexible communication, reducing errors in the software, allowing use by sprint, and generating changes on the requirements for the development of the project. This also has a work team which is identified scrum master, development team and product owner, which makes it possible for the system to be an agile environment [20]. It is also good for teaching students, professionals, among others. Scrum is known for project management both in companies and educational sites, allowing to have a wide knowledge when managing or leading the implementation of the project for industries, education or daily lives [21]. Taking into account the authors on scrum, it will allow to have a better organization at the time of developing the mobile application and to be able to make feedback to improve, that the work team has better communication and there are no problems at the time of developing the management of the project.

These authors show the importance of their mobile application development, as design proposals to satisfy the user, as well as agile methodologies to solve any project management based on software development, having as a main priority the motivation to develop projects dedicated to the treatment of overweight and obesity, using mobile and web applications.

## 3. Methodology

For the development of the mobile application was developed with the scrum methodology, allowing to have better consistency when managing the software development time, having a better organization when communicating with the work team, which has 5 main phases: meeting planner, sprint backlog, daily meeting, sprint review, retrospective feedback.

### 3.1. Scrum

The scrum methodology is an agile framework that has a set of best practices that is dedicated to performing their

work collaboratively with group techniques to obtain better results in the projects [22]. This methodology is performed with functional deliveries of the final product so that the user can interact with their software and find improvements to find their satisfaction [23]. Scrum is dedicated to any type of work, being very guaranteed for complex projects with the ability to adapt to change in their production, which is why it works with small teams that are responsible for collaborating, providing a plan of values, roles and guidelines, for their concentration and continuous improvement [24][25] as shown in Figure 1.

### 3.1.1. Planning Meeting

The meeting celebrates the beginning of each scrum, allowing the whole team to participate in the inspection of the product backlog, helping the product owner to know about the product backlog updates during the meetings so that the development team can take care of estimating and qualifying the necessary elements [26]. It is divided into two parts: the planning meeting on the "What" will be done in the sprint and the second part on the "How", in which the product owner will be responsible for organizing and directing the development team, the planning of the first phase is 8 hours for each sprint [27][28].

### 3.1.2. Sprint Backlog

The main objective of the sprint backlog is to maintain transparency within the project development, to review the evolution of the work and the risk analysis which will be necessary and which does not meet the requirements for the functionality of the project [29][30]. This is important for any work tracking to calculate the probability of achieving a sprint goal and decision making in which the tasks that have not yet been started, the tasks that have already started and the tasks that each participant is responsible for developing, the tasks that were completed, will be coordinated [31][32].

### 3.1.3. Daily meetings

The third phase, which is the daily meetings, are meetings that last 15 minutes in which only the development team will participate. In this meeting, the following questions will be coordinated: What was done to contribute to the sprint? How will it be done to contribute to the sprint? Was there any impediment at the time of delivering the work? [33].

### 3.1.4. Sprint Review

This phase has the main objective of evaluating each sprint, taking about 3 to 4 hours to evaluate. The work team must hold a meeting to verify the progress of each sprint in order to be accepted for each sprint and continue with the next process until the final product is completed [34][35].

### 3.1.5. Retrospective Review

This last phase is in charge of verifying the good and bad practices during the project in order to know the attitudes

that the work team had during the work so that in the following projects, they can take into account the incidents and minimise the work limitations [36][37].

## 3.2. Technological Tools

This part of the work will show the technological tools to develop the mobile application.

### 3.2.1. Kotlin

It is a mobile programming language that, in recent times, has become popular for the creation of Android mobile applications; kotlin is interoperable with Java code, which allows it to be able to migrate to any project [48] gradually. One of the benefits of kotlin for mobile development is that it has different architectures for development, which are MVVM, MVC and MVP [39].

### 3.2.2. Trello

It is an open software that anyone can use for project management administration, which can be used with the Scrum methodology, Kanban, and rup, among others [40]. Trello also allows us to have a better organisation when making software for companies [41].

### 3.2.3. Android Studio IDE

It is a tool that allows the development of mobile applications and web pages, among other things, which works with Android operating systems and has greater flexibility. It is also compatible with gradle, which is important when compiling, allowing for better automation and more flexibility [42][43].

### 3.2.4. Firebase

This is a Google platform that is a database that is in the cloud, allowing connection in web and mobile applications. Firebase was created with the intention of being able to store information in the cloud, allowing the management of data to be more accessible at the time of the operation of web and mobile applications. One of the benefits of Firebase is in development, growth, monetisation and analysis [44][45].

### 3.2.5. Figma

It is an editor for prototyping web and mobile pages and vector graphics, creating advertisements for social networks, and even creating company presentations [46]. One of the benefits that help is that it can be used for cooperative work; it does not need updates as it is online [47].

## 4. Results

In the section had different types of integration for the results of the work done, conducting planning meetings for the incorporation of the user stories of the mobile application, then continuing with the results of the sprint backlog where the user stories will be ordered with each sprint.

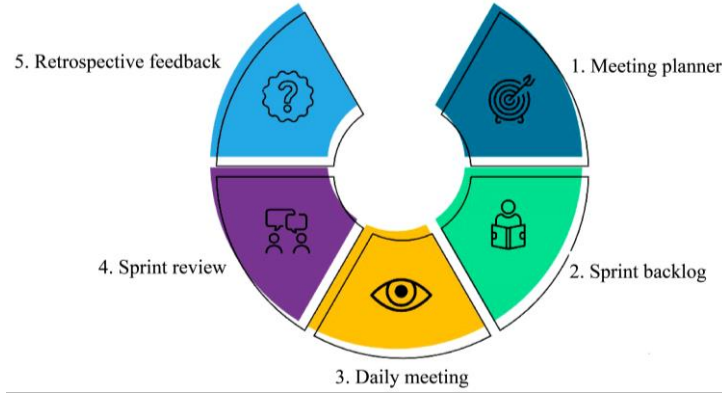


Fig. 1 Scrum methodology

Table 1. Backlog

ID	User History
H1	As a user, I need to register my personal data to log in to the mobile application.
H2	As a user, I need the password recovery option to avoid losing my account.
H3	As a user, I want to log in to access the mobile application.
H4	As a user, I want to edit my profile to be able to change my personal details.
H5	As a user, I need to register and update my current weight to obtain a list of treatments.
H6	As a user, I need to view the list of treatments to check the routines according to my registered weight.
H7	As a user, I need to display a guide on the screen for each routine to perform the treatment correctly.
H8	As a user, I need to have a diet list every day for better weight control.
H9	As a user, I need to have a calendar of activities to visualise the treatments of the day.
H10	As a user, I need a graphical report of each treatment to visualize the daily, monthly or yearly progress.
H11	As a user, I need to have a virtual advisor to help me and advise me on the treatments to solve my doubts.

Table 2. Sprint planning

ID	User History	Weeks	Sprint
H1	As a user, I need to register my personal data to log in to the mobile application.	2 Weeks	Sprint 1
H2	As a user, I need the password recovery option to avoid losing my account.		
H3	As a user, I want to log in to access the mobile application.		
H4	As a user, I want to edit my profile to be able to change my personal details.		
H5	As a user, I need to register and update my current weight to obtain a list of treatments.	3 Weeks	Sprint 2
H6	As a user, I need to view the list of treatments to check the routines according to my registered weight.		
H7	As a user, I need to display a guide on the screen for each routine to correctly perform the treatment.		
H8	As a user, I need to have a diet list every day for better weight control.	4 Weeks	Sprint 3
H9	As a user, I need to have a calendar of activities to visualise the day's treatments.		
H10	As a user, I need a graphical report of each treatment to visualize the daily, monthly or yearly progress.		
H11	As a user, I need to have a virtual advisor to help me and advise me on the treatments to solve my doubts.		

**4.1. Results Planning Meeting**

The work team held a meeting to implement the user stories, analyzing and captivating the mobile application's functionality. This served to give an idea of how the application works, with 11 user stories for their respective operation, as shown in Table 1.

**4.2. Results of the sprint backlog**

Once Table 1 shows the 11 user stories, we started to make the results of sprint backlog where which allowed us to group each sprint with each user story to have a respective order with their respective time; in total, there were 3 sprints where sprint 1 took the time determined 2 weeks, sprint 2

was calculated 3 weeks, sprint 3 was developed in 4 weeks as shown in Table 2.

It will show the complete development of the 3 sprints indicating the respective user stories showing the mobile application's functionality.

**4.2.1. Sprint 1 (H1)**

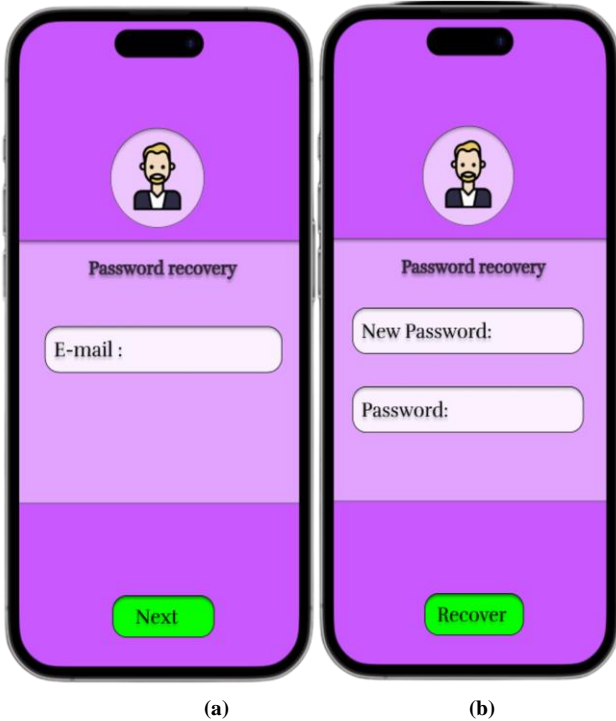
The mobile application in Figure 2 shows the startup at the moment of clicking on the screen and starting the process (a); if the user does not have an account, he/she can register correctly with his/her personal data to create a new account for the treatment (b).



(a) (b)  
**Fig. 2 Mobile application registration: (a) Start application (b) Register**

4.2.2. *Sprint 1 (H2)*

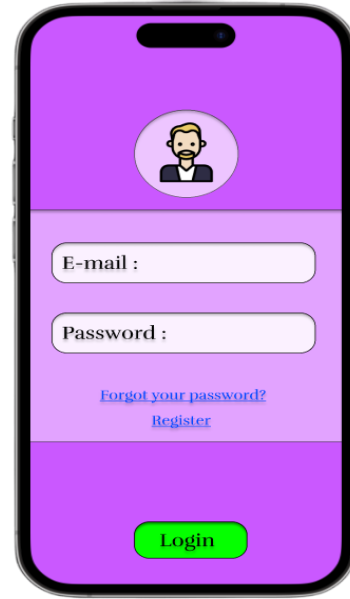
Figure 3 shows the correct way to recover a password when going through a forgotten password incident; the user must enter his registered email (a), and finally, the user can reset his password without any problems (b).



(a) (b)  
**Fig. 3 Password recovery: (a) Enter your email address (b) Enter a new password**

4.2.3. *Sprint 1 (H3)*

The application session in Figure 4 will allow users to enter their registered email and password to log in to the mobile application.



**Fig. 4 Start section**

4.2.4. *Sprint 1 (H4)*

Figure 5 shows that the user will be able to edit his profile by clicking on the configuration button. A list of options will appear (a), and the user should click the edit profile button. A new window will appear where the user can edit his registered data (b), fulfilling the objectives of changing the personal data.



(a) (b)  
**Fig. 5 Edit profile: (a) Setting options (b) User editing his registered data**

4.2.5. Sprint 2 (H5)

In Figure 6, the user, once connected to the mobile application, can register his weight and height so that the application can search for the appropriate treatments based on what he has registered.

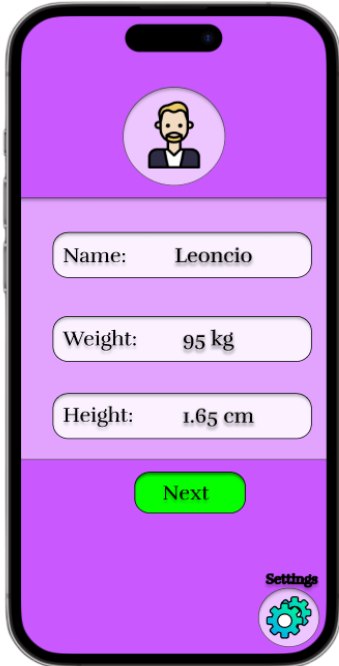


Fig. 6 Weight and height registration

4.2.6. Sprint 2 (H6)

Figure 7 shows the appropriate routines according to the recorded weight indicating the 4 routines to perform each day to lose weight.



Fig. 7 Routines

4.2.7. Sprint 2 (H7)

Figure 8 shows the example of the four routines according to the registered weight in which the user must comply with the estimated time of the routines to perform correctly with the treatment. Also, the user can recommend the routines by clicking on the number of stars (a) indicates routine 1, which is about doing push-ups that must be completed in 30 seconds, (b) indicates routine 2, which is about doing squats which must be completed in 30 seconds, (c) indicates routine 3 which is about doing sit-ups in 30 seconds, (d) indicates routine 4 which is about running for 4 minutes.

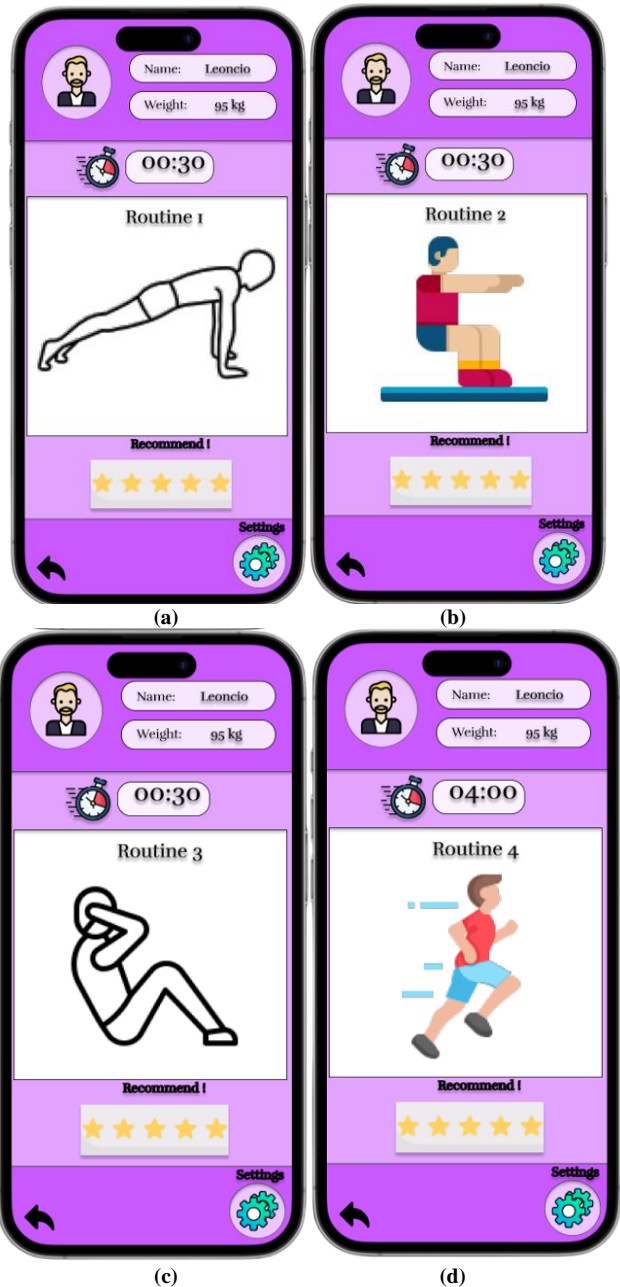


Fig. 8 Examples of routines: (a) Routine 1 (b) Routine 2 (c) Routine 3 (d) Routine 4

4.2.8. Sprint 2 (H8)

Figure 9 shows the diet list option for which the user must press the settings button, and a list of options will appear (a); finally, (b) shows the diet list so that the user can consume daily and improve their nutritional quality.

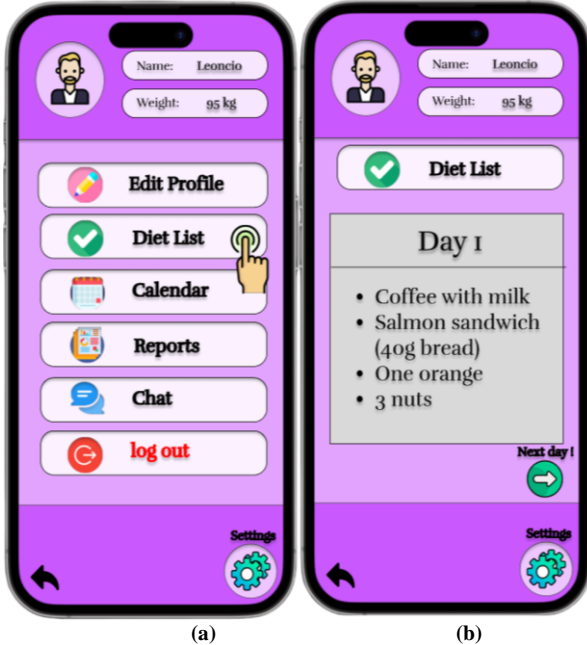


Fig. 9 Diet list: (a) Setting options (b) Diet for the user

4.2.10. Sprint 3 (H10)

Figure 11 shows the report of the routines performed during the month so that the user can check his progress. To do this, the user must click on the settings button, and a list of options will appear (a); finally, it will show the report of the routines completed during the day and month (b).



Fig. 11 Report: (a) Setting options (b) Routine reporting

4.2.9. Sprint 2 (H9)

Figure 10 shows the calendar where the user must click on the settings button, and a list of options will appear (a); finally, it shows the calendar established to carry out the routines where it will show the rest days and the days that the routine must be completed during the month (b).



Fig. 10 Calendar: (a) Setting options (b) Calendar of user activities

4.2.11. Sprint 3 (H11)

Figure 12 shows the chat, for which the user must click on the settings button and a list of options will appear (a), finally opening the chat to ask the specialist any questions about the routines or other queries (b).



Fig. 12 Chat: (a) Setting options (b) Chat with the specialist

**4.3. Results of Daily Meetings**

To obtain the structuring that would take each sprint, it was organized with daily meetings with the work team and the project leader, and the daily meetings served to be able to realize new ideas and opinions that could be implemented in the project, as well as allowing to give follow-up and control to carry out each sprint, normally the sessions lasted 15 minutes that were carried out every day, where they were asked: What was done to contribute in the sprint, What progress was made, What things were completed or what things were missing, What prevented to deliver the work, What was done, What was done, What was done, What was done, What was completed or what was missing, What prevented to deliver the work?

**4.4. Results of the Sprint Review**

At this stage, the progress of each sprint will be evaluated by assessing the user stories in such a way as to see the progress of each week and day.

**4.4.1. Sprint 1 Review**

Sprint 1 indicates that it has been developed correctly without presenting any changes or incidents that delay the project. It started on January 4th and finished on January 18th, considered an acceptable sprint, as shown in Figure 13.

**4.4.2. Sprint 2 Review**

Sprint 2 indicates that it has been developed correctly without presenting any changes or incidents that delay the project. It started on 19 January and finished on 9 February, being considered an acceptable sprint, as shown in Figure 14.

**4.4.3. Sprint 3 Review**

Sprint 3 indicates that it has been developed correctly without presenting any changes or incidents that delay the project. It started on 10 February and finished on 10 March, being considered an acceptable sprint, as shown in Figure 15.

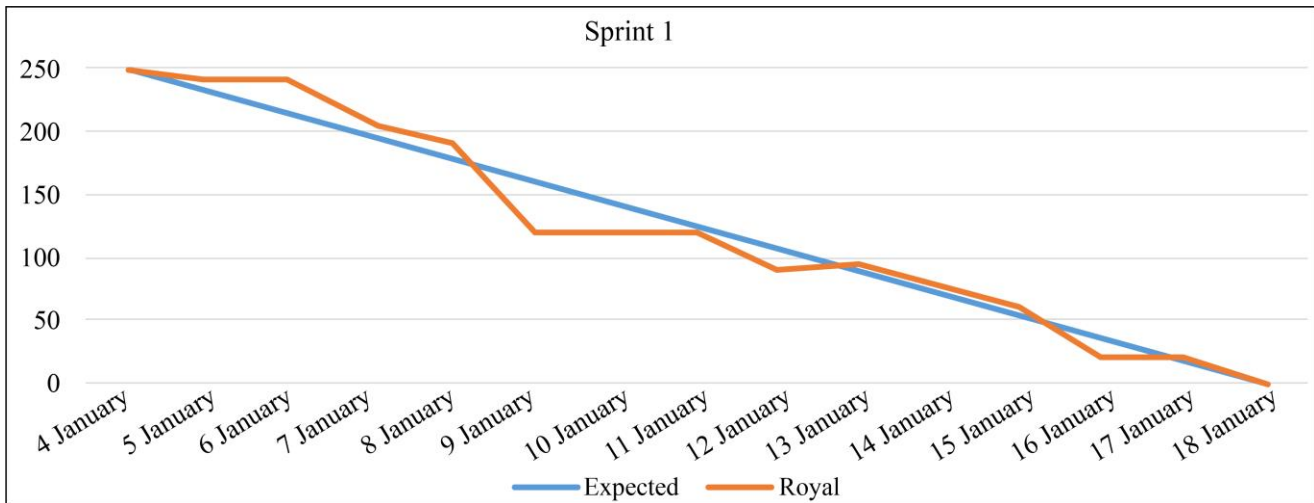


Fig. 13 Sprint 1 review

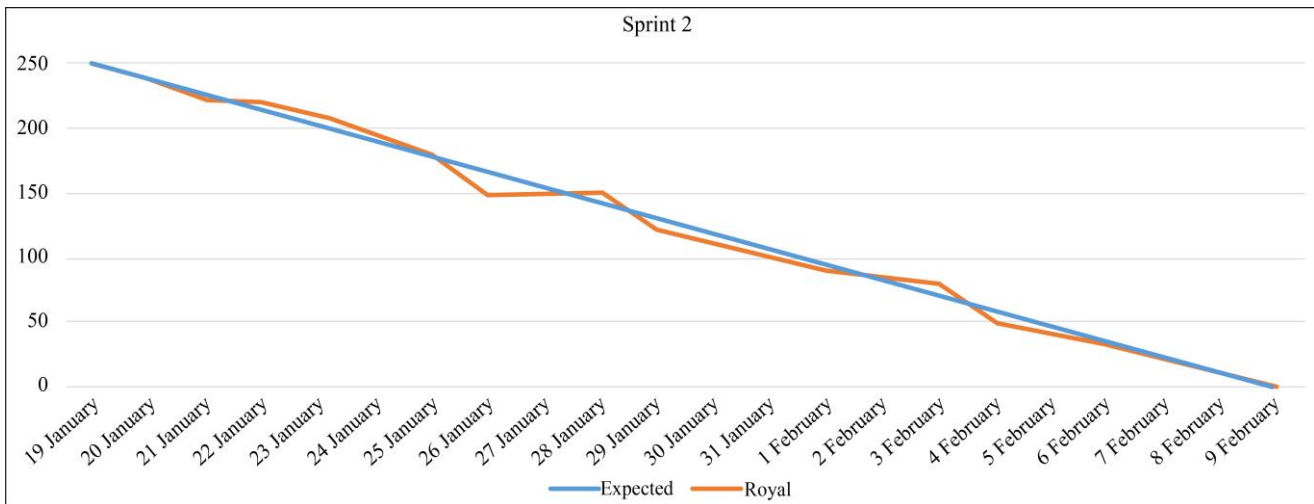


Fig. 14 Sprint 2 review



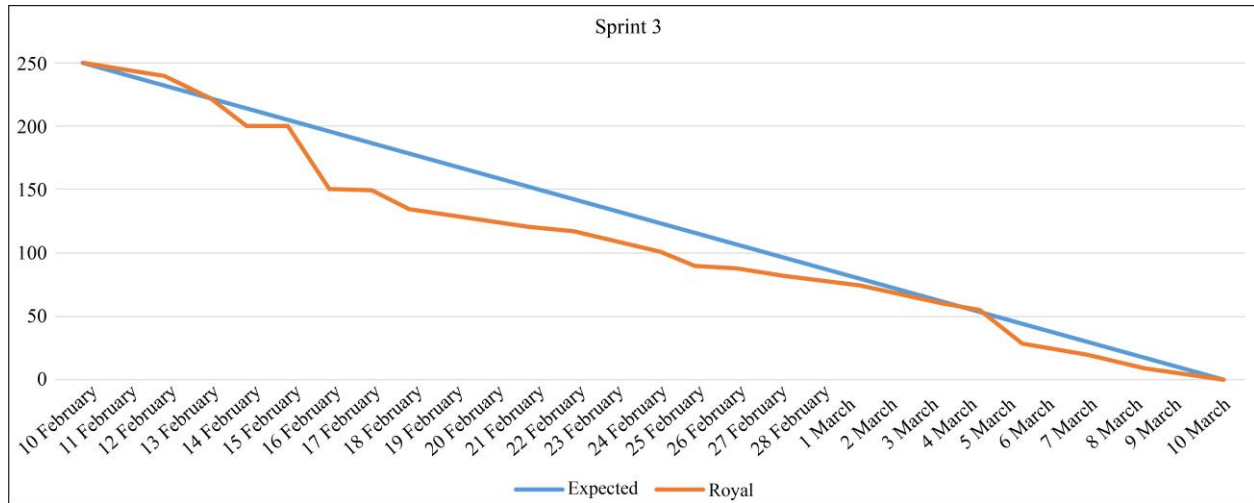


Fig. 15 Sprint 3 review

Table 3. Retrospective review

Questions	Answers
What can be improved in order to work in a coordinated way?	Apply project management tools such as Trello, Jira, Asana, and Smartsheet. This will allow for better coordination in the development of the project.
What should you let yourself do?	Do not be afraid to express new and challenging ideas because it can lead to an improvement of the project.
What has the team done well?	Meeting the agreed deadlines for the completion of deliverables.

4.5. Results of Retrospective Review

In the last phase, new evaluations were carried out, which allowed us to improve the meetings with the work team, as the scrum methodology allows for feedback to improve so that the projects to be developed are more effective. The following questions were asked: What can be improved to work in coordination, what should be left to be done, and what things have been done well in the work team, as shown in Table 3.

4.6. Prototype Approval by Experts

For the verification, we proposed seven experts in different areas for approval, considering the following criteria: realism, integration, adaptability, technology, innovation, functionality and usability of the mobile application. Taking into account that each expert is a specialist in each area, which allows us to approve the mobile application and obtain sanctification for the user.

Table 4. Level of acceptance

Under	Moderate	High
0% - 49%	50% - 79%	80% - 100%

Together these criteria will be evaluated with the level of acceptance from a low level of 0% to 49% indicating the ineffectiveness of the mobile application, and a moderate level of 50% to 79%, indicating that the mobile application should be updated. A high level of 80% to 100% indicates that it is very effective from Table 4.

As shown in Table 5, the score is based on the criteria established for the experts to validate the mobile application. Giving us as a result, the approval for each criterion is realism having 95%, integration at 94%, adaptability at 94%, technology at 94%, innovation at 94%, functionality at 92%, and usability at 95%, giving us overall a 94% overall approval for the final version of the mobile application.

Table 5. Expert validation

Validation	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total	Level
Realism	98%	97%	93%	98%	93%	95%	91%	95%	High
Integration	99%	95%	98%	89%	94%	96%	92%	94%	High
Adaptability	95%	93%	90%	94%	94%	98%	93%	94%	High
Technology	95%	94%	89%	95%	96%	95%	90%	94%	High
Innovation	98%	95%	94%	90%	97%	96%	90%	94%	High
Functionality	94%	97%	94%	90%	94%	91%	91%	92%	High
Usability	95%	93%	93%	96%	94%	95%	96%	95%	High

## 4.7. About the Methodology

### 4.7.1. Advantages

One of the advantages of scrum with other methodologies that are implemented for the development of software having ease of management, which allows better efficiency and flexibility when organizing the software, other advantages which allows us to have better communication with the team and better organization when implementing the software, mostly scrum is applied in different areas such as accounting, systems, finance, among others.

### 4.7.2. Disadvantages

In order to develop the scrum methodology, it is necessary to have basic knowledge when implementing it in companies, as this can lead to non-compliance when delivering functional requirements, loss or excess financial costs.

### 4.7.3. Comparison

Compared to others, scrum methodology is mostly focused on the enterprise level for software development in different areas. Design thinking is a methodology that allows the development of prototypes or graphic designs but not web or mobile application development. Rup is tedious because it has a longer scope for project scopes for its deliverables in business cases.

## 5. Discussions

The elaborated project fulfills the main objective of carrying out treatments for overweight and obesity with diet control. A list of physical treatments to be carried out according to the program will be of great help to those people who have this great problem, so other authors assimilate the same objective as this author [13], which is to develop a mobile application for overweight teenagers encouraging them to be physically active and to change their eating habits so that this author [16]. It shows its contribution

to society by providing a mobile application that shows the main foods for the patient's diet. It will also show the graph of the weight loss progress that the patient has during the time that was registered in the application. Finally, this author [20]. It shows the importance of using the scrum methodology when communicating with the work team, understanding their needs to reduce errors in the software, and making any kind of change. The authors show their solutions as being able to solve this problem of overweight and obesity, ensuring that the elaborated project greatly contributes to society and can solve health problems. Taking into account these works that differ from the work done is that the mobile application is developed so that people can be treated at home and no longer necessarily go to a hospital with a virtual assistant who can give the necessary advice and evaluate according to each patient's case. Since most people have cell phones, allowing to reduces cases of overweight and obesity, encouraging them to perform physical activities at home.

## 6. Conclusion and Future Word

The mobile application was successfully developed; it met the planned objectives to create a mobile application for the treatment of overweight and obesity in people in order to perform their treatments from home, also allowing for more fluid communication with the specialist. It was developed with the scrum methodology, which helped to reach the fulfillment of the requirements for the presentation of the final product through the sprint to make deliverables of each requirement of the mobile application, having the purpose of developing it in less time and with the determined times. In future work, it is recommended to implement virtual reality and artificial intelligence, allowing to have a better approach when obtaining and giving results on more chronic diseases of obesity or overweight, helping people of any class can be treated and prevent more this disease that is affecting everyone, especially young people.

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