GAMIFIED PLATFORM TO SUPPORT CHILDREN WITH OBESITY

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ABSTRACT
The ProViTao project is an initiative aimed at helping children with obesity problems to overcome this disease in a fun and effective way through the use of gamification. In this project, during an obesity treatment of nine months, only the first three are supervised by a medical team into the hospital. After that period, the treatment is relegated to the family for the next six months. This may involve some disadvantages for monitoring and supervising the patients. Hence, the goal of this work is to provide a platform, ProViTao APP, for monitoring and supervising the patient in those six last months of treatment, which allows to improve the connection between the medical team and the patient and family. ProViTao consists of a mobile and web application, both similar and with multiple functions. This platform covers all the aspects and processes of the treatment. Namely, (i) store and sync information in the cloud, (ii) a user manager and file system. (iii) tools for analysis and data collection, (iv) a communication channel between users, and (v) sports module.

KEYWORDS
Gamification, human-computer interaction, childhood obesity, e-health.

1. INTRODUCTION
One of the most important risks of childhood obesity is that they tend to remain obese in adulthood while also increasing the likelihood of no communicable diseases (see Whitaker et al., 1997; Must and Strauss, 1999; Freedman et al., 2001). “The program of active video games for the treatment of obesity and diabetes” (ProViTao) is a project aimed at supporting the treatment of childhood obesity at early ages by means gamification (i.e., the use of games for motivating and achieving goals). The obesity treatment intervention contemplated in this work takes nine months and it is intended to gradually bring the patient over a habit of healthy living. This period is divided into two parts. The first part last three months and along it the child is tutored directly by the medical team. The second part of the intervention takes the remaining six months and the supervision of the medical team is performed through telephone interviews. This may lead to various problems related to their age and the capacity of the patient to change their habits,
compromising the treatment. To address these shortcomings, we propose ProViTao APP, an environment that supports the intervention through various training and monitoring tools to improve patients’ adherence to the program as well as enhancing their learning in a fun way using gamification techniques. In this regard, the contribution of ProViTao to the existing tools is based on the way it adapts itself to the user, leading to a more rewarding user experience which is translated into an adhesion of healthy lifestyles.

The goals of this work are, on the one hand, to describe the design and implementation of the proposed technological platform, ProViTao APP, as a support tool for the treatment of childhood obesity. On the other hand, to depict the basics of the platform while discussing some strategies and uses of gamification to the obesity treatment.

The remainder of this paper is organized as follows. Section 2 describes the proposed platform, ProViTao. Afterwards, Section 3 briefly reviews some strategies and gamification appliances to tackle childhood obesity. Finally, Section 4 draws the concluding remarks extracted from the work and indicates several promising directions for further research.

2. PROVITAO APP

One of the main features of ProViTao APP is the automation of processes and intelligent adaptation of interfaces, blended with gamification components.

![ProViTao APP Interface](image1.png)

**Figure 1. ProViTao APP Interface**

The interface of ProViTao APP is designed to behave differently depending on the user profile. This way, depending some input data related to the user such as the age and the role, the user may have access to different features and information of the application. Thus, for example, a user with the role of a doctor will have access to patient panel and information in contrast to a user with the patient role that instead of it will have access to the gaming platform.

The types of user roles allow to enjoy the same application without interfering among them. In Figure 2, we depict the four possible roles for which the application is designed. Namely, patients (i.e., children with obesity problems following the treatment exposed in this work), family (i.e., parents or legal guardians), medics (i.e., doctors, nurses and nutritionists involved in the project), and staff (i.e., analysts and researchers).

![Possible roles within ProViTao APP](image2.png)

**Figure 2. Possible roles within ProViTao APP**
Furthermore, ProViTao APP not only manages the visuals to suit your role, but uses the remaining information hosted in the profile to automate as many tasks -related to the treatment- as possible. This way, the information contained in the user profile is used to infer some information when crossing the data from the profile with the one obtained from a test. It should be mentioned that the use of the user data seeks to generate in the user the feeling that the application has been designed exclusively for him / her.

Researchers and analysts involved in the development of the platform use it mainly to monitor the behavior of the patients and obtaining some knowledge from it. That is why ProViTao APP offers several tools for bidirectional communication between users. Based on previous ProViTao interventions the actual model considers two communication tools (see Figure 3) a chat adapted for children and a generator questionnaires. Both tools allow the direct interaction among patients and doctors, bridging the gap that separates them.

3. GAMIFICATION AND VIDEOGAMES

One of the most favorite activities children want to do is to play, and, hence, taking advantage of it may be the most appropriate way to help them acquire healthy habits. This way, ProViTao takes the concept of play and bundle it with the goal of improving the habits of the children allowing them to learn through video games, but also making the environment a pitch.

In this work we propose two training games that have been developed in ProViTao to promote healthy lifestyles.

- The first is called "The Account Steps" and consists of a pedometer with purpose. The doctor assigns a task type exercise jogging or running, with a certain distance to a particular child. This distance is structured in a route divided into several separate control points. Each time control point indicate that a part of the section has been completed, thus, the child should not go back. The route is surrounded by a fantastic narrative where the child is hunter, with the mission to recover all the dragons that escaped from a castle. Each step he takes brings him closer to capture the dragon (i.e., the control point). If the child decide to leave before reaching the dragon, then he/she may lose all the points collected from the last checkpoint to that moment. Once all the dragons are captured, that is, all the control points have been visited then a final dragon can be captured by answering one question provided by the application. If the child is successful in this last part, he/she will receive extra points and a different medal (value, consistency, etc.).

- The second game is called "treasure hunt" and consists of an application that uses geo-location to place the user at the center of a Google map. The player must go in search of attractions related to healthy food, sports or any other healthy item. Each marked location is transmitted to other users who can validate that it is indeed a source of concern. The more people validate the location, the more
points generates this achievement on your profile. In the end, it will create a common map of attractions for the acquisition of healthy lifestyles.

![Figure 4. ProViTao videogames for promoting healthy habits](image)

Beside these games, an additional system of ranks and points related to the application motivates the patients to upgrade their level. The points can be increase by means of the time spent using the software, achieving merits or by the interaction with other users (e.g., medics, familiars). Players who accumulate enough points can level-up its category and acquire a new rank. Although the patient is encouraged to strive to win, he has not wanted to do much emphasis on the display of an overall score to avoid discouragement. Instead, a series of positive messages motivate the user to be better every day.

4. CONCLUSION

In this paper, we propose a platform gamified intended to support the treatment of childhood obesity and diabetes. It is based on process automation, intelligent adaptation of interfaces, and game mechanics for achieving an ideal mix that motivate healthy lifestyle habits in children. In this regard, in this work we have proposed ProViTao APP as a support tool for medical teams when they have to virtually follow-up and monitor children. On the other hand, the gamification included in ProViTao APP promotes a treatment adherence and a progress in the weight loss maintenance through the uses of games.

On the basis of the findings presented in this work, the next stage of our research will be focused on an intensive analysis of the benefits provided by ProViTao on patients as well as its integration with further developments in the spirit of video games for training in healthy lifestyles. On the other hand, we will conduct the testing with real users during the 2015/2016 intervention in order to validate our proposal. Moreover, another feature that will be included as future improvement of the application the adaptability of the interface for those users with visual impairment. Following the philosophy of "full automatic"; the software will change the layout, content or form of the interfaces to be adapted to the user disability.

REFERENCES

