14 A MOBILE SERIOUS GAME FOSTERING HEALTHY EATING HABITS

Stefano Carrino, Maurizio Caon, Elena Mugellini
University of Applied Sciences and Arts Western Switzerland

Contact: stefano.carrino@HES-SO.ch

INTRODUCTION

In recent years, overweight and obesity have become epidemic and have been identified among the leading causes of death for non-communicable diseases. However, several studies demonstrated that knowledge about food and nutrients tends to imply healthier food habits **[1]**. Thus, in the context of the PEGASO European project **[2]**, we aim at creating a serious game (SG) that improves the user knowledge on food nutrients in a pleasant and enjoyable way.

This paper focuses on the design approach used to develop a mobile solution for a target population of teenagers within an age range of 13-16.

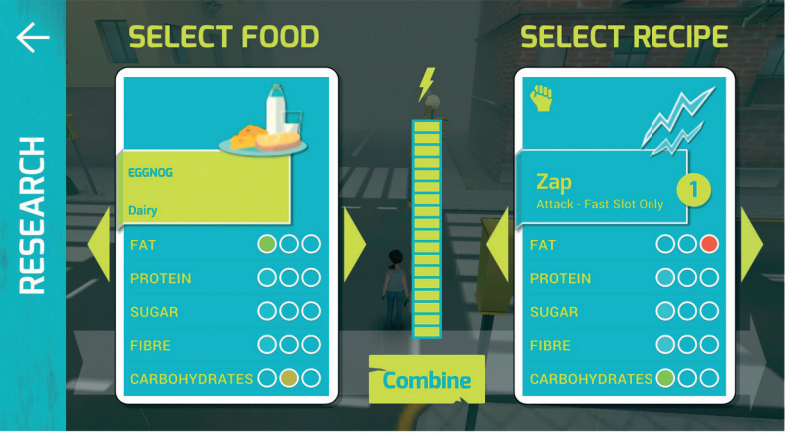
PARTICIPATIVE DESIGN

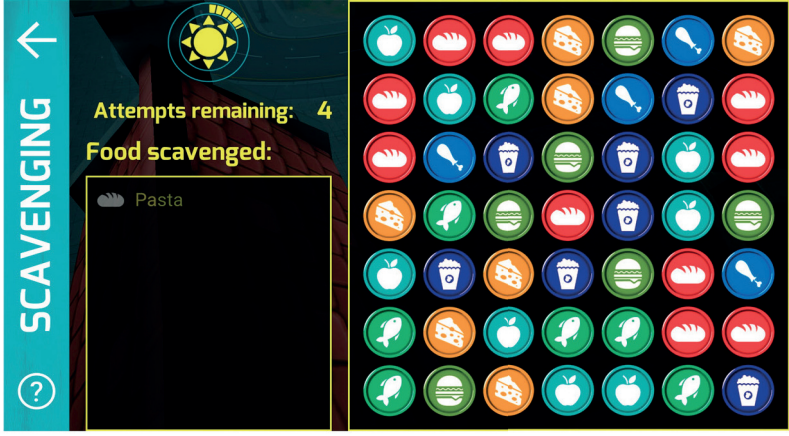
Involving the final users in the development of an application is the basic principle of participative design. We think that this approach is particularly interesting in the development of SGs, as the one presented in this paper, and that our experience can be useful to researchers in the SG domain who intend to involve users in the creative design process.

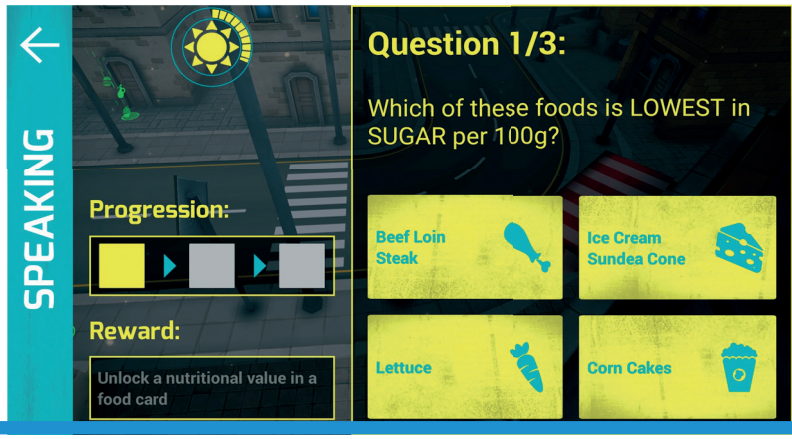
The game described in this paper has the special characteristic of being conceived as a mini-game inside a broader game experience. The "parent" game **[3]** focused on healthy behaviours aspects related to physical activity and sedentariness neglecting aspects related to nutrition and healthy eating habits. We designed this game to address this specific issue via the expert support in the PEGASO consortium (in physiology and nutrition) and the results found in the scientific literature **[1]**. For instance, Turconi et al. **[4]** produced a multiple-choice survey and it concluded that a person that can answer it accurately tends to eat healthier. The mini-game iterative design approach started from such survey and intended to provide the user with the knowledge to answer it correctly.

FIRST DESIGN ITERATION

As first step, we developed a standalone version of the mini-game. In it, the user had to select the most adapted aliments to craft a balanced meal with the right combination of macronutrients (carbs, proteins, fat, fibers and water). Then, a skill-based mini-game asked the user to catch the right nutrients in a time-limited session. The goal of this first prototype was to detect and address usability and content issues as soon as possible. As a result of the evaluation phase, we assessed that the game was pleasant to play but the knowledge transmitted to the user was, to a certain degree, limited. Therefore, we decided to combine a quiz game to the original skill-based crafting mechanics. Quizzes are, indeed, a valuable way to provide nutritional knowledge to the user and, additionally, can be easily integrated in the main game narrative. In our solution, correct answers to the questions increase also the in-game player character knowledge, creating a favourable correlation between real world and the virtual one. While the player acquires new knowledge in the real world, her character is doing the same in the virtual one (for instance, new in-game knowledge brings the character the possibility of acquiring new abilities).







THE INTERMEDIARY STEPS: PRE-PILOT STUDIES

After the integration with the main game, two short duration studies (1 and 3 weeks respectively) were conducted. The first pre-pilot study goal was to assess the usability of the novel concept that includes the mini-game into the main game and the second measured the user experience in the whole PEGASO platform.

THE FINAL STEP: THE PILOT STUDY.

As we are writing this paper, about 400 teenagers are using the game in an international pilot study in Catalonia (ES), England (UK), Scotland (UK) and Lombardy (IT). The study has been designed as a multi-centre quasi-experimental controlled pilot study with control groups. The aim of this experiment is to quantitatively and qualitatively measure if, at the study end, players have acquired knowledge about eating healthy habits and evaluate possible impacts on the users' behaviours.

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