

Ludo-pedagogical Module for Emotion Regulation of Undergraduate Students

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Abstract—This demo presents an educational e-learning module that teaches emotion regulation to medical students in a 3D virtual environment. The scenario focuses on the pressure and stress experienced by students when studying for an exam. The survey results based on 50 university students have shown that the immersive tool is effective to elicit stress and anxiety emotions. Although the majority of students were able to regulate their emotions, half of them used inappropriate strategies to manage their negative emotions.

Index Terms—Educational Game, Virtual Environment, Mental Cares, Emotion Regulation.

I. INTRODUCTION

The COVID-19 pandemic has led to an increase in depression among students, particularly those who are emotionally vulnerable due to factors such as remote learning, lockdowns, and isolation. The practice of Emotion Regulation (ER) can be a valuable skill for managing negative emotions, as it involves modifying one's experiences and responses to reduce the impact of depression. However, educators in healthcare fields express concerns that ER techniques are not sufficiently taught in France. In addition, it can be difficult to instruct ER skills for undergraduates through conventional methods, as it requires the triggering of specific emotions and the creation of particular situations. Affective gaming has the potential to invoke and detect the real-time emotional state of players [1].

Earlier, an interactive e-module using omnidirectional videos was created to teach non-clinical skills to medical students [2]. In this study, the ludo-pedagogical e-module is extended with a 3D virtual universe to assess and explore the emotional states of students and their regulation strategies in a more immersive way.

In section II, we describe our framework by detailing its scenario, clinical and technical components. The results are presented in section III while the last part contains conclusions and future work.

II. TEACHMOD ER

TeachMod ER was developed by game designers and programmers in close cooperation with health professionals. The application is compatible with *Apple* and *Android* for use on PC, tablet, and mobile. It can be downloaded for free using this link¹.

¹<http://cobtek.fr/teachmod-re/>

A. Scenario and clinical objectives

The scenario concerns the pressure generated during exam preparation, as it is the main period of stress and anxiety for students. Throughout the revision process, the student will face 25 different situations such as technical issues (Fig. 1a), time passing quickly (Fig. 1b), the expectations/judgment of their relatives (Fig. 1c) and receiving an email from the professor (Fig. 1d). At each circumstance, the student is invited to act and make decisions to manage their triggered emotions through multiple-choice questions displayed on the screen. The events evolve depending on the previous choices made by the player. The synthesis of these choices will allow for the establishment of the ER strategies used by the student and determine whether they used emotional suppression or cognitive reappraisal.

Two modes are provided to users. The first mode hides the correct answers and disables the time limit for each question. This allows for more accurate and genuine responses for data analysis. The second mode is activated automatically after the first part. It seeks to challenge users based on their decisions and provides theoretical knowledge and advice on ER.

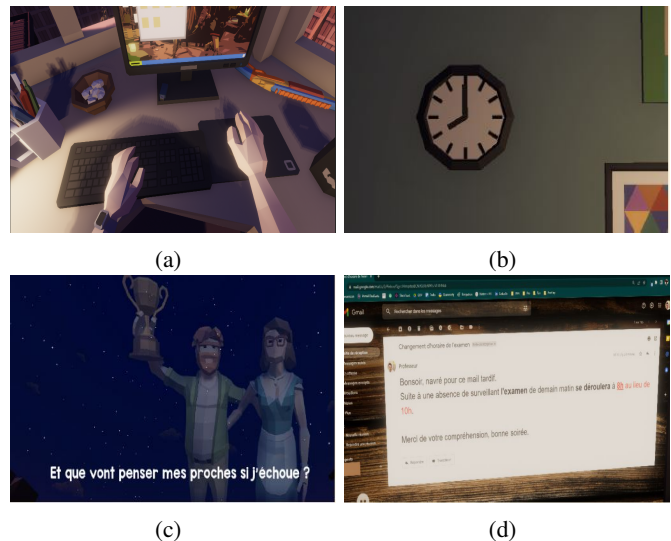


Fig. 1: Examples of stressful situations presented during the scenario

B. Technical design aspect

TeachMod ER offers a 3D interactive environment using *Unity3D* engine. Blender was used to create certain custom 3D models. The learner embodies a first-person student avatar in a choice-based gameplay setup, allowing them to influence the outcome of the game through their own decision-making. To increase immersion and involvement, various game design components (visual, auditory, and narrative) were incorporated into the game such as heartbeat sounds, camera orientations, relaxing or anxiety-inducing music, hand animation, etc.

A scoring system based on a "review gauge" is designed to monitor the student's level of concentration. In the end, all student's actions are collected and summarized to show the employed ER strategies and the progression of their revision gauge. The architecture is depicted in Fig. 2. Additional scenarios can be easily added, deleted, or modified in our game to address further educational goals.

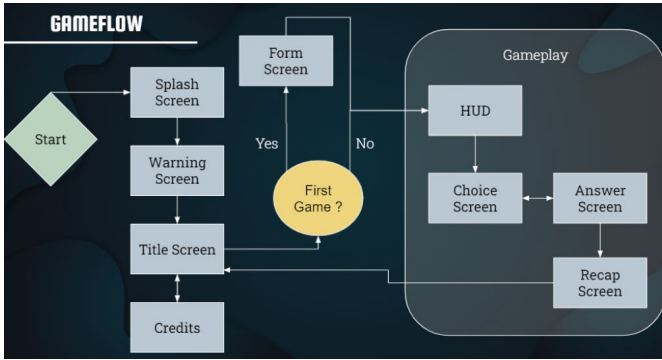


Fig. 2: The architecture of the game

III. EXPERIMENTS AND RESULTS

The game was tested with 50 speech therapist students, 22 at the Bachelor level and 28 at the Master level. During the playtest sessions, five questions were asked to analyze the strategy adopted in response to each stressful situation:

- Q_1 Late at home with remaining work, what is your reaction?
- Q_2 After returning from class the day before an exam, what self-talk and reactions occur?
- Q_3 You have only one hour left to study. What is your reaction?
- Q_4 You started studying without reviewing beforehand. What do you do? What do you think?
- Q_5 Upon receiving an email informing you that the exam has been rescheduled from 10 to 8 am, how do you react?

Figure 3 revealed that 67% of the students successfully regulated their emotions, but nearly half of them (49%) used inappropriate ER strategies, emotional suppression rather than cognitive reappraisal (see Tab I). As depicted in Fig. 4, there is no significant difference in ER skills between Master's and undergraduate levels of study, as the responses were comparable.

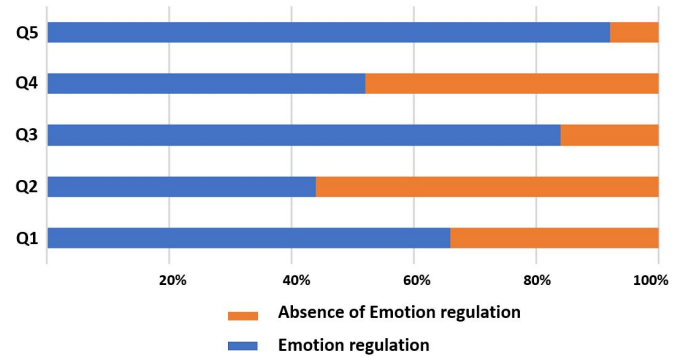


Fig. 3: The proportion of students who do or do not regulate their emotions

Question	Cognitive Reappraisal (%)	Emotions Suppression (%)
Q_1	90	10
Q_2	50	50
Q_3	42	58
Q_4	38	62
Q_5	35	65

TABLE I: The rates for each ER strategy

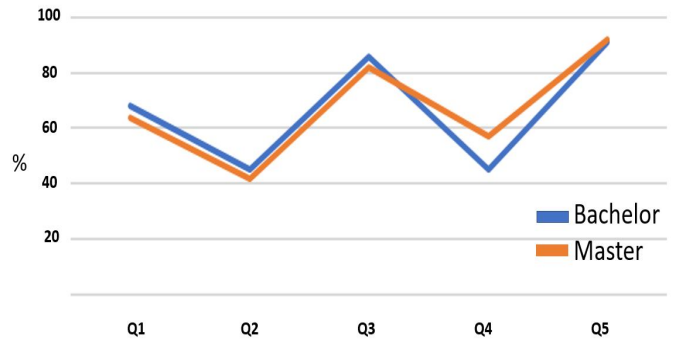


Fig. 4: The rate of students employed ER for each study level

IV. CONCLUSION & FUTURE PERSPECTIVE

The work proposes an interactive module that teaches appropriate cognitive strategies for managing negative emotions during studying in a dynamic and immersive manner. Visual and auditory game design elements were used to trigger the desired emotions and increase student engagement. Besides in-game data, we will collect physiological measures, including heart rate, skin conductance, and facial expressions, to accurately assess the players' emotional states in the next phase.

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