Designing gamified interactive systems for empathy development

Lissette López-Faican
Universitat Politècnica de València, ES
lislofai@posgrado.upv.es

Javier Jaen
Universitat Politècnica de València, Grupo ISSI, ES
fjaen@upv.es

ABSTRACT

The lack of empathy contributes to the development of insensitive social attitudes, so the design of interactive systems based on games or playful experiences for the development of empathic skills is of vital importance in the field of education. In this paper we propose a circular and iterative empathy development model and analyze gamification strategies that can be useful for the design of interactive systems that favor the development of empathy through pedagogical strategies in which users are exposed to affective, cognitive, reflective and social experiences that encourage the expression of behaviors of a prosocial nature.

KEYWORDS

Game design, empathy, augmented reality

1 INTRODUCTION

In recent decades, empathy research has evolved into a vibrant, multidisciplinary field of study, defined as "the act of perceiving, understanding, experiencing, and responding to another person's emotional state and ideas" [1].

Recently, some attention has been paid to the idea that emotional deficiencies, such as lack of empathy, lead to insensitive social attitudes [2]. Under this panorama, Homa Tavangar [3] discusses the need to include empathy in education, and defines it as if it were a muscle that must be exercised, being a skill that can be practiced and reinforced.

In the literature there are several pedagogical strategies to teach empathy in education, an example of this is the Roots of Empathy curricular model (ROE) [4] where its main objective is to promote prosocial behavior and reduce aggressive behaviors. Another interesting contribution is the "dolls of diversity" of Papouli [5] to develop empathy towards vulnerable populations.

On the other hand, there are innovative proposals, where educational strategies for empathy are designed through mobile or computer games. One contribution is that of Buchman and Henderson [6], featuring a virtual reality simulation of a patient to enhance empathy towards sick or vulnerable people. Even more interesting, although there is little research, are games that involve a social environment to teach empathy more efficiently, such as the ORIENT game where team users have to cooperate in the virtual world to save a planet [7] as a way to learn intercultural empathy.

In this sense, we believe that current technologies offer new possibilities to implement affective, cognitive, reflective and social experiences in order to teach and promote in a better way the empathy in education. In particular, the emergence of the so called Cyber-Physical-Social Systems (CPSS) [8], that emphasize a deep interaction between the physical, cyber, and social world. Even more interesting is the combination of CPSS with Augmented Reality (ARCPSS), promising technology that is currently revolutionizing educational processes due to its potential to enhance motivation and innovation as we have already studied in our prior work [9] and it is extensively discussed in [10], [11].

For this reason, in this work we describe the theoretical bases and possible gamification strategies that would allow the design of interactive playful experiences to promote prosocial behaviors and ultimately develop empathic skills as argued in [12]. In this sense, the ideas presented in this work are intended to be the frame of reference for the design of an interactive system that allows us to validate the following research hypothesis:

- Gamified Cyber-Physical Social Systems based on augmented reality for the realization of affective, cognitive, reflective and social experiences in secondary education favor the development of empathic skills expressed in the form of prosocial behavior.

2 CIRCULAR MODEL OF EMPATHY

Empathy is a very broad and general concept that many researchers have tried to define in terms of models of components that constitute the so-called empathic ability. These components include mimicry, emotional contagion, sympathy and compassion that lead to the expression of prosocial behaviors [13]. However, Davis [14] unifies this diversity of models with the definition of the Interpersonal Reactivity Index (IRI) proposing a global concept of "empathy" consisting of fantasy, perspective taking, empathic concern and personal anguish.

However, empathy is not only made up of components but also involves mental and emotional processes. In this sense, Davis [15] argues that empathy is the individual's tendency to cognitively and emotionally empathize with others and that this tendency is supported by both mental and emotional processes. In this sense, there are various proposals that try to focus on the processes that take place. In the model proposed by Feshbach [16] there are three

Table 1: Proposed circular model of empathy

Concept	Definition
Observing	Characteristics of the situation, where all responses to another person, whether cognitive or affective, arise from some specific situational context
Meaning	Give meaning to the feelings and thoughts of another person or the situation presented
Imagining	Promote imagination to stimulate emotions and thoughts
Perspective taking	Cognitive side of empathy that consists of evaluating events from the perspective of the other person
Feeling	Affective domain of empathy, which consists of sharing the feelings of the other person
Understanding	To be reflexive and understand the other person's situation
Acting	Goal-directed behaviors that result from prior exposure to the goal such as prosocial behavior

Figure 1: Proposal of the circular model of empathy that integrates the circular model of Keskin [17] and Davis [15]

interrelated processes (two cognitive and one affective): a) The ability to discriminate and identify the emotional states of another, b) The ability to take the perspective or role of the other and c) The evocation of a shared affective response. On the other hand, Keskin [17] proposes a circular model of empathy with several stages such as: acting, meaning, imagination, perspective taking, feeling and understanding. Finally Davis [15], identifies in his model four processes related to empathy, with a preliminary process related to the definition of the antecedents, including the characteristics of the observer, the individual who is the target of the observation process and the description of the situation the target is in, followed by processes that are particular mechanisms by which empathic results are produced. These results may be intrapersonal outcomes, referring to affective and cognitive responses of the observer that result from exposure to the target, and lastly interpersonal outcomes that are behaviors directed toward the target such as aggression, helpful behavior and prosocial behavior.

Given the diversity of component and process models for empathy, we propose a hybrid model (see Figure 1) that integrates the

circular process of Keskin [17] and the expected outcomes defined by Davis [15]. In this way, we not only provide a process for developing empathic skills as proposed by Keskin, but we also define the expected outputs in different phases of said circular and iterative model (see Table 1).

3 DESIGNING GAMIFIED EMPATHIC EXPERIENCES

Gamification, defined as the process of applying game elements to non-gaming contexts, is an effective learning strategy that is used to create highly engaging learning experiences in education [18]. This is why we plan to implement our empathy model in a gamified scenario integrating CPSSAR technology.

Given that games can be interpreted as stories [19], our gamification proposal is focused on integrating a narrative design with significant emotional aspects, thereby seeking to promote cognitive and affective processes in students in several iterations, which should allow teaching, promoting and instilling empathy in terms of prosocial behavior with greater efficacy.

3.1 Observing, Meaning e Imagining

We propose a storytelling strategy for these phases of our model because it would allow the player to be involved in the playful experience through fantasy and suspense. The story should propose the objectives and their derived goals to help the player to perceive the context, with a dramatic and mysterious rhythm. In this sense, the gamification design elements that we propose for an ARCPSS would be the existence of:

- Stories
- Final objectives
- Intermediate goals to meet the final objectives
- Story progression to develop skills

3.2 Perspective taking, Feeling, Understanding

Role-taking allows the player to identify with a character, which leads the participant to get involved in the story, therefore avatars and feedback are elements that help promote perspective taking, generate feelings and understand the story. Therefore, the design elements that we propose for the gamification of these phases of our circular model would be the existence of:

- Avatars, paying special attention to those that express the emotions of the elements participating in the game

- Affective feedback that allows users to feel and understand the emotional situation in which others find themselves in the context of the story.

3.3 Acting

In this phase it is vitally important to motivate the participants to make prosocial decisions. For them, we propose a mixed gamification strategy in which both competition and cooperation co-exist since the co-existence of both promotes an increased level of engagement as discussed in [20]. In this sense, we propose for this phase of our model the existence of:

- Challenges/Tasks/Missions (individual and group-based)
- Emotional rewards (individual and group-based) that increase the degree of social binding between group members.

Finally, it is important to note that our proposal will focus on a meaningful gamification mechanics and dynamics for behavioral change, "a transformative learning approach, where students connect the experience with previously held beliefs, which can allow the transformation of those beliefs and long-term change" [21], seeking to improve empathy in terms of prosocial behavior.

4 CONCLUSIONS

Our research seeks to implement a circular model of empathy through various elements of gamification for behavioral change related to empathy in terms of prosocial behavior in students. In this article we have presented a circular and iterative model for the development of empathy and defined the elements of gamified design that we intend to develop in the future to validate our research hypothesis in relation to the effectiveness of Cyber-Physical-Social Systems based on Augmented Reality (ARCPSS) and storytelling strategies that allow generating affective, cognitive, reflective and social experiences.

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