Serious Games as Positive Technologies

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Abstract. Serious games are emerging as innovative tools to promote opportunities for human psychological growth and well-being. The aim of the present paper is to introduce them as Positive Technologies. Positive Technology is an emergent field based on both theoretical and applied research, whose goal is to investigate how Information and Communication Technologies (ICTs) can be used to empower the quality of personal experience at three levels: hedonic well-being, eudaimonic well-being and social well-being. As Positive Technologies, serious games can influence both individual and interpersonal experiences by nurturing positive emotions, promoting engagement, as well as enhancing social integration and connectedness. An in-depth analysis of each of these aspects will be presented in the chapter, with the support of concrete examples.

Keywords: Positive psychology, positive technology, serious games, well-being.

1 Introduction

Serious applications for computer game technologies have become important resources for the actual knowledge society. Their use and effectiveness have been broadly acknowledged in different sectors, such as education, health, and business [1]. By fostering continuous learning experiences blended with entertaining affordances, serious games have the potential to shape new opportunities for human psychological development and growth. They have in fact supported the creation of socio-technical environments [2], where the interconnection between humans and technology encourages the emergence of innovative ways of thinking, creative practices, and networking opportunities. Further, serious games have been capable of supporting wellness and promoting happiness. That is why they can be considered as “positive technologies”. Based on the Positive Psychology [3] theoretical framework, the Positive Technology approach claims that technology can increase emotional, psychological and social well-being [4].

Seligman and Csikszentmihalyi identified Positive Psychology as the scientific study of "positive personal experience, positive individual traits, and positive institutions" [5,6]. By focusing on human strengths, healthy processes, and fulfillment, Positive Psychology aims to improve the quality of life, as well as to increase wellness, and resilience in individuals, organizations, and societies.

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The link with accurate and scientific methodological practices [7] has become the engine of interventions to study and promote the optimal expression of thought, emotions and behaviors. In particular, Keyes and Lopez [8] argued that positive functioning is a combination of three types of well-being: (i) high emotional well-being (hedonic level), (ii) high psychological well-being (eudaimonic level), and (iii) high social well-being (social level). This means that Positive Psychology identifies three characteristics of our personal experience – affective quality, engagement/ actualization, and connectedness – that serve to promote personal well-being.

Similarly, the Positive Technology approach claims that technology can influence both individual and interpersonal experiences by fostering positive emotions, promoting engagement, and enhancing social integration and connectedness. Positive Technology is an emergent field based on both theoretical and applied research, whose goal is to investigate how Information and Communication Technologies (ICTs) can be used to empower the quality of personal experience.

Starting from an introductory analysis of the concept of well-being as it has been framed by Positive Psychology research, this paper will reflect on the nature and the role of serious games as positive technologies. In particular, it will discuss how they can support, and train the optimal functioning of both individuals and groups, by contributing to their well-being.

2 Fostering Emotional Well-Being: The Hedonic Perspective

Kahneman, Diener, & Shwarz [9] conceptualized the idea of emotional well-being within the hedonic perspective. They in fact defined hedonic psychology as the study of "what makes the experience pleasant or unpleasant". Among the different ways to evaluate pleasure in human life, a large number of studies have focused on the concept of subjective well-being (SWB), "a person's cognitive and affective evaluation of his or her life as a whole" [10,11]. At the cognitive level, opinions expressed by individuals about their life as a whole, and the level of satisfaction with specific life-domains, such as family or work, becomes fundamental. At the emotional level, SWB is indeed related to the presence of positive emotional states and the absence of negative moods.

This point is of particular interest to the hedonic perspective. Unlike negative emotions, that are essential to provide a rapid response to perceived threats, positive emotions can expand cognitive-behavioral repertoires and help to build resources that contribute to future success [12,13].

2.1 How Can Technology and Serious Game Foster Hedonic Well-Being?

The hedonic side of Positive Technology analyzes the ways technologies can be used to produce positive emotional states. For example, Riva and colleagues tested the potentiality of Virtual Reality (VR) in inducing specific emotional responses, including positive moods [16] and relaxing states [17,18]. More recently, other studies explored the potentiality of emerging mobile devices to exploit the potential of positive emotions.

Serious Games and games in general are strictly connected to positive emotions, and to a wide variety of pleasant situational responses that make gameplay the direct emotional opposite of depression [19].

At first, serious games can evoke a *sensorial pleasure* throughout graphics, usability, game aesthetic, visual and narrative stimuli. This point has been analyzed by emerging trends, such as engineering aesthetics 2.0 [20] and hedonic computing [21], whose results will be able to significantly influence game design.

Secondly, serious games foster an *epistemophilic pleasure* by bridging curiosity with the desire of novelty within a protected environment where individuals can experience the complexity of their self, and developing mastery and control. Empowered by new media affordances and possibilities, serious games can promote a dynamic equilibrium between excitement and security.

Thirdly, serious games promote the *pleasure for victory* and, by supporting virtual interactions with real people, they nurture a *social pleasure*, promoting collaborative and competitive dynamics, communication and sharing opportunities, even outside the context of the game [22].

Games have also been traditionally recognized as marked by a *cathartic pleasure* as they represent a relief valve for emotional tensions, anger and aggressiveness.

Finally, pleasure has a *neural* counterpart. An interesting example is that of dopamine, a neurotransmitter that affects the flow of information in the brain and that is often involved in pleasant experiences, as well as in different forms of addiction and learning. In a classic study made by Koepp and colleagues to monitor the effects of video games on brain activity, a significant increase of dopamine (found in a quantity comparable only to that determined by taking amphetamines) was measured [23].

Good examples of Serious Games explicitly designed to foster positive emotion are *The Journey to Wild Divine*" (`http://www.shokos.com/The_Journey_to_Wild_Divine.html`) and *Eye Spy: the Matrix*, *Wham!,* and *Grow your Chi*!, developed in Dr Baldwin's Lab at McGill University (`http://selfesteemgames.mcgill.ca`). In *The Journey to Wild Divine* the integration between usable biofeedback sensors and a computer software allows individuals to enhance their subjective wellbeing throughout a 3D graphic adventure. Here, wise mentors teach the skills to reduce stress, and increase physical and mental health.

Eye Spy: the Matrix, *Wham!,* and *Grow your Chi*! are indeed projects whose goal is to empower people with low self-esteem respectively by working on ignoring rejection information, throughout positive conditioning, or by focusing on positive social connections [24,25].

3 Promoting Psychological Well-Being: The Eudaimonic Perspective

This perspective is associated with the possibility to fully realize human potential through the exercise of personal virtues in pursuit of goals that are meaningful to the individual and society [4,9]. In this case, happiness no longer coincides with a

subjective form of well-being, but with a psychological one. Psychological well-being is based on 6 elements [26]: *self-acceptance*, *positive relationships with others*, *autonomy*, *environmental mastery*, *purpose in life*, and *personal growth*. An author that has fully interpreted the complexity of the eudaimonic perspective is Mihaly Csikszentmihalyi who formalized the concept of flow [27,28], a positive, complex and highly structured state of deep involvement, absorption, and enjoyment [28]. The basic feature of this experience is a dynamic equilibrium perceived between high environmental action opportunities (challenges) and adequate personal resources in facing them (skills). Additional characteristics are deep concentration, clear rules and unambiguous feedback from the task at hand, loss of reflective self-consciousness, control of one's actions and environment, alteration of temporal experience, and intrinsic motivation.

3.1 How Can Technology and Serious Game Promote Eudaimonic Well-Being?

Scholars in the field of human–computer interaction are starting to recognize and address the eudaimonic challenge. For example, Rogers calls for a shift from ''proactive computing'' to ''proactive people,'' where ''technologies are designed not to do things for people but to engage them more actively in what they currently do''[29].

Further, the theory of flow has been extensively used to study user experience with Information and Communication Technologies. It is the case of internet [30], virtual reality [31,32] social networks [33], video-games [34], and serious games [35].

Bergeron [35] defined serious games as interactive computer applications, with or without a significant hardware component, that (i) have challenging goals, (ii) are fun to play with and/or engaging, (iii) incorporate some concepts of scoring, (iv) impart to the user skills, knowledge, or attitude that can be applied in the real world.

Interestingly, all of these aspects can be easily overlapped to Csikszentmihalyi's theory of flow. Games are in fact "flow activities" [27, 28] as they are intrinsically able to provide enjoyable experiences [22], creating rules that require the learning of skills, defining goals, giving feedback, making control possible, and fostering a sense of curiosity and discovery.

In addition, the intrinsic potential of flow that characterizes serious games can be even empowered by (i) identifying an information-rich environment that contains functional real world demands; (ii) using the technology to enhance the level of presence of subjects in the environment, and (iii) allowing the cultivation, by linking this optimal experience to the actual experience of the subject [3]. To achieve the first two steps, it is fundamental to look at the following game design elements [36]:

- *Concentration*. Serious games should stimulate a mental focus on in-game dynamics, by providing a set of engaging, differentiated and worth-attending stimuli that limit the influence of external variables. Along with other aspects, concentration can result in hyperlearning processes that consist of the mental ability to totally focus on the task by using effective strategies aligned with personal traits [50];

- *Challenge*. As noted by Gee [37], who claims that the game experience should be "pleasantly frustrating", challenges have to match players' skills/level and to support their improvement throughout the game. During specific stages of the game, "Fish tanks" (stripped down versions of the real game, where gameplay mechanisms are simplified) and "Sand boxes" (versions of the game where there is less likelihood for things to go wrong) can support this dynamism;
- *Player Skills*. Games must support player skills and mastery throughout game usability, and specific support systems and rewards;
- *Control*. It is fundamental for players to experience a sense of control over what they are doing, as well as over the game interface, and input devices;
- *Clear goals*. Games should provide players with specific, measurable, achievable, responsible and time-bounded goals;
- *Feedback*. Players have to be supported by feedback on the progress they are making, on their action, and the ongoing situations represented in the virtual environment;
- *Immersion*. Players should become less aware of their surroundings and emotionally involved in the game dynamics;
- *Social Interaction*. Games should create opportunities for social interaction by supporting competition, collaboration, and sharing among players.

An interesting example of an eudaimonic serious game is *Superbetter,* developed by Jane McGonigal (`https://www.superbetter.com/`). SuperBetter helps people their life goals by working on personal resilience. The application of the aforementioned elements supports people being curious, optimistic and motivated and promotes high levels of user engagement.

4 Working on Social Well-Being: The Social Perspective

Social well-being indicates the extent to which individuals are functioning well in their social system and it is defined on five dimensions [39]:

- *Social integration*, conceptualized as the evaluation of the quality of personal relationships with a community or a society;
- *Social contribution*, evidenced by the perception of having something important to offer to society and the world at large;
- *Social coherence*, determined by the meaning given to the quality, organization, and operations that make up the social sphere;
- *Social acceptance*, based on the belief that people proactivity and agency can foster the development of societies and culture;
- *Social actualization*, determined by the evaluation of the potential and the trajectory of society.

4.1 How Can Technology and Serious Game Promote Social Well-Being?

At this level, the challenge for Positive Technology is concerned with the use of new media to support and improve the connectedness between individuals, groups, and organizations, and to create a mutual sense of awareness. This is essential to the feeling that other participants are there, and to create a strong sense of community at a distance.

Short and colleagues [40] introduce the term "social presence" to indicate the degree of salience of the other person in a mediated environment and the consequent salience of their interpersonal interaction. On this point, Riva and colleagues [41] argued that an individual is present within a group if he/she is able to put his/her own intentions (presence) into practice and to understand the intentions of the other group members (social presence). Nowadays, social presence has been empowered by advanced ICT systems. All these technologies can promote the development of a peak collaborative state experienced by the group as a whole and known as “networked flow” [42]. Sawyer [43,44], who referred to this state with the term of "group flow", identified several conditions that facilitate its occurrence: the presence of a common goal, close listening, complete concentration, control, blending egos, equal participation, familiarity, communication and the potential for failure. As noted by Gaggioli and colleagues [42], networked flow occurs when high levels of presence and social presence are matched with a state of "liminality". In particular, three pre-conditions have to be satisfied:

- group members share common goals and emotional experiences so that individual intentionality becomes a *we-intention* [45] able to inspire and guide the whole group;
- group members experience a state liminality, a state of "being about" that breaks the homeostatic equilibrium previously defined;
- group members identify in the ongoing activity the best affordances to overcome the situation of liminality.

Social presence and networked flow can be fostered by serious games as well. An interesting study realized by Cantamesse, Galimberti, & Giacoma [46], for example, examined the effect of playing the online game World of Warcraft (WoW), both on adolescents’ social interaction and on the competence they developed on it. The in-game interactions, and in particular conversational exchanges, turn out to be a collaborative path of the joint definition of identities and social ties, with reflection on in-game processes and out-game relationships. Another interesting example is *Mind the Game*™, developed by our research group [47] to enhance the optimal functioning of groups. The serious game does not only promote cooperation and competitive processes, but also stimulates a proactive co-construction of knowledge that foster the emergence of we intentions, networking opportunities and in-group dynamics.

5 Conclusion

In this paper we discussed the role of serious games as positive technologies. According to Positive Psychology theoretical framework and Positive Technology approach, we demonstrated that these applications are able to promote hedonic well-being, eudaimonic well-being and social well-being,

First of all, serious games can foster positive emotional states by enhancing the different forms of pleasure they are intrinsically made of. In particular, we discussed the importance of sensorial, epistemophilic, social, cathartic and neural pleasure.

Secondly, serious applications for computer game technologies can be associated with flow experiences and, thus, with psychological well-being. Throughout high level of presence and flow, technologies can, in fact, promote optimal experiences marked by absorption, engagement, and enjoyment.

Finally, serious games are able to increase connectedness and integration. To achieve such a complex goal they have to work on a mutual sense of awareness, as well as social presence and situations of liminality. In this way, groups can access peak creative states, known as networked flow optimal experiences, that are based on shared goals and emotions, collective intentions, and proactive behaviours.

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