A gamification approach to promote sports values

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Abstract. The practice of sports play an important role in the behavioral development of both players and supporters. The educational impact over the sport practitioners has a high influence especially in children and youngsters. To translate adequate values from the sport activities to the final behaviour of them, requires from an adequated educational methodology, and from new and innovative tools, which could be used by educators and coaches (in the case of sport activies) to guide the youngsters adequately to avoid threats as racism, intolerance or violence. This paper presents a new educational methodology that has been designed to be later applied to a video game (based on football), to learning sports values and, at the same time, avoiding non-desirable behaviours. The final gamification approach is based on two related software systems: the first one, allows to coaches evaluating the behaviour of kids during their training and matches. The second one takes the coaches evaluations, and transform them into skills points. These skills points are later used by the kids to improve the performance of their Non-Player Characters (NPC) in the video game (so their football team performance in the video game, will depends on their behaviour in the sport activities). The paper presents both, the educational methodology designed, and the two software modules developed (coaches evaluation system and video game).

Keywords: Gamification, sport values, video games, educational tools

1 Introduction

Sports, as cultural element of socialization, play an important role in the behavioral development of children and youngsters [7]. Research have shown the influence of the sports as an essential element of development that contributes

to the success of the education system maintaining health, correcting social inequalities, and improving social inclusion and promoting solidarity [21].

In many European countries the promotion of a social and moral development of children through the physical education it is a core element of their curriculum [1]. For this reason, education in values through physical education and sport play an important role in the social and moral development of children [15].

However, in the las two decades some sports have become a negative influence for the children development due to the increasing number of threats presents around it such as violence, racism, discrimination and intolerance, among others [19]. In this context emerges the SAVEit project[4]. This project was born with the idea that the best way to tackle these problems is through the education, so the main goal of this project is to support educational and innovative approaches to prevent and reduce violence and intolerance in the grassroots sports, specially on football, although its results and impacts could be transferred to other sports.

The main contribution of this work is the presentation of our gamification experience to promote sports values for children, who belong to different European clubs of football. The paper aims to describe the methodology applied when designing a gamification experience to teach sport values to a group of children. Through this video game and the application of gamification elements we pretend to motivate children (who are already involved in sportive activities) to learn sports values and, at the same time, modify their behavioral patterns, when these behaviours are not adequate in terms of violence, intolerance or other non desirable values for the society.

2 Education in sports values through gamification

Traditionally, sport values have been associated to competition, health, personal effort, equality, spirit of justice and the pursuit of victory by own merits, etc [7]. However, in the research community focused on the sports values, it is possible to find two main groups of opinions: on one hand, those researchers who advocate the idea that activities not generate values of their own, so it is necessary to create learning situations to develop those specific values. On the other hand, those researchers who believes that sports activities promote values of their own and not only positive values, but also negative ones [5], [16], [26].

This work agrees with the idea that it is necessary to provide innovative tools and educational programs in order to teach sports values. Resources such as Virtual Worlds (VW) [3], [12], or Serious Games [20], [28], have demonstrated a huge potential as educational tools. At the same time, research in areas such

[4] http://www.saveitproject.eu/saveit/

as Artificial Intelligence or Computational Intelligence, have demonstrated that the application of algorithms, techniques and methods [11],[10], and how their findings and contributions to related areas on Affective Games [17], or Language Learning [4], [2], can be successfully applied to improve educational processes, outcomes and to increase the interest of both, students and teachers.

Games technology is widely available, fun and entertaining for people of all ages. Its utilization combined with traditional training and educational approaches it could provide one of the most powerful tool for knowledge transfer in almost every application domain [9]. Thus, the use of gamification of learning would be an interesting approach that increasing the students motivation towards learning.

Gamification it is a novel concept that has increased its popularity in recent years, it was developed in the Industry in 2008, although it was not until 2010 that the adoption became widespread. The first documented use of the term gamification was in 2008 and this concept was defined as the use of the game design elements, in non-game contexts with the intention of increasing the participation of a person and motivate him/her to learning something or introduce new patterns of behaviour [8].

Increase the motivation of users or provoke them certain motivations through the use of video games is also a new issue that is been studied through the Affective Game. Affective Games research have focused theirs effort to adapt the video games to the users emotional state, through the evaluation of the emotions and replaying them with changes in the dynamics of the game [17]. This technology could provide several benefits to the player experience such as adopting new game mechanics depending on her/his affective state and creating game content dynamically to fit and provoke motivation feelings to the player[17].

The implementation of this type of technologies in the education field has had positive results due to children feel more motivated to complete the activities or challenges proposed [13]. Aware of the potential of video games as educational tool for the learning, it has been developed the SAVEit project.

3 A gamification design framework: the SAVEit project

The main goal of the SAVEit is to design innovative learning materials to promote sports values between children and youngsters football player. For this reason it has been proposed a learning methodology using gamification techniques.

The starting point of this project was developed a football video game and the software system to connect sports values with the video game, and then design a methodology of learning sports values using the video game as a gamification-based tool.

3.1 Video game development

In order to developed the football video game it has been followed the gamification design elements proposed by Professor Werbach [27]. These elements are Components, Mechanics and Dynamics.

- **Components**: are the resources and the tools that we use to design the game. These are achievements, avatars, levels of game, process-bars, rankings, quests, virtual goods, etc.
- **Mechanics**: are the basic components of the game that drive the action forward and generate player engagement. These are the rules of the game, the challenges, competitions, cooperation, feedback, resource acquisition, rewards, trading, turns, or win states
- **Dynamics**: are the way in which the mechanics are set in motion; they determine the users' behavior and are related to the motivation of the player. For example constraints, emotions, narration, relationships and progression.

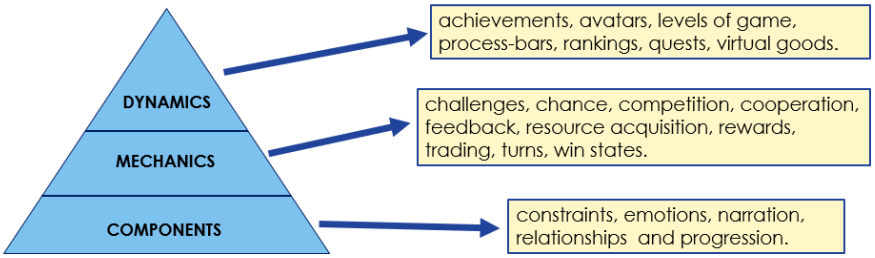

Fig. 1. Elements of the gamification [27].

Taking into account all these elements (see Figure 1). The outcome was a football video game with the following characteristics:

Game elements	Resources
Components	Football avatars, rankings, level of difficulty
Mechanics	Gain points to improve the skills of their NPCs, Virtual Leagues and coaches rewards
Dynamics	Competitive emotions

Table 1. Summary of the main elements used to develop the video game.

- *Components of gamification*: it has been used football avatars, rankings and different levels of difficulty, etc.

Main categories	Related Values	Definition
1. TOLERANCE	1. Sportsmanship	Positive behaviours towards opponents, accepting defeats.
	2. Tolerance	Respect and consideration for other people, regardless of their personal or social singularities.
2. RESPECT	3. Companionship	Respectful relationship with playmates.
	4.Concern for others	Showing interest for the members of the opposing team.
	5. Obedience	Accepting the decisions of the coach and /or referee. Respect rules of the game.
3. TEAM SPIRIT	6. Team Cohesion	Do something for someone else and for the sake of the team performance, maintain tactics, and game style (explicit and implicit) recommended by coach.
	7. Reception	Admission of another person to the group and active support, seeking their well-being.
4. PERSONAL EFFORT	8. Showing skills	Be able to use correctly skills or abilities required in game situations, both technically and tactically.
	9. Conscientious	Doing ones best all time, and not letting others down.
5. GAME ENJOYMENT	10.Game enjoyment	Enjoying the game regardless the result, experiencing feelings of satisfaction.
	11. Contract maintenance	Playing according to the spirit of the game, accepting what happens.

Table 2. Sport Values most voted.

- *Mechanics*: in the game the users have to gain points to improve the skills of their Non-Player Characters (NPC). This improvement is translated to a better chance of obtaining best results in the game. Therefore, the video game provides an external reward to those kids with better behaviour during the training and matches. Best players in the game will obtain these rewards given by their coaches, such as tickets to an official football game, visit the first team of the club, etc.

- *Dynamics*: children have to play a football match against the teams of their colleagues. The main motivation for the children is to gain points to improve their skills in the virtual team, but also to compete for the best position in the virtual league.

Once we had the video game developed, the second step was to identify which are prevalent values in football. After a review, 25 values were extracted from the state of the art related to sports [6], [18], [23], [24]. Once compiled, an online survey for the coaches was created, where they had to assess how important, or relevant, was each of those values using a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The most voted values would be used for the creation of a learning module for the coaches and also will be included in the video game (Table 2 shows the most voted and its classification in 5 categories).

The third step was to design a software system to connect values with the video game. An application for coaches was developed, where they had to create

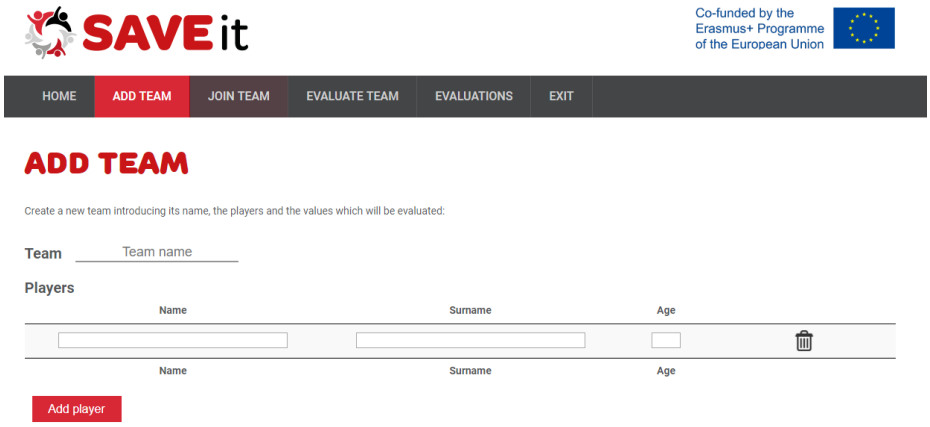

Fig. 2. Application for coaches, an example of the interface to add a team.

the football teams and sign up the children on the application, where they could assess the behaviors and sports values (see Figure 2).

3.2 Sports values learning methodology

Once we had the tools developed (football video game and coaches' application), a learning methodology was established to promote sports values using these tools and it is divided in the following actions:

INDICATORS	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Greetings upon arrival at the facilities or changing rooms during training and matches										
Say goodbye when leaving the facilities and/or chaining rooms in training and matches.										
Give thanks when it is appropriate.										
Respect the rules established by the Club, the team/coaches and facility managers.										
Respect for colleagues in the pitch										
Respect for peers in the changing room										
Respect for the technical staff (not to gesticulate when they make decisions, not to answer...).										
Accept the differing opinions of his colleagues										
TOTAL										

Table 3. Example of a evaluation form to assess the respect value

In first place, a learning course on sport values was developed, it is composed by 5 modules, that coaches must follow in order to learn how to promote sport values, and then implement these contents in their training sessions and assess the values and behaviours of the children. For these evaluations, coaches will have to evaluate each player individually on a set of established indicators through a evaluation form (Table 3 shows an example of questionnaire to assess the respect value, D is the days of evaluation) where, they will have to tick the box of positive attitudes that occur satisfactorily on each training day during a period (10 days in the example showed in Table 3). If it is not fulfilled in a positive manner, the box of that indicator should be left blank. After each day there will be a summation that will give us the final score of the child. That will be translated into the application web for the coaches (Fig 3 shows an example of the evaluation of a child in the all the sports values).

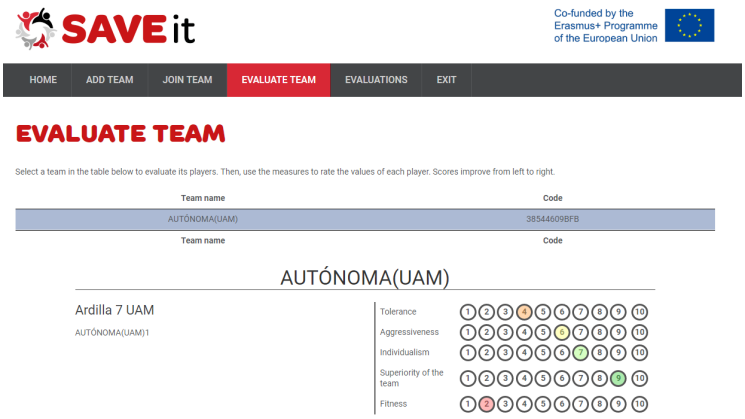

Fig. 3. Coach application to evaluate the children.

Once a coach has evaluated their team and the grades have been stored in the database, these data can be accessed from the video game. When a player logging in, the game will get him/her a fix number of skill points. These skill points are calculated as the average value obtained per each kid taking into account the coach assessment. Equation 1, shows how these points are obtained, where $e.value$ is the points given by coach per each "sport value", during the training or match sessions. These points are divided by the total number $\#e$ of "sport values" considered per kid. Then, this result is divided by 10 and multiplied by 20, to convert it into a score between 2 (minimum points) to 20 (maximum points). Finally, this number of skill points will be distributed by the player among the five NPC attributes: Speed, Resistance, Strength, Defense and Technique, each affecting to a different aspect of their Non-Player Character in the game (see

Figure 4).

$$P = \frac{20}{10} \frac{\sum_{e \in E_i} e.value}{\#e} \tag{1}$$

In the Affective game field, the emotions and behaviour of the user have usually been evaluated through a monitoring hardware systems to gather emotional information from the player [25] or through the developed of new techniques for emotional modelling [14]. In the save-it project, the values outcomes will be evaluated through the results in the video game and reports stored in the video game. Through these analysis we can see the evolution of each user, since children who get worse results in the video game is likely they had had a bad attitude or behaviour during the trainings or matches and vice versa. The final goal of this project is to evaluate if the use of a football video game as gamification element have any impact of the values and behaviours of a group of children.

Currently, the project is running on the second stage, the next step will be to deploying and testing the videogame in order to evaluate their usefulness and impact of the project over the target groups (coaches, parents and children enrolled in grassroots sport clubs).

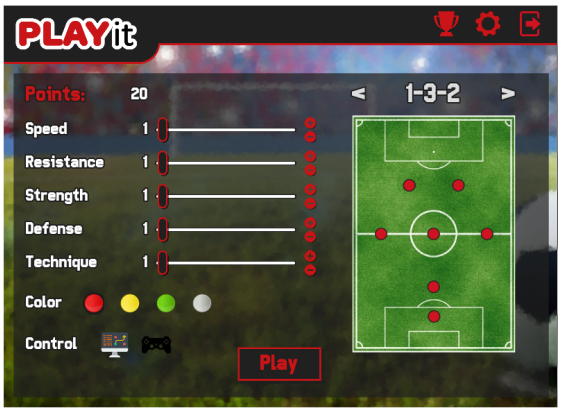

Fig. 4. Interface of the video game, this example shows the 20 points that can be distributed among the 5 technical characteristics for the NPC.

4 Conclusions

Education in values is a relevant issue that should be considered as key element in the design of any educational program and have an special relevance in

the sports education. As it was mentioned in the introduction of this work, in many European countries the social and moral development through the physical education it is a fundamental part of their curriculum [1]. So it is necessary to raise awareness between the main stakeholders, teachers, parents, coaches, psychologists, etc, in create and develop innovative approaches to education in values. Indeed, learning through video games is touted as a novel way to educate and activate an appropriate acquisition of values.

The gamification presented in this work born with the idea it is possible to transform intentional children behaviours into habitual behaviours through the human motivations present in the games. Although, these behaviours will be learned with the intention to improve their skill points in the video game, the use of these behaviours may be repeated without conscious intention [22] and they can be set in their values systems.

In the near future, the video game will be tested on real scenarios using different football clubs currently involved in the SAVE it project. The different values considered in this research, and presented previously in section 3.1, has been tested and evaluated by a set of 12 professional coaches belonging to the K.A.S Eupen Footbal Club at Belgium [5]. The methodology proposed has been evaluated and revised by the different partners associated to project. Currently, a first pilot has been designed to be applied in a control group of kids to assess the usefulness of the methodology proposed.

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References

1. Richard Bailey, Kathleen Armour, David Kirk, Mike Jess, Ian Pickup, Rachel Sandford, and BERA Physical Education. The educational benefits claimed for physical education and school sport: an academic review. *Research papers in education*, 24(1):1–27, 2009.
2. Anke Berns, Antonio Gonzalez-Pardo, and David Camacho. Designing videogames for foreign language learning. In *4th International Conference ICT for Language Learning*, Florence, Italy, 2011.
3. Anke. Berns, Antonio. Gonzalez-Pardo, and David. Camacho. Game-like language learning in 3-D virtual environments. *Computers & Education*, 60(1):210–220, 2013.

[5] http://as-eupen.be/

4. Anke Berns and David Gonzalez-Pardo, Antonio Camacho. Combining Face-to-Face Learning with Online Learning in Virtual Worlds. In *Proceedings of European Association for Computer Assisted Language Learning Conference (EUROCALL 2011)*, pages 1–5, 2012.
5. José A Cecchini and Javier Montero. Consequences of the intervention programme for developing Hellison's Personal and Social Respon- sibility on fair-play and self-control behaviours. *Psicothema*, 15(4):631–637, 2003.
6. Capdevila Lluis Cruz Jaume, Boixadós Mercé, Veliente Lourdes. Prevalent Values in Young Spanish Soccer Players. *Int.Rev. for Soc. of Sport*, 30(3-4):353–371, 1995.
7. E. A. Delgado, A. A., Gómez. Sport as a platform for values education. *Journal of Human Sport and Exercise*, 6(4):573–584, 2011.
8. Sebastian Deterding, Dan Dixon, Rilla Khaled, and Lennart Nacke. From Game Design Elements to Gamefulness: "Gamification". In *MindTrek'11 Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, pages 9–15, 2011.
9. Damien Djaouti, Julian Alvarez, Hean-Pierre Jessel, and Olivier Rampnoux. Origis of Serious Games. In Minhua Ma, Andreas Oikonomou, and Lakhmi C. Jainm, editors, *Serious Games and Eduntainment Applications.*, chapter 3, pages 25–45. Springer-Verlag, London, 2011.
10. Antonio González-Pardo and David Camacho. Environmental influence in bio-inspired game level solver algorithms. In *7th International Symposium on Intelligent Distributed Computing (IDC 2013).*, volume 511, pages 157–162. Springer-Verlag, Studies in Computational Intelligence series, 2013.
11. Antonio González-Pardo, Fernando Palero, and David Camacho. An empirical study on Collective Intelligence algorithms for Video Games problem-solving. *Computing and Informatics Journal.*, 34:233–253, 2015.
12. Antonio González-Pardo, Angeles Rosa, and David Camacho. Behaviour-based identification of student communities in virtual worlds. *Computers Scince and Information Systems*, 11(1):195–213, 2014.
13. Juho Hamari, Jonna Koivisto, and Harri Sarsa. Does Gamification Work? A Literature Review of Empirical Studies on Gamification. In *47th Hawaii International Conference on System Science*, pages 3025–3034, 2014.
14. Eva Hudlicka and Joost Broekens. Foundations for modelling emotions in game characters: Modelling emotion effects on cognition. In *Affective Computing and Intelligent Interaction and Workshops, 2009. ACII 2009. 3rd International Conference on*, pages 1–6. IEEE, 2009.
15. Frank Jacobs, Annelies Knoppers, and Louisa Webb. Making sense of teaching social and moral skills in physical education. *Physical Education and Sport Pedagogy*, 18(1):1–14, 2013.
16. Koon Teck Koh, Shu Wen Ong, and Martin Camiré. Implementation of a values training program in physical education and sport: Perspectives from teachers, coaches, students, and athletes. *Physical Education and Sport Pedagogy*, 21(3):295–312, 2016.
17. Raúl Lara-Cabrera and David Camacho. A Taxonomy and Survey on Affective Games. *Future Generation of Computer Systems FGCS.*, 2017.
18. M. J. Lee and M. Cockman. Values in Children's Sport: Spontaneously Expressed Values Among Young Athletes. *International Review for the Sociology of Sport*, 30:337–350, 1995.
19. Ramon Llopis-Goig. Racism and Xenophobia in Spanish Football: Facts, Reactions and Policies. *Physical Culture and Sport Studies and Research*, 47(1):35–43, 2009.

20. Minhua Ma, Andreas Oikonomou, and Lakhmi C. Jainm, editors. *Serious Games and Eduntainment Applications.* Springer-Verlag, London, 2011.
21. Ann Macphail, Trish Gorely, and David Kirk. Young people's socialisation into sport: A case study of an athletics club. *Sport, Education and Society*, 8(2):251–267, 2003.
22. Markus ML Ortiz de Guinea A. Why break the habit of a lifetime? rethinking the roles of intention, habit, and emotion in continuing information technology use. *Continuing Information Technology MIS Quarterly*, 33(3):433–444, 2009.
23. Ana Ponce-de León-Elizondo, Jesús Vicente Ruiz-Omeñaca, Mariangeles Valdemoros-San-Emeterio, and Eva Sanz-Arazuri. Validación de un cuestionario sobre valores en los deportes de equipo en contextos didácticos. *Universitas Psychologica*, 13(3):1059–1070, 2014.
24. Miquel Torregrosa Álvarez and Martin Lee. El estudio de los valores en psicología del deporte. *Revista de psicología del deporte*, 9(1):71–86, 2000.
25. Wouter Van den Hoogen, Wijnand A IJsselsteijn, and Yvonne AW De Kort. Effects of sensory immersion on behavioural indicators of player experience: Movement synchrony and controller pressure. In *DiGRA Conference*, 2009.
26. Carla Vidoni and Philip Ward. Effects of fair play instruction on student social skills during a middle school sport education unit. *Physical Education and Sport Pedagogy*, 14(3):285–310, 2009.
27. D. Werbach, K., & Hunter. *The gamification toolkit: dynamics, mechanics, and components for the win.* Wharton di edition, 2015.
28. Michael F Young, Stephen Slota, Andrew B Cutter, Gerard Jalette, Greg Mullin, Benedict Lai, Zeus Simeoni, Matthew Tran, and Mariya Yukhymenko. Our Princess Is in Another Castle: A Review of Trends in Serious Gaming for Education. *Review of Educational Research*, 82(1):61–89, 2012.