A gamification approach for values education: results of a pilot study

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Abstract. The inclusion of video games with training purposes in physical and sport education has not had a big impact so far. However, as traditional methodologies to promote values can bore young people, the interest generated by video games can be a good tool to attract them. On an affective and emotional level, knowledge acquired through practice with games, or video games, is more meaningful for children. With these reasons in mind, along with the interest of overcoming negative values typically related with sports, a group of researchers started a project to join video games and education on values called *SAVEit*. The goal of this project is to use new technologies for promoting values on sports for children. More specifically, a learning methodology was designed focusing in the use of football video games, on which each children's virtual team performance depends on the children attitudes and behaviour in real life. This paper presents the preliminary outcomes of the pilot study carried out in a Spanish sport club, paying attention to the Respect value, and how students from 8 to 13 years old acquired it using the system.

Keywords: Video game, Sports games, values education, behaviour, affective, Gamification

1 Introduction

Traditionally, sports has been a fundamental human activity that have had a great influence on people's life. Communities of fans emerge around sports that promote both positive and negative values. Unfortunately, sports such as football are constantly threatened by violent incidents inside and outside the stadiums. This generates a set of negative values, such as violence, racism, discrimination and intolerance, among others [1, 2] that are transmitted and reproduced by the

youngest. This is the reason why education in values in the field of sports is important from a very early age.

Many of the reviewed studies related to values promotion in physical education and sports focus on identifying the values, beliefs, attitudes or motivations of the research subjects [3–5]. Although some studies focus on the value teaching processes [6] and some of them focus on value teaching in football training [7–9], very few studies incorporate video games in the learning process. For these reasons, SAVEit project emerges relevant to create new methodologies for values promotion, developing training material for the coaches and a video game for the players.

Traditionally, there are 5 types of programs applied to physical education and sports: a) Sport-based life skill program [10, 11], b) physical and social responsibility program [12, 13], c) socio-moral education [14, 15], d) sports for peace [16] and e) fairplay programs [17]. The tools and methodologies used in these programs include group discussions and moral dilemmas among others [18]. Although the outcomes of these programs have been positive, they can become boring for youngsters accustomed to pay more attention to electronic devices. As keeping the motivation of the children is one of the challenges in education, it is important to develop innovative methodologies using video games.

Next section will provide a brief introduction about how video games can be used to induce emotions and change behaviours. Section 3 describes the gamification approach that SAVEit developed to promote social integration between youngsters. Section 4 describes the methods and tools used to obtain data during the pilot study. Finally, Sections 5 and 6 shows the main results and conclusion extracted from this study.

2 Emotions, behaviours and video games

Emotions and behaviour have an important role in children development. On recent years, researchers have found that emotions play a key role in the development of personal and social skills; more specifically, affect, attention, memory and decision making processes [19–22]. Emotions are also related with motivation. As Johnson and Whiles states, *"if a game does not generate positive emotions in the user, it is unlikely to succeed"* [23].

There are evidences of the positive emotional effects on users behaviour. In fact, there are some researchers who have analyzed the use of video games to treat phobias and change attitudes and behaviors. Wouters et al. [24] conducted a study about learning perspectives on video games. They established four kinds of learning outcomes that games might induce: cognitive, motor skills, affective learning and communicative learning [24]. Related to the affective learning, there are some examples of the use of games to desensitizing fears and phobias. In this sense, they highlighted that *Half-Life* game could be useful to confront the fear of spiders and *London Racer* to deal with accident phobia. In both experiences,

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http://saveitproject.eu/

the results showed positive results and a change of attitude related to their fears and phobias. For these reasons, video games can facilitate attitudinal change because they have a great potential as a tool for promoting social values.

An example of how games can be used to promote some social values is provided by Paracha et al. [25], who developed a serious game known as *Shimpai Muyou!*. This game is focused on confronting Islamic bullying, promoting the culture and values of this religion. It combines intelligent instructional and narrative concepts to teach children (8-12 years old) how to manage emotional and sensitive situations that are common at schools. Through ethical dilemmas, children have to make decisions, explore strategies and face the consequences of their actions. The results of this project were capable of influencing the childrens perception of bullying and increase their awareness, moral understanding and empathy [25].

3 Gamification approach

In order to create an attractive and motivating learning methodology, it was decided to develop a football video game adaptable to the attitudes and behaviours of the players themselves. This means that, if a child shows good behavior during the training sessions and shows that he understands which is the value teached, he will obtain skill points that improve his performance in the video game. A child who does not act according the values teached will have a lower amount of points to improve his skills on the video game. In order to develop this gamification approach, the next steps were followed:
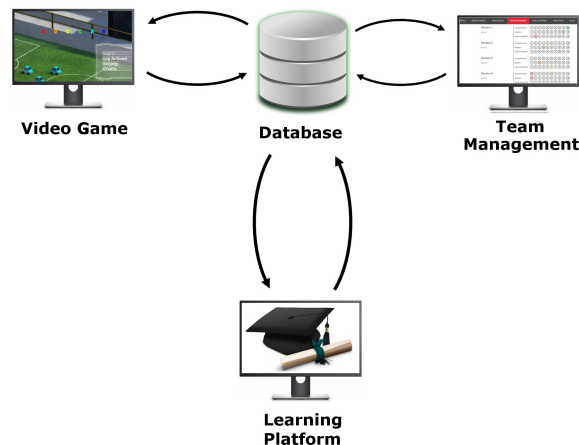

Fig. 1. Summary of the gamification approach model[26] built in the SAVEit project.

1. Values definition: five values were chosen to be teached during the intervention: 1) Respect, 2) Order, 3) Healthy Habits, 4) Companionship and 5) Coexistence.
2. Design of an online course for the coaches: this step was conducted to teach the educators related to the project how to transmit values and how the gamification approach works. The main purpose of this approaches is to provide activities and materials related to the values used in the intervention. And then use them in their training sessions to allow to acquire the corresponding knowledge regarding these values.
3. Develop the video game: using the software called Unity, a football simulation game was developed. In this video game, children have to play matches against bots and the gamification technique used aims to keep children motivated to have a good behaviour during the real training sessions. This engagement is produced because the skill points of the children inside the video game depend on the attitude of the children in real life[26, 27]. Children obtain skill points when they demonstrate their understanding of the values presented, and when they adopt those values on their behaviour. Coaches are in charge of evaluating the attitudes and behaviour of the children, introducing these evaluations in the video game. In order to connect the evaluations with the video game, we have created the application called "*team management application*" where the coaches have to create and register the teams and also evaluate the behaviour of the children. Figure 1 shows a summary of the proposed model. Once teachers have evaluated the behaviour of the children these evaluations are connected with the video game and translated into skill points. These skill points are distributed by the children among several technical characteristic of their virtual teams.

4 Methodology

The sample analyzed on this study was composed by 14 children between 8 and 13 years old from a Spanish football club. The gathering of the data was conducted using questionnaires and non-participating observation. The data extraction was conducted twice during the project: at the beginning of the implementation (in December 2017), and at the end of the football season (in December 2018). Coaches spent 3 days of observation, having to fill daily the questionnaires with the information gathered during the training sessions. It is important to remark that during these training session coaches have to implement the activities learned in the online course and also evaluate the behaviours and attitudes of the children.

The pre-test and post-test questionnaires were different for each value studied. Figure 1 shows the questionnaire related to "Respect", the value which will be analyzed on this pilot study. This questionnaire shows several indicators about the attitudes and behaviour designed to evaluate the corresponding value. During the training sessions coaches have to fill the table with +1 if the child manifests a positive attitude, or 0 if the child does not manifest the attitude or he/she

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shows a negative attitude. It is important to keep in mind, that these scores are translated to the video game through the "team management" application, and these results affect to the performance of the virtual team of each child.

CODE	INDICATOR	D1	D2	D3
Ind1	Assumes the rules established by the Club, team / coaches and managers of the facilities.			
Ind2	Assumes the work of the partners in the tasks in the field.			
Ind3	Respect the companions in the coexistence of the locker room.			
Ind4	Assumes the decisions of the coaches (without gestures, answers or protests).			
Ind5	Respect decisions of the arbitration team (without gestures, answers or protests).			
Ind6	Accepts opinions different from their own from their coaches, partners and / or followers.			
Ind7	He is educated with colleagues, technicians and followers regardless of their affinity with them.			
Ind8	Greets and says goodbye when arriving and leaving the facilities or locker rooms in training and games.			
Ind9	Give thanks when appropriate.			

Table 1. Example of the survey used to measure the different indicators for the value "Respect".

There was also a group questionnaires to measure the global behaviour of the team related to the "Respect" value. The questionnaire was composed by several indicators related to this value. In this case, coaches are requested to assess each of these indicators at group level, i.e. how the corresponding indicator is shown in the group. In this case the possible responses ranges from 1 to 5 where lower values mean that the corresponding indicator is not showed in the group, whereas 5 means that the member of the group have incorporated this indicator in their daily life.

5 Preliminary Results

This section provides an initial evaluation of all the data gathered through the method described in the previous section. This analysis is split in two different groups depending on the type of data analyzed: group and individual evaluations.

This initial study has been focused on the "Respect" value, and we have analyzed the results of 3 different teams where children have 8-9, 10-11 and 12-13 years old respectively. These three teams have been evaluated by their coaches, therefore in this study 3 different coaches have fulfill the different questionnaires.

It is important to note that for this preliminary study, all the participants belongs to the experimental group. This means that all the children have participated in the whole process including the video game.

In an initial study, the group evaluations for the "Respect" value are studied. As a global measure, Fig. 2 shows for each team the mean evaluations for each team: 1) 8-9 years old, 2) 10-11 years and 3) 12-13 years.. In this case, there are an increase in the age groups of 8-9 years and 12-13 years between both evaluations which means that these user groups have been more motivated with the proposed application. However, the group of 10-11 years old showed a decrease in the mean value. A possible reason about this result could be that the video game designed, or the activities developed during the training, are not interesting enough for this age range and thus, children are not motivated to incorporate the value because they are not engaged with the learning process.
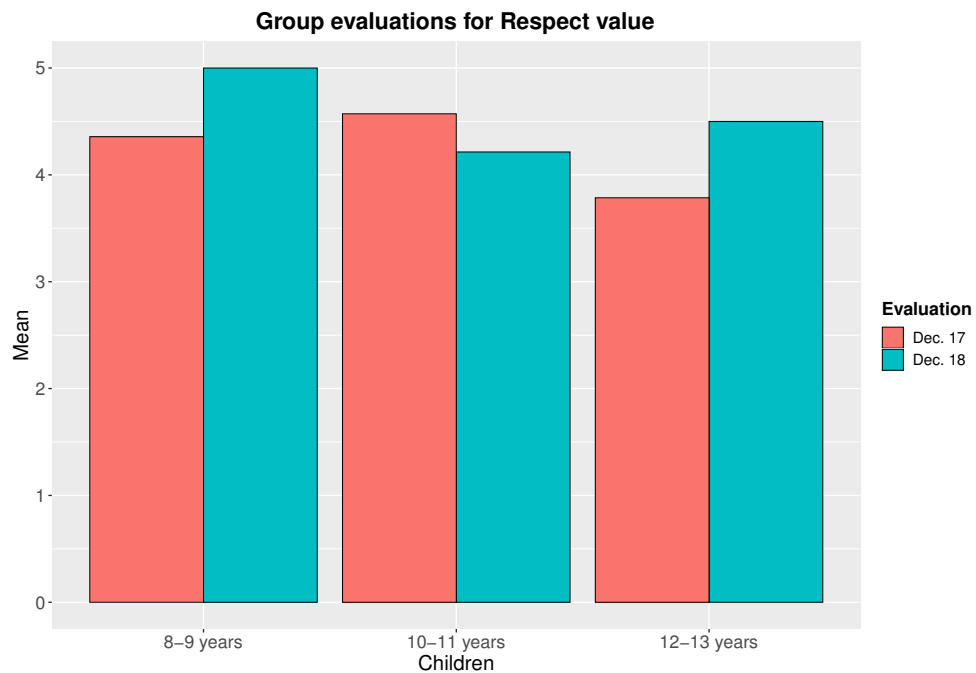
Group evaluations for Respect value

Fig. 2. Mean measurements of the "Respect" value

In order to clarify this result, we are going to analyze the individual evaluations of this specific group. The results about the individual evaluations of the children individually are shown in Fig. 3, where each Indicator code (Ind_1, Ind_2,...Ind_9) is shown on the x-axis, while in the Y-axis is number of the children that have shown the attitude related to each indicator of the "Respect" value. As it can be observed in this figure, the preliminary results show an increase in the number of children that have positive attitudes in the majority of the indicators. More precisely, 7 out of 9 indicators show the increase, which means that children have incorporated this attitude after the implementation of the methodology.
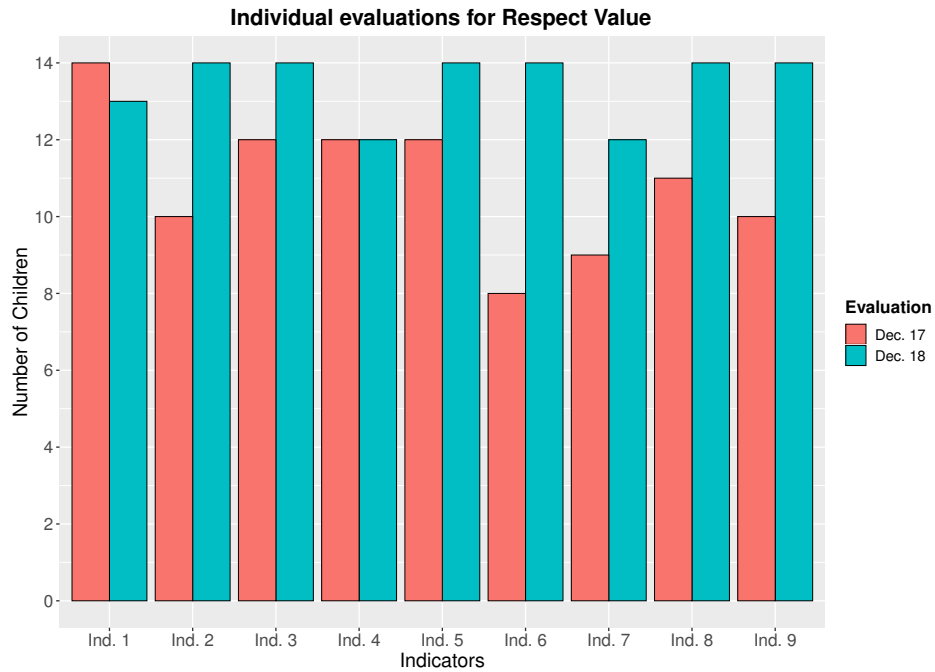
Fig. 3. Evolution of the attitudes of the children per indicator.

There are two indicators (Ind_1 and Ind_4) that children do not improve. In this case, at the end of the implementation less children showed Ind_1, and there was not any change regarding Ind_4. These two indicators are "*Assumes the rules established by the Club, team / coaches and managers of the facilities*" (Ind_1) and "*Assumes the decisions of the coaches (without gestures, answers or protests)*" (Ind_4). Therefore an explanation about this behaviour is that playing in a football team implies a lot of emotions, and in some situations (specially if there are children playing) it is quite difficult to assume some decisions, like leave the game and let another partner to play in your position when the result is bad, or when you are not playing well.

To sum up, we have observed a bad result in the questionnaire regarding the group, but analyzing in details the results of the individual questionnaires we do not observed this behaviour. Therefore there is a difference regarding the questionnaires. This could be produced due to the fact that coaches could not be interesting in the evaluation process due to the high number of the evaluations they had to do.

6   Conclusions

The gamification approach presented in this work is an innovative resource to values teaching in the field of sports. Not only because we have developed a methodology for training coaches in sport values, but also because we have introduced a video game as tool to engage children to have better behaviour.

The use of video games as tool for motivating children to improve their behaviour is based on the idea of transforming intentional children behaviours into habitual behaviours. Although, children learn the new behaviours to improve the skills of their virtual teams, these new behaviours will be repeated, or adopted, without conscious intention in the real life [28].

This work presents the preliminary analysis of the pilot conducted under the application of SAVEit project[29]. In this case three different groups are taken into account ranging from 8 to 13 years old. The results reveal that groups ranging from 8 to 9, and from $12 - 13$ years old have increased positively their attitude towards the "Respect" indicators. On the other hand, the group of $10 - 11$ years old showed slightly lower values which may indicate that this group is not motivated by the video game or maybe the activities developed to promote values were not motivating for the children.

This result can make sense if we keep in mind that the same video game cannot motivate in the same way to children of 8 years old and children of 10 years old. Nevertheless, a deeper study has been done, and we have analyzed also the evaluation for each children in this specific group. The "Respect" value is composed by 9 different indicators and the children belonging to the group of 10-11 years old improve, at the end of the implementation, 7 out of 9 indicators. This difference suggest that coaches could not be really involved in the evaluation process.

This paper presents a preliminary study that must be extended and studied in details in several ways, a deeper study is required to understand the performance of the methodology at two different levels: 1) At the individual level of the children, i.e. to perform a deeper analysis on the evaluation of all the children in the indicators of the 5 values presented in this methodology. 2) At the group level, to understand how the methodology impacts on their behaviour as a group, or whether there are other aspects that influence their global behaviour.

7   Acknowledgments

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