

# Graphics, playability and social interaction, the greatest motivations for playing Call of Duty. Educational reflections

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## ABSTRACT

War videogames raise a lot of controversy in the educational field and are by far the most played videogames worldwide. This study explores the factors that encouraged gamers to choose war videogames with a sample of 387 Call of Duty players. The motivational factors were pinpointed using a non-experimental descriptive exploratory study through an online Likert-type survey that was valid and reliable (Cronbach's  $\alpha = 0.897$ , Kaiser-Meyer-Olkin coefficient, KMO: 0.903). A factor analysis with varimax rotation was applied, which yielded 7 dimensions: graphics/playability; social interaction; learning; challenge/overcoming; fantasy; fun; and competition. Considering the score obtained for each dimension, it can be concluded that the most influential motivational factors were game graphics/playability game and the social interaction allowed by its multiplayer online status, both of them being factors determined by game design elements. These aspects should be considered in the design of educational activities so as to make them impactful and motivational.

**KEYWORDS:** MOTIVATION, VIDEOGAMES, VIDEOGAME DESIGN, EMOTIONAL EXPERIENCE, NEUROSCIENCE

## 1 INTRODUCTION

The following research question can be posed within the current academic context, and considering the high rate of videogame use: What makes videogames so appealing? The first answers point to design (graphics, sound effects, storytelling, interactivity, etc.), the purpose of which is to involve the gamer at an emotional level. The design elements generate emotional states (Crawford, 2003) which in turn support the learning process (Ostrander & Schroeder, 1996; LeDoux, 1999; Martínez, 2000; Jensen, 2004, 2006; Immordino-Yang & Damasio, 2007); especially if they have to do with the need to preserve the life (De Beauport, 1994) of the character or avatar of the player. War videogames stand out within this field.

In a review of online game servers (Xfire.com; Gamespy.com) performed in mid-2006, afterwards in mid-2009, and subsequently in 2011 and 2013, it was found that 60% of the most sought-after videogames recreated war environments that included World War II, current wars or even futuristic ones. This is a fact that prompts pedagogical reflection on the values of

identification supposed in the military scenery (epic) as a gaming “attractor.” Hence the initial questions which need to be asked: What makes war videogames so appealing? What encourages gamers to play them? And on the other hand, what do gamers learn playing them?

Previous research, neuroscience contributions, and the answers of gamers themselves have been used to answer these questions.

## 2 EMOTION AND MOTIVATION WHEN PLAYING VIDEOGAMES

The present study considers emotion and motivation as closely related psychological processes with an adaptive function (Fernández-Abascal, Martín & Jiménez, 2007). From a neurobiological perspective, emotion responds to a type of physiological/sensorial stimulation which is transformed into feelings and actions (Chóliz, 2007; LeDoux, 1999). These spontaneous or intentional (directed to goals) actions are considered motivated behaviors. That is why, from a practical point of view, it is difficult to separate both processes. Likewise, motivation appears as the force that triggers the behavior, and such force is determined by physiological aspects, different features of personality, cognitive factors, emotional reactions or behavioral patterns (Castilla del Pino, 2000; Chóliz, 2007). Our study of war videogame playing starts from the assumption that the gaming environment, both from the sensorial and the psychosocial point of view, generates emotional states which motivate the game-playing behavior. Nevertheless, the self-motivational nature of the gaming behavior itself must be considered as well.

Our choice of this approach sought to emphasize the importance of design. Sensorial stimulation is achieved through design, the body being activated and altered through the senses – which becomes visible at a physiological level and, consequently, at an affective-emotional level (emotional states) too. It is additionally necessary to consider other factors which naturally intervene in the decision to play a videogame, such as cognitive and social ones. All these elements converge, resulting in behaviors motivated towards playing the videogame.

### 2.1 Design and emotions in the game

The purpose of videogame design is to generate virtual environments which engage the user's perceptive capabilities, which provide them with a sensorial reward (Crawford, 2003), and which generate the feeling of immersion where the player “feels” that he can “participate.” This participation is enabled through the interactive features of the game; the realism offered

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through its graphic interface; the musical background; the sound effects; and, finally, the game's interactivity. The options to control the actions, the reinforcement of success, and the exaltation of achievements, all become key elements to generate the emotional state that motivates players during the game development. There is no consensus regarding this issue, but, in general, the elements of videogame design which generate emotions in gamers and encourage them to play are: graphic interface; musical background; sound effects; interactivity; and narrative structure, among others.

### 2.1.1. Graphic interface

Research into the effect of images on the brain (Belmonte, 2006; Jensen, 2004) has been used in the world of videogames and in the generation of sensations among recipients (Crawford, 2003; Byrne, 2004). In this context, Darley (2002) highlights that sensuality is exalted to the maximum extent at present, utilizing all the necessary resources to enhance sense stimulation, independently of the semantic weight that they may have, which is sacrificed on behalf of the pursuit of a spectacular effect. Regarding videogame images, this author claims that the feeling of realism provided strongly depends on the quality of the images designed and projected through the screen. And in many cases, this becomes a predictor of playing time (Crawford, 1982; Sherry, Lucas, Greenberg & Lachlan, 2004).

On the other hand, the world of videogames keeps on developing software, graphic engines, processors and diverse devices that will progressively make it possible to implement better textures, more polygons, better effects representing physical phenomena, the falling of water or people, smoke, fire, explosions, wind effects etc. all of which contributes to increasing the level of realism in the game's virtual environment and, therefore, its appeal. Both images and sound –especially when combined– become powerful elements for the generation of emotional states. These stimuli are neurologically processed at great speed, and they settle in the unconscious areas of the players' brain (Martínez, 2000; De Beauport, 1994). That explains their influence on communication, motivation and learning processes.

### 2.1.2. Interactivity/playability

Interactivity is another factor of analysis and a key element to achieve such aims as appeal, immersion, emotion and motivation in videogame playing.

Dominic (2007) conceives interactivity as the exchange between a human being and the game's system. Interactivity is thus understood as the opportunity to act in the game that is offered to the player, which involves all the controls handed over to the player in the game environment through external devices. This entails being physically involved in making things happen on the screen. In this regard, the gamer has the ability to modify the actions being represented, even when the possible "new scripts" are predetermined by artificial intelligence programming.

This interactivity is very positively valued by players, because it allows them to be part of those who direct the actions in this tridimensional environment where they are navigating. It is a way of feeling power, dominion and control, which results highly motivational. Darley (2002) uses the term "vicarious synesthesia" to address the sense of controlling what is happening in the present, within a specific game's environment, which gives the player the "feeling of presence," through the

dominion of external controls over acts which involve great danger and are performed at great speed. This capacity of interaction between the player and the scene through the use of external commands is called playability (relative to the handling of controls).

### 2.1.3. Social interaction and gaming motivations

Gaming motivations have to do with those elements which incite, maintain and drive behavior, therefore acting as "reinforcers" inside the game environment. Traditionally, in the field of videogame design, the reward system was based on such aspects as the immediacy of answers; the feedback on actions performed through peripherals; and the achievements obtained: an increase in scores, lives, weapons, ranks, etc. However, the reward system inside the game currently transcends the behavioral scheme to move on to a more social and interactive scheme, where the opportunities to interact with others are more important than being the winner in a game. Competitiveness decreases in those cases, and on the contrary, it increases when playing only with the computer (Hosokawa & Watanabe, 2012). Today's videogames, and particularly war videogames, have an online multiplayer mode which allows social playing, in teams, as well as the development of leagues and competitions around which multiple interaction opportunities are offered, and also taking advantage of the neurological bases of social reward obtained through them (Bos, Talwar & McClure, 2013). This is one of the features that make Call of Duty an appealing game: the online multiplayer game option.

### 2.1.4. Effects of music and sound effects on videogames

During the 1990s, the deepening of studies in the area of neurosciences revealed that music causes effects on the right hemisphere of the brain, which contains the areas related to abstract thinking, creativity, the bases of memory and iconic processing, and is also closely linked with affectivity and the limbic system responsible for experiencing emotions (De Beauport, 1994). Along these lines of research on the use of music and sound effects in the virtual environments of videogames, Shilling (2002) pinpoints four sound elements included in America's army, namely: footstep sounds, vehicles, weapons and general environment. Each one of these sounds provides clues for players to orient themselves in the game's scenery, and gives realism and precision to their actions. Among all sounds, the most important ones to evocate the sense of immersion in virtual environments are environment sounds, which go relatively unnoticed when they are present, but are clearly noticed when they are not present. Therefore, Shilling, Zyda and Casey (2002) proved not only the emotional impact produced by the sound of interactive supermedia but also that the emotions evoked in a simulation have a positive impact on the acquisition of knowledge about the events occurred during the simulation.

Finally, the use of music and sound effects in the creation of videogames and virtual environments is important in three ways: it helps the gamer to understand the game; it enhances the creation of a sense of immersion; and it generates emotional impacts. That is why videogames constitute powerful learning and training tools which can be used by educational institutions for training purposes in diverse skills or competences. As a matter of fact, the utilization of videogames has recently become a common practice within military organizations and, more

recently, in business companies and governmental institutions, as well as in the training of medicine specialists.

### 3 METHODOLOGY

The main goal in the present study was to determine the gaming motivations for those who play a war videogame –Call of Duty, in this case. A secondary objective was to investigate the possible learning outcomes taking as a reference the opinion of actual players.

#### 3.1 Type of research

Exploratory field research work was performed using an online survey with the players of our selected game. This kind of investigation is also called e-research because of the important role played by data and information-gathering means (Couper, 2000). Variables related to the design, play and learning process were examined (See Table 1).

#### 3.2 Population and sample

The population for this study included all the players of the videogame under analysis in any of its versions, both in PC and platforms, from every country. The sample selected was constituted by 394 players who answered the survey voluntarily and were contacted through their game clans, gaming communities' web sites, international leagues and championships, specialized forums and the players' own websites. Of all these players, who came from 35 countries, a total of 368 answered the whole survey. Most of them were: men, students, aged below 21, from Spain, playing less than 11 hours a week, members of a clan and participants in leagues or tournaments. Players with other sociological characteristics represented a minority.

#### 3.3 Instrument

The survey was drawn up from: a) the answers of gamers to a pilot questionnaire composed of open answers; b) the scale of game rewards authored by Sherry *et al.* (2004); and c) learning-related aspects. The result was a Likert-type scale with 32 items and 6 answer options varying from "I totally agree" to "I totally disagree." All questions were related to the videogame under analysis: Call of Duty (Cod), which is classified as a war videogame, of the shooter type, in the online mode.

#### 3.4 Procedure

The scale developed by Sherry *et al.* (2004) was adapted in an

initial phase. The final survey was subsequently designed, after which the process of approaching Call of Duty gaming communities started. The objective of the research was made known through a blog, and gamers were invited to answer the survey by referring them to a website specially designed for this purpose. Contact with gamers was established through the organizations that promote leagues, forums, and gaming communities, or through the websites of clans. The answers were gathered on a database with MYSQL for further processing and examination with the SPSS 15 software package for statistical analysis.

### 4 RESULTS

Two types of analysis were performed: a global factor analysis to determine the common dimensions underlying the answers which turned out to be in keeping with our research goal; and a descriptive analysis meant to establish the priorities in gaming motivations according to gamers.

#### 4.1 Factor Analysis

A reliability study made on the basis of internal survey consistency in order to check our survey's technical guarantees gave as a result a relatively high index value for this kind of survey, according to the criteria followed by Pomés & Argüelles (1991): Cronbach's  $\alpha = .88$ .

The global factor analysis was chosen in order to establish the groups of items that might correspond to a common motivation according to the correlation coefficients in the components matrix (García, Gil & Rodríguez, 2000). We checked that the adequate conditions for the realization of this type of analysis existed by obtaining the Kaiser-Meyer-Olkin coefficient and performing Bartlett's test. The adequacy of the sample for the execution of factor analysis was shown in both cases (KMO = .860 and Bartlett's sphericity:  $[\chi^2_{\text{approx}}(496) = 4222.851; p = .000]$ ).

An exploratory analysis of the main components was carried out together with a varimax rotation to estimate the number of factors and the percentage of variance explained by each one of them. Values below 0.40 were excluded in order to facilitate interpretation, and variables were sorted by the size of correlation within each factor. The results indicate a structure composed of 7 factors with values above 1 that explained 57.515% of the total variance of the correlation matrix among the survey items (See Table 2).

**Table 1.** Variables –related to learning– which encourage players to choose this game

<b>Related to design</b>
Graphics: the motivation factors are the high quality of graphics and the sound of videogames.
Realism: what players enjoy is the parallelism between real life and the game environment.
Playability: it is related to all the controls which allow the player to exercise the actions in the game environment, through external devices. The easier it is to exercise control over actions, the greater the playability is.
<b>Related to playing</b>
Emotion: The game is played to stimulate emotion as a result of the high action speed and the high quality of graphics.
Challenge: The game is enjoyed when testing one's own abilities and pushing them up to the maximum level. It also becomes a challenge when we desire to overcome a game level to move up to the next one or enjoy beating the obstacles that the game places in front of us.
Fun: The game is played to avoid the stress or escape responsibilities, as well as to avoid boredom.
Fantasy: the gaming motivation lies in being able to do things that cannot be done in real life, such as flying or driving a car, among other things.
Social interaction: the game is played to interact with friends and learn about the personalities of other players.
Competition: The player wants to test another player who has better playing skills and can react and think faster. This motivation also serves to show dominion and power within the hierarchy of the social group of players.
<b>Related to the learning process</b>
Emotional learning. The player recognizes that he is able to motivate and control himself in the game.
History learning. The player recognizes that he has acquired knowledge related to military history, weapons and context.
Technology learning: Recognition that competences have been acquired to use the game's technology

Table 2. Global factor analysis

Items	Factor loading
<b>Factor 1: Graphics / playability</b>	
15. I play Cod because I like its graphics and images.	.754
25. I play Cod because I like the sound effects.	.701
21. I play Cod because the controls are really funny to play with.	.657
16. I like Cod because the places shown in the game are like real places	.65
9. The playability of Cod is the funniest thing.	.629
3. I consider that Cod is thrilling.	.537
20. I like to find new and creative ways of moving through the game Cod.	.444
32. I like the emotion that I feel when I play Cod.	.42
<b>Factor 2: social interaction</b>	
6. In the games of Cod the members of my team support each other.	.765
1. Playing Cod i have been able to met a lot f people and i like it.	.737
10. The coordinated work to achieve an objective characterice my team of Cod.	.72
19. Often a group of friends and I spend time playing Cod.	.653
12. In the leagues of Cod I have learned to be more tolerant with the peopel and with myself.	.554
11. Playing Cod with my friends is important to me.	.551
24. With Cod I learn to configure/control the server of the gema.	.536
<b>Factor 3: Learning</b>	
27. Cod has served me to understand the World War II.	.802
31. Playin Cod I have learned about contemporary history.	.775
29. With Cod I have learned to handle wapons and war vehicles.	.57
28. Playing Cod I have learned to control my emotions in the critical moments of the game.	.543
<b>Factor 4: Challenge/Overcoming</b>	
13. I feel rewarded when I access to the next level of the game.	.815
7. I feel proud when I overcome a level of the game.	.8
30. The game Cod impulses me to effort in order achieve being the best.	.431
<b>Factor 5: Fantasy</b>	
18. I like to do something in Cod that I can't do in real life (ex.: pilot planes, drive tanks, shoot).	.805
2. I play Cod because it allows me to do things that I can't do in real life.	.773
23. I like Cod because it makes me fee like a real soldier.	.678
22. I enjoy the illusion of being the hero of the game.	.405
<b>Factor 6: Fun</b>	
14. I play Cod instead of doing other things that I should do.	.811
8. I play Cod although I have other things to do.	.758
4. I play Cod to avoid doing other things that I don't want to do.	.637
<b>Factor 7: Competition</b>	
5. I don't care when my friends are better than me in the game.	-.677
26. I like to play to show my friends that I am the best.	.553
17. When I lose against someone, I want to play again to beat him/her..	.419

$N=369$ ;  $\alpha = .886$

The factors were named after interpreting the saturations obtained by the items in each factor and based on the findings of Sherry *et al.* (2004) and their scale of videogame uses and gratifications.

The first factor accounted for the biggest part of variance 11.061% and was labeled as 'graphics/playability' in accordance with Sherry *et al.* (2004). It corresponded with 8 items which refer, on the one hand, to the effects of design: graphics, sound, tridimensional visual environment; and on the other hand, to the programing of the game controls that, as a whole, enhance the feeling of immersion and the degree of interactivity with the gaming interface. A high internal consistency was obtained in accordance with Cronbach's alpha coefficient ( $\alpha = .809$ ).

The second factor was named 'social interaction.' It explains 10.490 % of total variance and includes 7 items that refer to the coordinated teamwork in game play, the tolerance towards the rest of the people and towards themselves, the appreciation of contact with other players, and the friendly relationships established and maintained through the game. High internal consistency was found in this factor ( $\alpha = .793$ ).

The third factor was labeled as 'learning' and constitutes an innovation in relation to the scale of videogame uses and gratifications. It explains 8.918% of total variance and consists of 4 items that refer to players' understanding of World War II, what they have learned about contemporary history, if they have

learned to manipulate weapons and war vehicles in the virtual environment offered by the game, and if have learned to control their emotions in critical moments of the game. The internal consistency coefficient was .75 (Cronbach's alpha) which is considered high (Pomés & Argüelles, 1991).

'Challenge/overcoming' was the name assigned to the fourth factor, which explains 8.010% of variance and is composed by three items that refer to the satisfaction with the achievements and overcoming in the game which promotes self-improvement in itself.

Cronbach's alpha was .735, likewise considered high for internal consistency.

The next factor was named 'fantasy,' as in the scale of videogame uses and gratifications, and it explained 7.950% of variance. It included the items referring to the taste for identification with the characters of the videogame, the feeling of being a hero, a soldier, of driving tanks, piloting planes and other things that cannot be done in real life. This factor obtained an internal consistency coefficient similar to that of previous factors ( $\alpha = .762$ ).

The factor named 'fun' accounts for 6.095% of the variance and includes three items, which indicate that gaming takes place even if players have other things to do, other things that they should do, or to avoid doing other activities. It was found to

have a lesser internal consistency index than that of previous factors ( $\alpha = .695$ ). It is still considered high, though.

The seventh factor was named ‘competition’ following the guidelines of Sherry *et al.* (2004) and gathers the items related to the competitive state that can be present in the game and that stimulates the desire to win, to show personal skills, although this is secondary sometimes. It is worth mentioning that two of the three items that compose this factor share more or less similar saturations with other factors, which casts doubt on the validity of this seventh component. The results within this factor were very inconsistent ( $\alpha = .008$ ) which compromises the reliability of this survey section. That is the reason which led us to leave such items out of the subsequent analysis.

However, leaving the aforesaid items aside and considering the global results, it can be determined that this is a reliable and valid instrument from a psychometric point of view.

#### 4.2 Descriptive analysis

In accordance with variable reduction, established through the factor analysis technique and considering the validity of this study, it was found that the 12 variables initially proposed were regrouped into 6 dimensions or latent variables, namely: graphics/playability, social interaction, learning, challenge/overcoming, fantasy and fun. These variables will be discussed in this section in order of importance of each dimension (a common characteristic that underlies the answers).

##### Dimension 1: Graphics/playability

The variables: emotion, graphics, playability and realism converged on a single motivational dimension that was named graphics/playability although, if detailed, the indicators that encourage gaming the most are those with the highest scores in relation to item averages and the highest level of agreement among players (lower variability).

**Table 3.** Dimension 1: Graphics/playability

Items	M	SD
3. I consider that CoD is exciting.	4.88	1.15
32. I like the emotion that I feel when I play CoD.	4.87	1.30
9. The playability of Cod is the most entertaining thing.	4.67	1.33
15. I play CoD because I like its graphics and images.	4.41	1.47
21. I play CoD because controls are really fun to play with.	4.11	1.5
16. I like CoD because the places shown in the game look like real places.	4.11	1.66
25. I play Cod because I like the sound effects.	3.69	1.72

This factor regrouping provides us with the best evidence to highlight the link between design aspects (playability, graphics, realism and sound effects) and their ability to affect the senses and generate emotional states. This factor represents one of the main gaming motivations.

##### Dimension 2: Social interaction

This dimension included the indicators related to the coordinated work among team members, the relationship of mutual support, the friendly relationships and the opportunity to interact through the game.

**Table 4.** Dimension 2: Social interaction

Items	M	SD
6. In CoD games, the members of my team support each other.	5.14	1.23
1. Playing Cod i have been able to met a lot of people and i like it.	5.10	1.35
19. A group of friends and I often spend time playing CoD.	4.66	1.47
10. The coordinated work to achieve an objective characterizes my team of Cod.	4.46	1.42
24. Thanks to CoD, I learn to configure/control the game's server.	4.39	1.65
12. In the leagues of Cod I have learned to be more tolerant with other peope and with myself.	4.01	1.68
11. Playing Cod with my friends is important to me.	3.97	1.62

As can be observed in Table 4, the actions related to teamwork, the coordination in the task to be performed, together with mutual support between team members stand out. This finding contributes to the de-stigmatization of war videogames as a completely negative thing, demonstrating the motivational value that they have for CoD players, especially for those who belong to a clan and participate in leagues and tournaments.

##### Dimension 3: Learning

This dimension included the indicators initially pre-established for the variables related to the learning process, although not all of them were finally considered; only some related to emotional learning and history learning. The relatively high reliability coefficient (Cronbach’s alpha .75 for this type of instruments in accordance with Morales, 2000) in this dimension provides it with the necessary consistency to verify the matching level of players’ opinion about the indicators gathered here, although their answers are negative –as can be inferred from the measures obtained.

**Table 5.** Dimension 3: Learning

Items	M	SD
28. Playing CoD, I have learned to control my emotions in critical moments of the game.	3.54	1.73
31. Playin CoD I have learned things about contemporary history.	3.03	1.81
27. CoD has helped me to understand World War II.	2.82	1.79
29. Thanks to CoD, I have learned to handle weapons and war vehicles.	2.50	1.80

The players express that their knowledge of World War II or contemporary history has not increased playing this game. Nor are they learning to drive war vehicles. And the emotional control that can be acquired through the situations of extreme tension experienced in critical moments does not seem to have a decisive influence on the players either.

However, the indicator pre-established as technology learning turned out to be important for most players, though it was located in the social interaction dimension (see Table 5).

##### Dimension 4: Challenge/overcoming

*Challenge/overcoming* was the label assigned to the convergence of indicators for two types of variables: one related to gaming motivations: challenge; and the other linked with the learning process: emotional learning.

**Table 6.** Dimension 4: Challenge/overcoming

Items	M	SD
7. I feel proud when I overcome a level in the game.	4.67	1.55
13. I feel rewarded when I reach the next game level.	4.04	1.76
30. CoD drives me to make an effort to succeed in being the best.	3.67	1.70

The effort required from the gamer in order to advance through the different gaming levels, stimulates self-esteem and satisfaction with achievement when such levels are overcome. This is confirmed by the average score (M) obtained in this dimension, which puts it in third place in the classification of gaming motivations.

**Dimension 5: Fantasy**

The dimension named fantasy confirmed the aspects associated with this variable and included one of the elements proposed within realism in design variables. And even though fantasy is one of the most present factors in all kinds of games from a psychological point of view, due to the chance of creating ‘fictional realities,’ one could expect it to be more present in the gaming environment under study. However, the opinion of the players involved in the present study shows that this factor is one of the less motivational for playing the game.

**Table 7.** Dimension 5: Fantasy

Items	M	SD
18. I like to do something in CoD that I cannot do in real life (e.g.: piloting planes, driving tanks, shooting).	3.45	1.90
2. I play CoD because it allows me to do things that I cannot do in real life.	2.71	1.83
23. I like CoD because it makes me feel like a real soldier.	2.63	1.76
22. I enjoy the excitement of being the hero of the game.	3.54	1.86

According to the results, the illusory aspect of identification with the characters in the game constitutes a weak motivational element for these young adult players; the opportunity to feel like a hero or a real soldier is also irrelevant to them.

**Dimension 6: Fun**

The dimension named fun confirmed the indicators initially proposed for the motivational variable of the same name. This would reflect game play as an “escape or flight from reality” and the task to be performed. However, the data indicate that this aspect is the less motivational for playing the game.

**Table 8.** Dimension 6: Fun

Items	M	SD
14. I play CoD instead of doing other things that I should do.	2.47	1.58
8. I play CoD although I have other things to do.	3.36	1.74
4. I play CoD to avoid doing other things that I do not want to do.	2.47	1.58

In other words, according to the opinion of the players who participated in our study the avoidance of responsibilities or the desire to postpone other activities that should be carried out, constitute the less motivational factors for playing the game.

To sum up, it can be stated that the main motivations to play the game correspond to the design elements which generate emotions in gamers and the chance to interact with others.

According to the scores obtained, the most important aspect for the players involved in this study was the social interaction allowed by the game.

**5 RESULTS DISCUSSION**

The results presented in *dimension 1: Graphics/playability*, are suitable to highlight that videogames generate emotional states through 3D images, the environment of immersion and realism, the interaction possibilities (having the control of avatars in the game) and the sound effects. All of this is sent directly to the limbic area of the brain, which is responsible for affections and emotions. This area is part of the cognitive-affective structure that combines the ‘value’ element and the social element. In the case of online war videogames where players must interact, communicate with their team members, survive and ‘outperform’ others, emotions can go through a vast array of emotional states which range from the ‘fear’ of dying (being eliminated) to the ‘anguish’ over the constant threats or the ‘uncertainty’ of not knowing where the enemy is going to show up. All of this enhances the acquisition of behaviors or action patterns that can be used to win the game.

This is theoretically supported by the opinions of the neuroscientists working in the fields of emotion and learning, LeDoux (1999) and Damasio (2002), especially when they address the emotional state of fear, which leads us to learning actions that avoid or control such fear. With their experiments on emotional induction in virtual environments and learning, Shilling *et al.* (2002) support the explanation for the generation of emotional states through game interfaces, and how they drive the learning of avoidance behaviors to escape from negative emotional states. These findings must be revised in the educational field, especially considering the emotional states involved in learning situations. Above all, it should be reconsidered how secondary education students are being emotionally impacted, especially in terms of ‘immersion’ in subject contents, the strategies used to this end and their motivational power when faced with these other environments that are excessively stimulating from a sensorial point of view.

Regarding *dimension 2: Social interaction*, it must be noted that being a part of the clans, understood as affinity groups, imposes on the members the establishment of communication channels, the organization of functions and the assignment of roles to play before games and competitions, for which they also need to do some ‘training’ or previous rehearsing that stimulates getting to know game partners and in turn serves to measure one’s own skills and competences. That is why the environment of game practices can strengthen the cooperation between all the members as well as their tolerance capacity towards both the rest of people and themselves (Stallen & Sanfey, 2013). This is considered a positive aspect provided by the practice of CoD online and it can be enhanced from an educational point of view. On the other hand, apart from coordinated teamwork (Macmillan, 2001) –which is the concept used here to synthesize the previous ideas– the establishment of friendship bonds among the players is important in this dimension, regardless of whether players are previously acquainted or new friends made through the game interface, this being the main explicit gaming motivation.

The theoretical bases that support such empirical evidence are found in Sherry *et al.* (2004) and Jansz & Martens (2005) who found that the social interaction of videogames in general is a

reward factor and predictor of the playing time. This element is also highlighted by Elkonin (1985) and Gross (2000) when they address the importance of access to social space through the game, and the recognition of gamer identity among the social group of reference. This factor is also explained as an affiliation motivation, which enables belonging to a group that provides identity, reputation, instrumental and emotional support, and is also a source of activities (Chóliz, 2007). Likewise, Hosokawa & Watanabe (2012) highlight the pre-eminence corresponding to the social aspect of the game over competition, although this is a determining factor to win the game, and the satisfactions produced by being able to infer game moves when playing with others (Yoshida, Seymour, Friston & Dolan, 2010). In the educational sphere, it becomes vital to highlight the importance that social interaction has in academic performance, due to the relevance that being with others has for a human being.

Regarding *dimension 3: Learning*, it can be highlighted that the reflection about what is learned through videogames is not always clearly evident for gamers (Gros, 2004, González & Blanco, 2008). It is necessary to go through a metacognition process stimulated by the teacher and in accordance with the proposed learning objectives when the videogames are used as part of a didactic strategy, in a way that enables players to gain awareness of the educational contributions made by the videogame utilized. In *dimension 4: Challenge/overcoming*, there is a reference to personal performance and achievements; nevertheless, they have a social connotation at an individual level, as the achievement and personal achievements are publicly reflected on game screens when the avatar is revived after an elimination. And depending on the achievements, the players gain ‘advantages’ related to resiliency, eliminations in the plot of the game, defensive artifacts and the power of weapons. As pointed out by Elkonin (1985) “The action of winning is not the only relevant event of the game,” another relevant thing are “the possibility of finding an scenery to play in,” the role, the position, but above all, being admitted and identified with player identity and all its relational consequences. *Dimension 5: Fantasy* was not relevant for the players involved in the present study, which contradicts the opinion of some authors regarding the motivational aspects of videogames (Levis, 1999; Etxeberria, 2008; Gil & Vida, 2007). However, in our case, the results in this dimension –fantasy– may be influenced by the age and maturity level of participants, most of whom were young adults, and the little importance that they assigned to such elements –unlike the great importance that younger players might have assigned to this dimension. *Fun (dimension 6)* did not turn out to be a motivational factor either in the sense of an element implies evasion from the responsibilities of everyday life.

## 6 CONCLUSIONS

The sceneries and general environments of videogames are riddled with exciting elements, that is, they are capable of affecting gamers’ organism and generate internal changes that are reflected in their gaming motivations, in their performance and in their relationship with other gamers. Motivations, in turn, are affected by the instant gratifications or rewards offered both at a sensorial level, through their designs, and at a psychological level, through the well-being and satisfactions based on the achievements reached, and at a social level, through the possibilities offered in terms of relationship and recognition.

Given the strong emotional implication demanded by videogames, even more so when it comes to war videogames,

and considering the connection between emotion and cognition, videogames are recognized as the learning sceneries par excellence, regardless of their didactic and pedagogical uses. Based on research evidence and considering the strong appeal that war videogames have, they are considered to constitute a powerful motivational tool for learning due to the emotional implication that they require. From the didactic point of view, it is recommended to make use of the motivation that young people already have, to address topics related to history, with the wars evoked by videogames, with state policies, interventions in different countries and the value of peace. And from a personal point of view, to promote self-motivation, to stimulate the transfer of knowledge obtained through teamwork inside the game to other life environments (school, studies, family), and the transfer of competences to learning to learn which is implemented thanks to the interest of knowing how to win the game to other topics.

It is also recommended to bear in mind the emotional aspects for the design and creation of educational activities, as well as the promotion of activities involving interaction between participants in the educational process and the use of the power that images, multimedia, videos and videogames themselves have to make the teaching and learning process a more rewarding experience.

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