Article

Key Competences for Lifelong Learning through the "Animal Crossing: New Horizons" Video Game

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Abstract: The growth and impact of video games in education at an international level is a reality. Research shows that gamers can increase their knowledge, skills, and behavioural flexibility. However, there has been no in-depth research into the relationship between current video games and the key competences for lifelong learning set out by the European Commission. This research focuses on learning acquisition through playing the popular game "Animal Crossing: New Horizons". The Communicative Methodology has been used in this research through, on the one hand, use of the Social Impact in Social Media (SISM) method involving the analysis of 1000 comments posted on the social network Twitter and, on the other hand, through communicative inter, sanviews with five gamers and a family member of a user. The results show that the Animal Crossing video game promotes learning achievements regarding literacy, multilingualism, mathematical skills, digital competence, social skills, citizenship, entrepreneurship, and cultural awareness.

Keywords: competences; video game; social media; Animal Crossing; learning

1. Introduction

The video games sector is growing exponentially. In the last year, it has grown by more than 2.7 billion gamers [1]. These audio-visual products have an impact on entertainment [2], education [3], and culture [4], which also have an effect on gamers.

The aesthetics and narratives of video games are key elements in creating effects on players [5,6]. Several studies throughout history have pointed out that playing video games can have both risks and benefits [4]. Ryan and colleagues [7], who studied the impact of video games on gamers, found positive effects on issues such as education or prosocial behaviours. The negative impact has been proven to be related to issues such as violence. Thus, research has been conducted on the effects of video games on issues such as health [8,9], feelings [10], learning [11], or social relationships [12]. In this sense, the emergence of newsgames, conceived as recreational developments that encourage citizens' interest in news content, warrants attention [13]. This type of development has inaugurated an interesting field of work that connects journalism [14] and that focuses on the educational applications of video games [15].

In the field of education, several studies show that video games can have a positive effect on increasing knowledge and skills [16,17]. However, this learning has not been investigated by considering the learning achievements in relation to key competences for lifelong learning. This article aims to find out the learning achievements of gamers of the "Animal Crossing: New Horizons" video game. In this game, users live a life in which they must perform tasks such as talking to neighbours. This social simulation game, developed by Nintendo, is one of the best-selling games in recent years. To understand the impact of the video game in terms of learning achievements related to the key competences described by the European Commission, the tools used in the research were, on the one hand, an analysis of the Twitter dataset and, on the other hand, five communicative interviews with

gamers and one family member of a user. The results show that players learn competences such as literacy, multilingualism, mathematical skills, digital competence, social skills, citizenship, entrepreneurship, and cultural awareness. Our conclusion is that this video game contributes to the learning achievements of the key competences for lifelong learning outlined by the European Commission [18].

1.1. Video Games and Education

Video games have often been used for entertainment (Connolly et al. 2012). However, they have also had potential as an educational tool [16] and as a tool for the development of skills [17]. Games that were not intended to educate can drive indirect education [19].

Over the course of time, video games have begun to increase in development and become more popular, which, in addition to entertaining, involves various learning activities for the gamer [20]; these games are currently known as Serious Games: a typology of games that have the main objective of increasing knowledge, as well as generating a change in the player's behaviour. An example is the video game Cap Odyssey, developed by the company KTM Advance for the French Ministry of Agriculture, which allows the player to gradually get used to the principles of agricultural economics, including production, sales, and price evolution. In the case of entertainment-only video games, we find Call of Duty, developed by Treyarch, Infinity Ward, and Sledgehammer Games. This series of war-style video games involves people shooting at each other in scenarios set in historical wars and current or futuristic battles.

Serious games are becoming increasingly important in the fields of education, training, and social change [21]. This has been echoed in scientific research, which is reflected by the increase in research on this audio-visual product in education. Yu [22], who conducted a systematic review of the literature in major databases from 2009 to 2018, found that the number of scientific publications had increased in recent years. Studies have particularly delved into issues related to their educational design [23], user motivations [24], and video game quality [25]. Video games build virtual worlds that players want to explore and experience to satisfy their curiosity [26]. Exploring new maps and solving new quests satisfies the need for and motivations toward exploration [27]. This curiosity is conceptualised by Kashdan, Rose, and Fincham [28] as a positive emotional–motivational system associated with seeking, recognition, self-regulation, and challenges.

Various studies on the motivations for playing video games show that these motivations can be diverse, depending on the type of game, with these motivations then in turn influencing the behaviours and preferences of gamers when playing online [29]. However, motivations can be produced by achievement, socialisation, and investment [30]. Furthermore, studies such as the one conducted by Nau and Liu [24] have also found that incorporating narrative elements into designs has been shown to be successful in terms of learning and encourages greater motivation. Likewise, Moradi and Noor [31] found that video game investment boosted players' intrinsic motivation to learn.

1.2. Learning Achievements through Video Games

Several studies, mainly focusing on video game development and its educational component, highlight that several strategies for encouraging players appear to increase the user's learning [32–34].

The effects of educational video games have been extensively studied, especially in recent years. Fraga-Varela et al. [35], who studied the impact of educational video games in classrooms through a quasi-experimental study, point out that the time spent playing these video games is related to the results obtained and improvements in players' academic grades. Likewise, Mostafa and Faragallah [36] point out that video games are an efficient didactic tool.

The use of educational video games can potentially be associated with an increase in knowledge in various didactic subjects and the academic performance of players [37]. For example, current studies show that these video games have increased knowledge in natural

sciences [38], nutrition [39], engineering [40], first aid techniques (Alonso-Fernandez et al. 2019), second language acquisition [41], programming [42], economics and entrepreneurship [43], and mathematical concepts [44]. Moreover, these products can improve players' skills. Research shows evidence of improvements in the skills of health care professionals [45], social skills in companies [46], and reading comprehension skills [47]. There is also research showing that video games are a tool that can contribute to behavioural changes or to raising awareness of certain issues that affect society. For example, we found studies showing their effectiveness in raising awareness about cyberbullying [48], climate change [49,50], disease awareness and healthy living [51], and abuse prevention issues [52].

Studies investigating these positive effects in education have also found that they can reduce depression and anxiety [53] and bring psychological and cognitive benefits [54] in addition to increasing attention, spatial awareness, memory, and balance skills [55].

These advances throughout research on video games and education show us that they are a tool that can generate learning [56]. However, the link between video games and the acquisition of key competences has not yet been studied. Therefore, this research aims to analyse the learning achievements acquired by gamers playing the popular video game "Animal Crossing: New Horizons", developed by Nintendo.

2. Materials and Methods

This research is an exploratory study that integrated two different research techniques developed within the Communicative Methodology [57]. Firstly, the Social Impact in Social Media Methodology (SISM) [58] was used to analyse comments on the video game posted on the social network Twitter. At the same time, six communicative interviews were conducted with users, one of whom was a family member of a user. Figure 1 shows the process established in the data collection for this research.
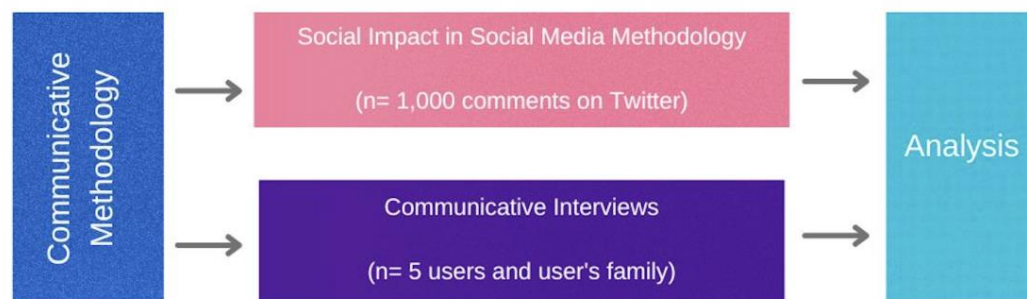

Figure 1. Flowchart of the data collection and analysis process.

2.1. Social Impact in Social Media Methodology Data Collection

The Social Impact in Social Media Methodology (SISM) [58] was used for the quantitative and qualitative content analysis of the selected Twitter sample [56]. The following steps were followed for the selection and extraction of the data:

In the first step, the research team selected one of the most widely used social networks in the world, Twitter, to extract the information. This selection was based on the following criteria: (1) the number of active users in millions in 2021, specifically, this network has 192 million [59]; (2) the comments are publicly available; and (3) the content published on the social network is related to the object of study.

In the second step, a specific keyword was selected to extract the sample; #ACNH. This way, only comments containing this hashtag were extracted. We extracted 1000 comments that were made during the Christmas holiday period from 24 November 2021 to 1 January 2022.

The research team has considered international ethical considerations in the selection, extraction, and subsequent analysis of social media data. Therefore, we followed the ethical guidelines endorsed by the Economic and Social Research Council [60] and Ethics in Social Science and Humanities [56]. We have also read the terms, conditions, and legalities of

the selected social network. Therefore, we have only collected public information without identifying users.

All data have been appropriately anonymised to avoid traceability and stored in a secure location. Therefore, we cannot share all raw data due to the current terms of the social network from which the sample has been extracted and the General Data Protection Regulation (GDPR).

2.2. Communicative Interview Data Collection

The interviews were conducted with three women and three men, five of whom are players and one of whom is a relative of an 8-year-old player. The selected persons are between 16 and 48 years old (see Table 1). The communicative interviews were carried out to find out in more detail what the users had learned during their time playing "Animal Crossing: New Horizons".

Table 1. Profiles of those interviewed in the communicative interviews.

Anonymised Code (Interviewees)	Years Old	Sex	Role
Maria	43	Woman	User's family (minor, 8-year-old)
Pablo	20	Man	User
Janet	24	Woman	User
Daniel	16	Man	User
Alicia	40	Woman	User
David	48	Man	User

The participants and the legal guardian of the minor were previously informed and signed ethical consent forms, this research thus incorporates the data acquired through the communicative interviews in accordance to the international ethical standards related to data collection. The data were coded and anonymised following the criteria of the European Commission [56]. In these communicative interviews, one of the researchers discussed the educational impact of playing the video game "Animal Crossing: New Horizons" with the players and one of the family members. First, the users were briefly told about the scientific literature found for the study. They were then asked whether they had acquired educational competencies such as literacy, multilingualism, mathematics skills, digital competence, social skills, citizenship, entrepreneurship, and cultural awareness. The players expressed and reflected on the educational effects acquired from playing the video game. The interviews were recorded, and a verbatim transcript of the interviewees' contributions was made.

2.3. SISM and Communicative Interviews Analysis

The SISM results and communicative interviews were analysed by considering the key competences for lifelong learning [18] set by the European Commission.

Based on the previous theoretical contributions and relating them to the study's objective, categories were created for the codebook used to analyse the comments on the social network and the content of the communicative interviews. These categories organise the data in the following ways: No validation makes mention of messages that were not related to the object of study; literacy competence identifies those comments that involved some aspect of literacy development providing further learning and linguistic interaction; multilingual competence shows the comments in relation to linguistic and intercultural competences; mathematical competence and competence in science, technology, and engineering relates to comments that contained mathematical thinking, knowledge of the natural world, or changes produced by human activity; digital competence relates to media literacy and critical thinking with the use of technologies; personal, social, and learning to learn competence refers to an individual's ability to reflect, manage one's own learning, and work constructively with others; citizenship competence refers to an individual's ability

to participate civically and socially with others; entrepreneurship competence identifies those comments that showed an ability to work collaboratively with others in order to plan and manage cultural, social, and financial projects; and finally, the cultural awareness and expression competence refers to the expression and creative communication of ideas and cultures through different artistic expressions (see Table 2).

Table 2. Codebook for the SISM Methodology and the Categories for Analysis of the Communicative Interviews.

Code	Elements/Category	Definition
0	No validation	The message is not related to the object of study.
1	Literacy competence	Ability to identify, understand, express, create, and interpret concepts, feelings, facts, and opinions orally and in writing.
2	Multilingual competence	Ability to use different languages appropriately and effectively to communicate.
3	Mathematical competence and competence in science, technology, and engineering	Ability to develop and apply mathematical thinking to solve a range of problems.
4	Digital competence	Confident, critical, and responsible use of digital technologies.
5	Personal, social, and learning to learn competence	Ability to reflect on oneself, manage time and information effectively, and work constructively with others.
6	Citizenship competence	Ability to act as responsible citizens and to participate fully in civic and social life.
7	Entrepreneurship competence	Ability to act on opportunities and ideas and to transform them into value for others.
8	Cultural awareness and expression competence	Understanding and respect for the way ideas and cultures are creatively expressed and communicated through a range of arts and other cultural forms.

The social network comments and communicative interviews were analysed in March 2022 using Excel and MAXQDA software. A researcher, trained in this type of analysis, carried out the categorisation of the comments and, subsequently, another researcher reviewed each of the previously categorised messages.

3. Results

The analysis of the comments on the social network and the interviews with players and a family member of the video game "Animal Crossing: New Horizons" shows that playing this game promotes the acquisition of the key learning competences. However, there are some competences that are promoted more than others. For instance, the citizenship competence is the one with most results in the SISM results, followed by the personal, social, and learning to learn competence and digital competence. On the other hand, interview results found that interviewee responses tended to coincide more with competences related to the acquisition of literacy, cultural, multilingual, and mathematical competences. The following subsections share the results of each research technique developed in detail to deepen the corresponding analysis.

3.1. Social Impact on Social Media Results

The results of the analysis of the 1000 comments made by players show that 86.3% exhibited some kind of learning, while 13.7% were discarded as they were not related to the object of study. Of all the competences acquired, the one that stands out is the citizenship

competence with 68.5%, followed by the personal, social, and learning to learn competence with 5.3%, literacy competence with 3.8%, and digital competence with 3.1%. In relation to the entrepreneurship and cultural awareness and expression competences, each category represented 2.4% of the comments, while mathematical competence and competence in science, technology, and engineering represented 0.6% and multilingual competence 9.2% of all comments (see Figure 2).
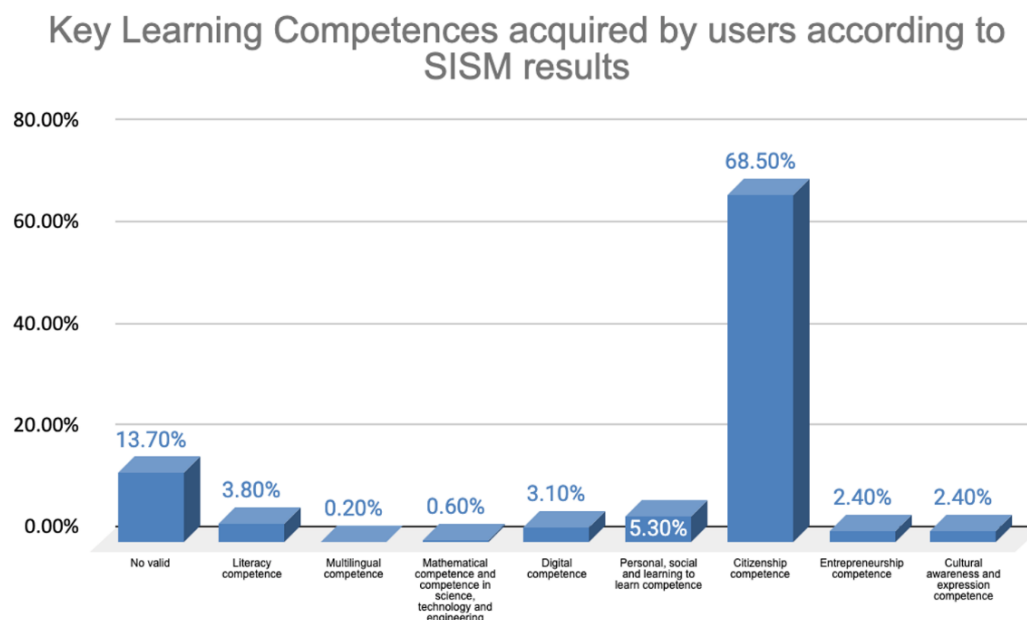

Figure 2. SISM results for "Animal Crossing: New Horizons" on Twitter.

The analysed comments that related to literacy competencies were related to the increase in knowledge regarding nature, work tools, and culture. This knowledge is acquired when users are in the virtual museum, doing tasks such as fishing, farming and construction work, or even when they are interacting with other characters. There are also virtual actions that simulate real life, such as reading books at school. The comments by the players that were also highlight the interpretation of feelings generated by the contents of the video game and the people they interact with.

Multilingual competence appears very infrequently and appears in messages when they interact with players from other cultures, as well as when they use a language mixed with two or more languages. Other competences that appear less frequently in the analysis are mathematical competence and competence in science, technology, and engineering. These comments show mathematical thinking through the accounting they must do in relation to the value of the food they produce and the objects they want to buy.

The messages published and analysed in the digital competence study show how players demonstrated their skills in the game, from creating scenarios that did not exist to dressing up in clothes they had bought in the digital shop. This skill makes it easier for players to handle themselves in this virtual world, which is conducive to the future use of other software or digital devices. It is also worth mentioning that players take photos, record videos, create music, and use social networks to showcase their audio-visual creations.

The analysed comments related to society show that, in the personal, social, and learning to learn competence, players were invested in collaborative work, whether it was building their virtual homes, their virtual gardens, or other tasks. These tasks made players grateful and made them want to continue working as a community. That is why they invited people who had worked together with them at parties and events that took place. Regarding the comments related to the citizenship competence, these were the most common ones found in the analysis. These comments are related to the creation of new

friendships and, in some cases, virtual romantic relationships. With these relationships, they shared various joint experiences such as parties, lunches, dinners, and breakfasts. They also went on joint outings such as shopping trips or visits to other players' islands or homes and gave gifts. Some comments showed the desire to share their lives with other gamers who belonged to other geographical areas virtually and in reality.

Entrepreneurship competence was shown through analysed messages when players had to manage their profits and expenses, when they made property exchange agreements, or when they had to take financial actions. Finally, analysed messages showed how the video game allowed players to design, decorate, and create scenarios based on architectures from different countries and to set up trips to other places where they learn about other cultures.

3.2. Communicative Interview Results

The people interviewed said that playing the "Animal Crossing: New Horizons" video game had enabled them to acquire various skills linked to education and training. These learnings have led people to live both virtually and in real life in a way in which they have learned things and received feedback at the same time. Janet, a player of the video game, explained how she started to learn how the world works thanks to the video game, "Playing the game makes you learn what real life is like" (Janet).

In relation to literacy competence, the people interviewed pointed out different acquired learning related to reading and writing and the ability to understand and interpret concepts. While also referring to literacy competence, one of the interviewees, the mother of a minor who played the video game, pointed out that when her daughter was four years old and was learning to read at school, the girl showed a lot of interest in playing her sister's video game, and it was her motivation and effort that led the girl to read the video game's dialogue and that this was how she learned to read. Maria, the girl's mother, explains it as follows:

> "The game is all written down and if you want to play you have to read what they are writing. And my daughter, who was learning her letters at school, would look at what was written and say 'mum, he told me this', and I would say 'yes, this' and she would reply 'yes, yes'. That's how she learned to read. She learned very quickly when she was 4 years old". (Maria)

All the people interviewed highlighted the learning they acquired on issues related to nature and culture while doing basic game tasks, such as fishing or collecting plants and food. Daniel, a 16-year-old boy who had been playing for a year, explained that he learned quite a few things but that one thing stood out. This learning was generated while he was fishing. He discovered an unusual type of fish that he later found on an internet search engine. The young man explains it as follows: "There is a fish in the video game that has a transparent head and I discovered that it really exists" (Daniel). They also commented that they had learned about culture and history by going to the virtual museum, while at the same time learning from the knowledge of their friends in the game. David, who had been playing the game for three months, says that he learned about prehistory in the museum and about the history of constellations from a friend he had in the game.

> "I learnt interesting things, for example in the game there is a museum where they explain the prehistoric animals. Also, about the constellations as there is a character that appears and talking to her, she told me a legend of each of the signs of how the zodiacal signs are formed and I didn't know, and I was fascinated". (David)

Four players reported that they had acquired multilingual competence, especially in English. One of them said that he was already playing video games in English to learn English. However, all four of them pointed out that to interact and have friendships with other people in the world, they had to interact in English. Alicia, a player who had been

playing the game for a year, pointed out that it was a lot of fun to make friends in other countries and that this encouraged her to learn English in order to establish relationships.

"I have improved my English. For example, I must use English, more than anything else, because even people from Japan also use English, so you speak it. I mean, it's not the same as at school because it's a more friendly or more personal communication, so you use English a little bit differently". (Alicia)

Likewise, Pablo, a player who said he was shy, pointed out that meeting people from other countries such as the United States, among others, meant that he had to translate texts and write. In the process, he was learning English.

"I don't usually socialise that much, and this is something that helped me to get out of my bubble a little bit, you know. And I've had to play with people who speak English and from so much translating there are things that are rubbing off on me". (Pablo)

In the mathematical competence and competence in science, technology, and engineering, five players pointed out that they had acquired and reinforced mathematical thinking, especially because they had to calculate the money they earned from the work they did and relate that to what they needed to pay. This learning is most visible in the answers given by the mother interviewed, as she explained that her daughter had to do the mathematical calculations regarding what she earned and what she had to spend to build things for her island. The child's mother explained it as follows:

"The house is getting bigger and bigger, and you have to pay and for that, you have to go to the cashier. For this, you must pay, for example, 30 euros for 30 fences and then it starts to be 200 or so fences, etc.". (Maria)

With regards to digital competences, all gamers mentioned some issues either because they handled the device better or because they used other programmes to interact with the community, such as Facebook, Discord, or Twitter. In the video game communities, the interviewees described how they had asked for help, got in touch with people, etc. Thus, the game allows interaction beyond the Nintendo game console. "You contact people, well, through many platforms such as Discord or Twitter, you can contact these people and meet up to go to their island and exchange items" (Daniel).

As for competences related to the ability to reflect on oneself, manage time and information effectively, and work constructively with others, all players and the player's family member emphasised the importance of interacting with other people in the construction of both your island and that of others. These players helped each other to improve their constructions and achieve their goals. David commented on how, at the beginning of the game, he observed and experienced people helping each other to build their islands. He explains: "When I started, I didn't know, and a girl helped me at the beginning and gave me different things to build on my island" (David). Janet also commented on how people you do not know offer and help by giving things or building.

"When something is missing, people give it to you. Sometimes they are at work, and they connect to give you something and this encourages people to connect with each other. I think it's one of the least toxic communities I know. People have kindness in giving you things and that cooperativeness ... I think it's very good that you can share". (Janet)

Social relations are also closely related to the citizenship competence, as users start to act as a community where players participate with other players and characters through events or actions. One of the issues that comes up in the game is that it is important to keep the cities clean and take care of the environment. Alicia explains that when:

"You create ordinances for the villagers. There is one that points out that you must keep your island clean, and you must take care of the plants. It is by taking

care of the environment and taking good care of your island that you can get between one to five stars for it". (Alice)

The entrepreneurship competence appeared persistently in all the communicative interviews conducted, as participants pointed out that financial issues and developing entrepreneurial skills while managing economic issues is a regular theme in the game. Janet pointed out that the principle of investment appeared through food products (turnips), which you must sell appropriately in order to recoup your investment.

"In the video game, the principle of investment comes up, especially with the turnips, which you can sell from Monday to Saturday. When you sell them, you must know how to sell them to get back what you have invested". (Janet)

Finally, the cultural awareness and expression competence appears, and this can be promoted because there are players from many parts of the world and also because the video game makes each zone have specific cultural objects. These objects must be exchanged with other people from other countries. Daniel explains how he needed a carpet from India, and he could only get it if he knew someone from there. Thus, he contacted a person from that country and they were able to make a cultural exchange.

"I needed a type of carpet from India, and I had to contact a person there through a platform. Then I went to their island, and we did an exchange of objects from each culture". (Daniel)

4. Discussion

The video game "Animal Crossing: New Horizons", through analysis of relevant comments and from the opinions of people interviewed, contributes to promoting learning achievements in relation to the acquisition of key competences of lifelong learning [18]. Therefore, playing this video game has a positive, direct, or indirect effect on improving players' knowledge and skills [16,17,19].

The design, aesthetics, and narrative of this video game can drive increases in knowledge and the improvement of educational skills outside of school. The elements introduced in the development of the video game encourage the motivation and learning of the gamers, which proves that some video games are developed with the aim of satisfying their curiosity and promoting their cognitive development [26]. Thus, the elements involved in video game development can be fundamental [5,6] in the possibility of improving the player's education.

We found that playing the game can enhance the knowledge of users regarding didactic materials on natural sciences, the acquisition of second languages, economics and business entrepreneurship, and mathematical concepts, as has already been examined in previous studies in relation to other games focused on education [37,41,43,44,47]. Playing this video game can also contribute to reading comprehension [47] and help change behaviour in relation to climate change [49]. Likewise, playing this product can promote collaborative and social values such as solidarity with other players from other parts of the world. This is an aspect that, together with the interrelationships between people from different geographical areas, is a motivating incentive for the player. Thus, this video game has an objective beyond entertainment, which is to contribute to social change [21].

The learning acquired by the people under study was further enhanced by the interactions they established with other people in the gaming community and the interactions they may have had outside. Thus, it is important to bear in mind that when playing a video game, it can be beneficial to generate feedback or interactivity and active learning with other people [61,62]. Therefore, the consumption of this educational video game can bring several educational and training benefits in various aspects, making it a game full of potential positive impacts. Educational benefits enhance the intrinsic motivation of the player to continue playing [31,63].

5. Conclusions

Video games with educational elements, such as "Animal Crossing: New Horizons", contribute to the promotion of learning achievements in relation to the acquisition of the European Union's key competences [18]. In this way, the gamer will be able to become literate, increase their cultural, digital, and mathematical knowledge, and improve their competency in other languages. Gamers will also acquire an entrepreneurial spirit and obtain social and citizenship skills.

However, despite the benefits we have found in this study, we would like to highlight that the player can have positive or negative experiences depending on the interactions he/she establishes within the community. Some interactions that, if positive, may benefit the people who relate to each other and, if negative, may affect the integrity of some of those people.

One limitation of our study is that we have not delved deeper into the role of interactions in the learning acquired in all the digital spaces in which the players of this video game participated. Therefore, future research should delve deeper into what types of interactions contribute to educational scaffolding and which ones are detrimental to educational learning through video games. This research can then contribute to an understanding of what encourages interactions that improve the education of players and how to encourage those interactions.

Institutional Review Board Statement: Ethical review and approval were waived for this study due the ethical criteria applied followed the ethical guidelines for social media research and human interviews developed in Ethics in Social and Humanities Sciences of the European Commission (European Commission, 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to ethical criteria applied.

Conflicts of Interest: The authors declare no conflict of interest.

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