sustainability

MDPI

Article

Perceived Utility of Video Games in the Learning Process in Secondary Education—Case Studies

Verónica Marín-Díaz [1], Begoña E. Sampedro-Requena [1,*] and Issota Mac Fadden [2]

[1] Education Department, University of Córdoba, 14071 Córdoba, Spain; vmarin@uco.es
[2] University Degli studi di Firenze, 50121 Firenze, Italy; isottamc@hotmail.it
* Correspondence: bsampedro@uco.es; Tel.: +34-957-212-617

Received: 20 October 2019; Accepted: 21 November 2019; Published: 28 November 2019

Abstract: The incorporation of videogames into the training of students is a reality that becomes very important to the extent that they are becoming more relevant in their personal lives. Linking aspects of their informal to formal life implies taking into account how students perceive this link. The purpose of this work is to determine what the perceived utility values are among secondary school students towards the inclusion of video games in the curricular development of the contents of the said educational stage, paying attention to the educational approach of video games. The quantitative methodology used is based on explaining the relationship between variables through a multiple linear regression analysis, targeted at 223 secondary education students. It has been proven that this utility is linked to the attitude that the student has towards the following aspects: The culture of educational success, diversity, and inclusion, as well as coexistence. Therefore, we consider that the linkage development of content-video games is an element in value to be incorporated into the classroom methodology by the teacher.

Keywords: videogames; student; secondary education

1. Introduction

In the 1950s and 1960s and, in the first years of the 1970s, the appearance of video games in the recreational sphere of people meant a revolution [1–4], since it overthrew television as an entertainment tool, such as television, as an entertainment usually overthrew other tools, since it offered the possibility of interacting with the medium (the console), turning to the subject in one in an active way, and offering a relationship against the passivity of television [5]. Throughout this period, the situation of video games has been, we could say the most varied, because it has gone through various stages of love and hate with society, being now in a moment of sweetness, and as such, reflecting the report published by Reference [6], for the Spanish Association of Video Games, in 2018. On the other hand, this favorable moment has also drawn considerable competition from other means of entertainment, because the game now competes with a new way of consuming television; this competition is reflected in the new game that in the last years has been sold, while some of them linked to popular series like Game of Thrones, Dexter, Prison Break The Conspiracy, Criminal Minds, etc.

Nowadays, and according to Reference [7] the current trend in the design of video games is that they develop in complex environments, where the role of the content, the ability of the video player, as well as their attitudes, is the point of inflection. These aspects make games more attractive in the field of education, since in most cases, here there are aspects that children and young people will face once incorporated into active life [8]. Reference [9] suggests and is collected in the research conducted at the University of Glasgow [10], where it is highlighted that to play a videogame allows young people to develop skills of communication, as well as the adaptation of their minds that help them later in their incorporation into working life. On the other hand, the European Union, and across

Europe generally, announces creative project for the development of videogames through the Support to European Cooperation Projects 2020, with the aim of improving the competitiveness of this sector of the European industry by the increase of its ability to develop work with a high potential of spreading, both in the EU and outside of it.

Focusing our attention on the educational sphere, what has been said so far is reflected in research, such as that of Reference [11] along with those of References [12–14], which endorses the relationship videogames-education-learning. On the other hand, one aspect that cannot be left aside is that today it is formed and evaluated in and for competitions, in which we note the use of the game as an educational resource as related to accomplish one series of competitions that will be necessary for the proper development of the individual in society [15].

In the educational sphere, the incorporation of videogames involves talking about their ability to teach content and develop skills [16,17]. According to Reference [18], the introduction of video games in the classroom implies an increase in the motivation for learning, since a real environment, such as that of the informal play space of each student, -that is to say that referred to his or her leisure time-, moves to a formal one of learning. Along these lines, we can indicate that they also promote the formation process to be active; and the development of critical thinking, the construction of knowledge, and the promotion of teamwork is encouraged [3,5,19–23].

Authors, such as from Reference [24], consider them an escape route, which helps the individual, in this case the student, to reduce his or her stress or anxiety situation, hence, studies on the subjects, already being carried out, considered already professional videogame players who are able to participate in competitions [25], because one of the strong points of the game today is to interact in teams, promoting the work in group from one constructivist perspective [15,19]. Reference [26] led out with Spanish university students, allowed one to underscored that experimentation with non-educational games made the content closer to work, that is to say, towards the process of learning that was more experiential and closer to reality. Research, realized by Reference [12], shows that students of French as a second language, consider that video games are effective for both learning the mother tongue, as well as the second, in this case, French. Reference [27], on the other hand, reflect that they also contribute to help students in the generation of social relationships. Reference [28], underline that students like to learn with video games that present simulations, and allow one to approach reality, have the advantage, and additionally, to deal with money that is not real.

On the other hand, although we consider that the education-video game overlap is positive, we can also find elements that hinder its incorporation into the classroom methodology, we refer to aspects behavioral as the addiction or violence [21,27]. From them, we want to reflect on the vision that students may have as recipients of the educational training process mediated by video games continuing the line of the works of References [11–14,27,28].

The development of methodologies active in the classroom in the XXI century involves the incorporation of digital resources, such as Tablet or Smartphone, in this regard one notes the development and presence that the games have in the lives of the students. At the same who performed work on the opinions of the teachers about the use of the videogames in the classroom as an educational resource [20], here it is necessary to develop studies that embody the visions, perceptions, and opinions that the students have of the possibility of using the game as an element that helps to develop the curricular content as such, and as reflected in the work of References [8,11,21,22]. On the other hand, studies, such as that led by Reference [10], reflect that if the students learn to use the educational way of the games, these help to prevent the typical generation behavior disruptive in the classroom [3,12,22], and from there the need to carry out studies on the figure of the student. Specifically, we focus on these students because Spanish educational law indicates, that at that age they must possess the skills and abilities that allow them to enter working life, and the world of video games is today a new field of work [9].

In this sense there is another aspect to analyze among the objectives of this work the usefulness perceived by the secondary students of the game compared to the learning of content curriculum at

their stage of education, studying the comprehensive influence, and details of independent variables as the gender of the student, the level that attends one at the stage of secondary learning, and the game in the network peers of the educational center.

This article highlights the usefulness that Secondary Education students have about the implementation of learning through this device. This is compromised by various elements, such as the attitude towards the culture of diversity and equality, as well as the fact that at a general level has its possibilities as a tool to develop the learning process of the curricular contents of this educational stage.

Faced with this exposed situation, and considering the voice of the students of secondary education, what aspects impact on the usefulness of the videogames so that the student holds in respect the learning of contents themselves at this stage, Understanding that these aspects ranging from the behavior towards the use of the video games, the ability displayed in the game before the culture of a successful educational process, the recognized ability in the videogames for education, the competence attributed to the game before the diversity and the suitability manifested in the game for the democratic values of equality, and living up to the hours spent playing a game for their learning contents during the week and over the weekend; also, it is interesting to explain whether the relationship between aspects of the usefulness of the game to observe the students of secondary education, is seen altered by independent variables, such as the gender of the student, for example, the course of education at school, or play in the network with peers from the educational center?

2. Materials and Methods

2.1. Participants

Study participants are a total of 223 students of secondary school, between 12–13 years old (N = 96), 43.9% are in the 14–15 years range (N = 98) and 13.0% are from 16 to 17 (N = 29). The majority go to public centers (97.8%, N = 218), while only 2.2% are enrolled in concerted educational institutions (N = 5). The courses where these students enroll are—15.2% in the first of Secondary Education (N = 34), 39.0% in second (N = 87), 24.2% in third (N = 54) and, finally, the 21.5% in the fourth (N = 48).

In relation to the use of video games, 51.6% (N = 115) use the mobile phone as the usual device with which to play; 26.5% (N = 59) the game console; 5.4% (N = 12) the computer; 4.5% (N = 10) the Tablet; 2.7% the mobile phone and the Tablet (N = 6); and the remaining 13.8% (N = 15) different combinations of these devices.

The hours they spend playing a game for their learning process varies, 45.7% (N = 102) do it between 1 and 3 h; 17.9% (N = 40) from 4 to 6; 6.3% (N = 14) between 7 and 9; 16.6% (N = 37) 10 or more hours, and 13.5% do not respond. While this temporary frequency varies with respect to the weekend, between 1 and 3 h 44.4% (N = 99); 22.0% from 4 to 6 (N = 49); 7.2% between 7 and 9 (N = 6); 20.2% 10 or more hours (N = 45) and, 6.3% have not answered at all.

Likewise, the playing habits of these participants are determined by the following data, 56.1% state that they do so alone (N = 125); 37.7% play accompanied (N = 84) and only 1.3% indicate doing so in both ways (N = 3); however, 4.8% do not respond (N = 11). 35.0% (N = 78) report playing on the net, compared to 40.4% who do not (N = 90) and; the remaining 20.2% comment doing it sometimes (N = 45). Regarding the customs of network play with other colleagues in the center where they study, 17.9% say they do (N = 40); 50.7% refuse to play with them (N = 113), and 27.4% answer they do so only sometimes (N = 61).

2.2. Instrument

The instrument designed ad hoc, contained a total of 52 items, where the first 12 are referred to socio-demographic aspects and temporal and behavioral habits towards video games; while the remaining 40 are typical of the study.

The Exploratory Factor Analysis (AFE) be executed with respect to the instrument, shows all the parameters that regulate it: Values in asymmetry and kurtosis close to ±1 which refers to a normal

distribution of the studied items; several response options in them, Pearson's low correlation between the factors; and more than two items to measure each factor [29]. By means of a method of extraction of factorization of main axes and of normalized varimax–Kaiser rotation with eigen values greater than 1, it is adjusted by six factors that explain 54.05% of variance, since factorial loads greater than 40 have been considered [30] it can be assumed; and, whose Kaiser-Meyer-Olkin values are acceptable (KMO = 0.798) [31], and Bartlett's sphericity (X^2 (861) = 4074.05 and $p < 0.001$) significant. The six dimensions are the following:

Dimension 1. Perceived usefulness of videogames regarding the learning of secondary content ($\alpha = 0.883$). Composed of 11 items measured on the Likert scale of 5 valuation options (where 1 strongly disagrees, and 5 totally agree), being an example of the item "They allow the student to recognize the primary and secondary colors".

Dimension 2. Behavior towards the use of videogames ($\alpha = 0.862$). Likert scale measurement of 5 frequency options (1 means nothing and 5 too much). It includes nine items, being an example of the same "I like to play video games".

Dimension 3. Ability observed in videogames in the face of culture in educational success ($\alpha = 0.803$). Composed of 7 items on the Likert scale of 5 valuation options (where 1 strongly disagrees, and 5 totally agree), being an example of an item "They can help people from a different culture from the country to have a lower failure rate at school".

Dimension 4. Behavior observed in video games towards education ($\alpha = 0.629$). It encompasses five items, being an example of the same "Video games can be educational", being the same measured Likert scale of five frequency options (1 means nothing and 5 too much).

Dimension 5. Fitness observed in videogames in the face of diversity ($\alpha = 0.846$). This factor integrates four items measured on the Likert scale of 5 valuation options (where 1 strongly disagrees, and 5 totally agree), one of them is "They can be used by people with physical disabilities."

Dimension 6. Behavior observed in video games for democratic values of equality and coexistence ($\alpha = 0.837$). Composed of four items on the Likert scale of five valuation options (where 1 strongly disagrees, and 5 totally agree), being an example of the item "They can give a stereotyped view of women".

Furthermore, and l analysis with fit reliability data of the entire instrument, obtained with the parameter alpha Cronbach, is quite good ($\alpha = 0.902$); as well as, the data was analyzed using an item-test linkage test, where Cronbach's alpha coefficient oscillates in all the items between $\alpha = 0.88$–0.90; Finally, the analysis of the discrimination capacity of the reagents analyzed gave a high discrimination power in the various items (with values of $p < 0.05$).

2.3. Procedure

The study based on a positivist paradigm, typical of quantitative research, is explanatory, seeking to define the variables that condition or relate to each other [32]; specifically, two o one aspect of the appreciated aspects useful in games and learning from them, where it is converted into the dependent variable, and the absorption by the predictors and students of the explanatory process, and would explain the assumed behavior towards the use of videogames, behavior observed in the game before culture in the success of education, behavior seen in the videogames in regards to education, behavior observed in the game before the diversity and behavior observed in the videogames for democratic values of equality and coexistence; without obviating the frequency time (hours) one spends playing videogames in terms of their learning process, both during the week and over the weekend. For this reason, a sample of students, previously determined, from secondary school was selected, requesting the appropriate permits from the legal tutors as they mark the ethical norms of the investigations.

2.4. Statistical Analysis

The analysis of the data is quantitative, being, in the first place, of a basic descriptive nature of the variables (measures of central tendency and measures of dispersion); previously an exploratory

factor analysis was performed, and in the next steps, step-by-step method; multivariate analyzes are made referring to multiple linear regressions; in general, looking for the model that more adequately explains the perceived utility in videogames regarding the learning of secondary content based on other factors; and, more specifically in relation to other predictive elements that determine the sample, all of them executed with the statistical program SPSS v.23.

3. Results

The descriptive results show greater values in the perceived usefulness of videogames regarding the learning of secondary contents (M = 3.58 and SD = 0.904); and, the ability observed in videogames in the face of culture in educational success (M = 3.56 and SD = 0.849). While the behavior towards the use of video games is estimated in a lower way (M = 2.48 and SD = 0.930); and the behavior observed in video games for education (M = 2.94 and SD = 0.896), as shown in Table 1.

Table 1. Descriptive analysis of the dimensions.

Dimension	N	Minimum	Maximum	M	SD
Perceived usefulness of videogames regarding the learning of secondary content (UPVACS)	214	one	5	3.58	0.904
Behavior towards the use of video games (AUV)	219	one	5	2.48	0.930
Ability observed in video games before culture in educational success (AOVCEE)	217	one	5	3.56	0.849
Behavior observed in video games for education (EVOO)	212	one	5	2.94	0.896
Fitness observed in video games before diversity (AOVD)	218	one	5	3.21	1.039
Behavior observed in video games for democratic values of equality and coexistence (AOVVIC)	203	one	5	3.17	1.118

The equation that best explains the perceived usefulness of videogames regarding the learning of secondary content (UPVACS), by the students of the secondary stage participating in this study, has been achieved through a multiple linear regression by the procedure of successive step by step, F (3.179) = 34.630 and $p < 0.001$, giving a corrected level of determination R = 0.35 and Durbin-Watson equal to 1.77, the latter suitable for being close to a value of 2 that indicates the interdependence of waste [14]. Therefore, the variables involved are AOVCEE (t = 6.478 and $p < 0.001$); AOVD (t = 2.671 and $p < 0.001$); and AUV (t = 2.395 and $p = 0.018$) as shown in Table 2.

Table 2. UPVACS [a] multiple linear regression.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	10.643 [b]	2.433		4.374	0.000 *					
AOVCEE	0.747 [b]	0.115	0.440	6.478	0.000 *	0.560	0.436	0.385	0.768	1.303
AOVD	0.443 [b]	0.166	0.181	2.671	0.008 *	0.419	0.196	0.159	0.772	1.295
AUV	0.202 [b]	0.084	0.149	2.395	0.018 *	0.304	0.176	0.142	0.916	1.092

Note [a] Dependent variable: Perceived ability of videogames regarding the learning of secondary education content; [b] Predictors (Constant), Ability observed in the game before the culture in the successful education process (AOVCEE), Fitness observed in the game before diversity (AOVD), behavior towards the use of the game (AUV); * Level of significance $p = 0.05$.

That is, the equation that explains UPVACS = 10.643 + 0.74AOVCEE + 0.44AOVD + 0.20AUV, which implies that the factors that explain the perceived usefulness of videogames with respect to learning secondary content are associated with the aptitude observed in the videogames before culture in educational success (AOVCEE); the fitness observed in video games before diversity (AOVD); and, the attitude towards the use of video games (AUV), while the frequency of the amount of time (hours) to spend playing with the videogames for learning, both during the week and at the weekend, are not considered variables predictive of this equation.

When studying the residues to generalize this model that UPVACS explains for the students of the secondary stage, we have already observed the perfect non-multi-collinearity through the value close to 1 of IVF, and the independence of the residues by Durbin-Watson [33]. However, it is also necessary to address the homocedasticity of the waste and the linearity of the same [34,35], the latter through the graphics made indicate that the two are met (scatter plot for and = zpred ex = zresid, does not expose patterns of association complying with homoscedasticity nor are linearity patterns observed), likewise, the values of normality of the residues by means of the Kolmogorov-Smirnov test (Z = 0.047 and $p = 0.200$).

The study of this model to explain UPVACS by students of the high school, has been divided according to the gender of students, expressing that conditioning factors vary from one genre to another, as it develops a continuation.

The best explanatory model of the perceived usefulness of videogames regarding the learning of secondary content (UPVACS), of the male students surveyed, F(2.90) = 16.762 and $p < 0.001$, has a value of $R^2 = 0.25$ and a Durbin-Watson value of 1.8 (close to 2, indicating the interdependence of waste [33]), being the variables that make up the equation: The ability observed in video games before culture in educational success (AOVCEE) (t = 2.933 and $p = 0.004$), and the fitness observed in videogames in the face of diversity (AOVD) (t = 2.448 and $p = 0.016$). So the resulting equation is UPVACS for male adolescents = 15.990 + 0.51 AOVCEE + 0.62 AOVD, where it is observed that the variable hours passed playing the games for learning during the week and the hours at the weekend, are not considered variables predictive of this equation.

In reference to the residuals of this regression, non-multicollinearity is supported by the IVF value obtained (see Table 3; on the other hand, the homoscedasticity of the waste and the linearity of the same [34], observed in the graphs comply with these assumptions, also, the values of normality of the waste by means of the Kolmogorov test–Smirnov (Z = 0.048 and $p = 0.200$).

Table 3. UPVACS [a,c] multiple linear regression for male adolescents.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	15.990 [b]	3.287		4.864	0.000 *					
AOVCEE	0.513 [b]	0.175	0.320	2.933	0.004 *	0.472	0.295	0.264	0.678	1.474
AOVD	0.627 [b]	0.256	0.267	2.448	0.016 *	0.449	0.250	0.220	0.678	1.474

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary education content (UPVACS); [b] Predictors: (Constant), Ability observed in videogames before culture in educational success (AOVCEE), Fitness observed in videogames before diversity (AOVD); [c] Selection of cases only for which gender = male; * Significance level $p = 0.05$.

For adolescent women, participants in this study, the equation that best explains UPVACS, F (3.86) = 31.172 and $p < 0.001$, obtained a value of $R^2 = 0.52$, and a value of Durbin-Watson 1.7 (independence of the residues for being a value between 1.5 and 2.5 as indicated by Reference [36]), where the variables that make up the equation: The ability observed in video games before culture in educational success (AOVCEE) (t = 7.118 and $p < 0.001$); hours playing the weekend (HJVFS)(t = 3.513 and $p = 0.001$), and the aptitude observed in videogames in the face of diversity (AOVD) (t = 2.194 and $p = 0.031$), as shown in Table 4. The resulting equation is UPVACS for female adolescents = 5.259 + 1.02AOVCEE + 2.33HJVFS + 0.44AOVD.

The fulfillment of the residuals of this regression to contemplate it as acceptability, yield non-multicollinearity, which is supported by the value of IVF in the various variables (all of them close to 1); the homocedasticity of the residues and the linearity of the same [34], shown in the graphs comply with these assumptions, also, the values of normality of the residues by means of the Kolmogorov-Smirnov test (Z = 0.045 and $p = 0.200$).

In view of the equations obtained with the division of gender, we observe that the variables that condition the explanation of the perceived usefulness of videogames regarding the learning of secondary content (UPVACS), vary, as well as, the coefficients, which indicate which will increase this utility for each unit that increases each variable [33].

Table 4. UPVACS [a,c] multiple linear regression for female adolescents.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi- Partial	Tolerance	IVF
Constant	5.259 [b]	3.216		1.635	0.106					
AOVCEE	1.022 [b]	0.144	0.569	7.118	0.000 *	0.646	0.609	0.531	0.873	1.146
HJVFS	2.326 [b]	0.662	0.263	3.513	0.001 *	0.313	0.354	0.262	0.990	1.010
AOVD	0.447 [b]	0.204	0.176	2.194	0.031 *	0.403	0.230	0.164	0.868	1.152

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Ability observed in videogames before culture in educational success (AOVCEE), Hours playing on the weekend (HJVFS), Fitness observed in videogames before diversity (AOVD); [c] Selection of cases only for which gender = female; * Significance level $p = 0.05$.

Then dividing the sample depending on the course of secondary education in which they are enrolled, the only model that explains the perceived usefulness of video games to learning content secondary (UPVACS) for freshmen, F (1.26) = 7.373 and $p = 0.012$, gave an $R^2 = 0.191$ and a Durbin-Watson value of 1.9 (indicating the interdependence of the residues), the ability observed in video games before diversity has the following variable in the equation (AOVD) (t = 2.715 and $p = 0.012$), resulting in UPVACS for students of first = 20.159 + 1.18AOVD, where it is observed that the variable hours passed playing the games for learning during the week and hours spent at weekend, are not considered variables predictive of this equation.

The residuals caused by this regression of the first students: Non-multicollinearity is supported by the IVF value obtained (see Table 5); on the other hand, the homoscedasticity of the residues and the linearity of the same [34]. As observed in the graphs, comply with these assumptions, as do also, the values of normality of the residues through the Kolmogorov-Smirnov test (Z = 0.047 and $p = 0.200$).

Table 5. UPVACS [a,c] multiple linear regression for first year high school students.

Variables	B	IS	Beta	T	S.I.G.	Zero order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	20.159 [b]	4.785		4.213	0.000 *					
AOVD	1.185 [b]	0.436	0.470	2.715	0.012 *	0.470	0.470	0.470	one	one

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Fitness observed in videogames before diversity (AOVD); [c] Selection of cases only for which course = first compulsory secondary education. * Significance level $p = 0.05$.

For students second best model explaining the perceived usefulness of video games to learning secondary content (UPVACS), F (2.74) = 28.551 and $p < 0.001$, has an $R^2 = 0.420$ and a value of Durbin-Watson of 1.9; the variables that contemplate the equation are: The ability observed in videogames in the face of culture in educational success (AOVCEE) (t = 6.271 and $p < 0.001$), and the attitude towards the use of video games (AUV) (t = 2.363 and $p = 0.021$), therefore, UPVACS for second graders is = 7.703 + 1.04 AOVCEE + 0.31AUV (see Table 6), while the hours that one plays videogames for learning during the week and the weekend are not contemplated in education.

Table 6. UPVACS [a,c] multiple linear regression secondary school second students.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	7.703 [b]	3.617		2.130	0.037 *					
AOVCEE	1.044 [b]	0.167	0.569	6.271	0.000 *	0.627	0.589	0.548	0.927	1.079
AUV	0.315 [b]	0.133	0.214	2.363	0.021 *	0.368	0.265	0.206	0.927	1.079

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Behavior observed in videogames before culture in educational success (AOVCEE), Behavior towards the use of videogames (AUV); [c] Selection of cases only for which course = second of compulsory secondary education; * Significance level $p = 0.05$.

The fulfillment of the residuals of this regression to contemplate it as acceptable, yield non-multicollinearity, which is supported by the value of IVF in the various variables (all of them close to 1); the homoscedasticity of the residues, and the linearity of the same [15], shown in the graphs, comply with these assumptions, as also do the values of normality of the residues by means of the Kolmogorov-Smirnov test (Z = 0.045 and $p = 0.200$).

The only model that explains the perceived usefulness of video games to learning secondary content (UPVACS) for juniors, F (1.42) = 13.077 p = 0.001, gave an R^2 = 0.219, and a value of Durbin-Watson 1.5 (indicating the interdependence of waste, which is acceptable according to Reference [17]), has the following variable in the equation: The fitness observed in video games before culture in educational success (AOVCEE) (t = 3.616 and p = 0.001), resulting in UPVACS for third-year students = 20.524 + 0.73AOVCEE, it is not predictive of the equation hours to play a game for learning during the week, and over the weekend.

In reference to the residuals of this regression, non-multicollinearity is supported by the IVF value obtained (see Table 7); on the other hand, the homoscedasticity of the residues and the linearity of the same [34], observed in the graphs comply with these assumptions, as do also, the values of normality of the residues through the Kolmogorov-Smirnov test (Z = 0.055 and p = 0.200).

Table 7. Multiple linear regression UPVACS [a,c] for third-year secondary school students.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	20.524 [b]	4.529		4.532	0.000 *					
AOVCEE	0.735 [b]	0.203	0.487	3.616	0.001 *	0.487	0.487	0.487	one	one

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Ability observed in videogames before culture in educational success (AOVCEE); [c] Selection of cases only for which course = third year of compulsory secondary education; * Significance level p = 0.05.

For fourth, the only model explaining the perceived usefulness of video games to learning secondary content (UPVACS), F (1.32) = 12.929 p = 0.001, has an R^2 = 0.266, and a value of Durbin-Watson of 1.8, being the variable contemplated by the equation: The ability observed in video games before the culture in educational success (AOVCEE) (t = 3.596 and p = 0.001), therefore, UPVACS for fourth-year students is = 15.738 + 0.91AOVCEE (see Table 8), where it is observed that the variable hours passed playing the games for learning during the week, and hours at the end of the week, are not considered variables predictive of this equation.

Table 8. UPVACS [a,c] multiple linear regression for secondary school students.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	15.738 [b]	5.699		2.761	0.009 *					
AOVCEE	0.912 [b]	0.254	0.536	3.596	0.001 *	0.536	0.536	0.536	one	one

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Ability observed in video games before culture in educational success (AOVCEE); [c] Selection of cases only for which course = compulsory secondary education room; * Significance level p = 0.05.

The fulfillment of the residuals of this regression to contemplate it as acceptable, yield non-multicollinearity, being accredited by the value of IVF in the variable; the homoscedasticity of the waste and the linearity of the same [34], observed in the graphs, comply with these assumptions, likewise, the values of normality of the waste by means of the Kolmogorov-Smirnov test (Z = 0.045 and p = 0.200).

Considering the division of the sample in function of playing in network with classmates of the center, the only model that explains the perceived usefulness of video games regarding the learning of secondary content (UPVACS) for students who do play in the network with classmates of the educational center, F (1.31) = 4.317 and p = 0.046, gave an R^2 = 0.094 and a Durbin-Watson value of 1.6 (noting the interdependence of the residues [36]), has the following variable in the equation the fitness observed in video games before the fact of culture in educational success (AOVCEE) (t = 2.078 and p = 0.046), therefore, UPVACS for students who play in a network with other colleagues in the center is = 24.361 + 0.55 AOVCEE.

In reference to the residuals of this regression, non-multicollinearity is supported by the IVF value obtained (see Table 9); on the other hand, the homoscedasticity of the residues and the linearity of the same observed in the scatter plots for y = zpred ex = zresid, does not expose patterns of association

complying nor are linearity patterns observed; also, one calculates the normality values of the residues by means of the Kolmogorov-Smirnov test (Z = 0.050 and p = 0.200).

Table 9. Multiple linear regression UPVACS [a,c] for students who play in a network with other school partners.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	24.361 [b]	5.828		4.180	0.000 *					
AOVCEE	0.553 [b]	0.266	0.350	2.078	0.046 *	0.350	0.350	0.350	one	one

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Ability observed in videogames before culture in educational success (AOVCEE); [c] Selection of cases only for which the subject plays in the network with colleagues from the center = yes; * Significance level p = 0.05.

The best explanatory model of the perceived usefulness of video games to learning (UPVACS) secondary content of students surveyed who do not play networking with other colleagues in the school, F (2.85) = 38,229 $p < 0.001$, It has a value of R^2 = 0.46 and a Durbin-Watson value of 1.7 (close to 2, indicating the interdependence of waste [32]), being the variables that make up the equation: The ability observed in video games before culture in educational success (AOVCEE) (t = 5.849 and $p < 0.001$) and fitness observed in video games to diversity (AOVD) (t = 2.677 and p = 0.009). So the resulting equation is UPVACS for students who do not play with other peers in the networked educational center = 8.085 + 0.90 AOVCEE + 0.58 AOVD, the hours that one plays videogames for learning during the week, and on the weekend, are not predictors of the equation.

In reference to the residuals of this regression, non-multicollinearity is supported by the IVF value obtained (see Table 10); on the other hand, the homoscedasticity of the residues and the linearity of the same [34], observed in the graphs comply with these assumptions, also, the values of normality of the residues through the Kolmogorov-Smirnov test (Z = 0.040 and p = 0.200).

Table 10. Multiple linear regression UPVACS [a,c] for students who do not network with other classmates of the school.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi- Partial	Tolerance	IVF
Constant	8.085 [b]	2.926		2.763	0.007 *					
AOVCEE	0.900 [b]	0.154	0.533	5.849	0.000 *	0.655	0.536	0.460	0.747	1.339
AOVD	0.582 [b]	0.217	0.244	2.677	0.009 *	0.512	0.279	0.211	0.747	1.339

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Ability observed in videogames before culture in educational success (AOVCEE), Fitness observed in videogames before diversity (AOVD); [c] Selection of cases only for which one plays in the network with colleagues from the center = no; * Significance level p = 0.05.

The only model that explains the perceived usefulness of video games to learning content secondary (UPVACS) for students who sometimes play networking with fellow school, F (1.52) = 8.590 and p = 0.005, gave an R^2 = 0.125 and a Durbin-Watson value of 1.9 (indicating the interdependence of the residuals, which is acceptable according to Reference [36]), the following variable in the equation has the behavior observed in video games for education (EVOO) (t = 2.931 and p = 0.005), as shown in Table 11, leaving UPVACS as a result for students who sometimes play in a network with their classmates = 27.691 + 0.86 EVOO, where it is observed that the variables in the hours spent playing videogames for learning during the week and hours on the weekend, are not considered predictive variables of this equation.

Table 11. Multiple linear regression UPVACS [a,c] for students who sometimes play in a network with other school partners.

Variables	B	IS	Beta	T	S.I.G.	Zero Order	Partial R	R Semi-Partial	Tolerance	IVF
Constant	27.691 [b]	3,624		7.641	0.000 *					
EVOO	0.860 [b]	0.293	0.377	2.931	0.005 *	0.377	0.377	0.377	one	one

Note: [a] Dependent variable: Perceived utility of videogames regarding the learning of secondary content (UPVACS); [b] Predictors: (Constant), Behavior observed in videogames for education (EVOO); [c] Selection of cases only for which the subject plays in the network with classmates = sometimes; * Significance level $p = 0.05$.

The fulfillment of the residuals of this regression to contemplate it as acceptable, yield non-multicollinearity, being accredited by the IVF value in the variable; the homoscedasticity of the residues and the linearity of the same [34], observed in the graphs comply with these assumptions, also, the values of normality of the residues by means of the Kolmogorov-Smirnov test (Z = 0.047 and $p = 0.200$).

In summary, the equations that explain the perceived usefulness of videogames regarding secondary content learning (UPVACS) both in general and considering some features that make up the sample are:

The results, shown in Table 12, show that the ability observed in videogames in the face of culture in educational success (AOVCEE) is a factor that conditions the explanation of the perceived usefulness of videogames regarding content learning of secondary content (UPVACS) in most of the issues raised.

Table 12. Equations that explain the UPVACS according to various aspects.

Parameters	Features	Equation
general		UPVACS = 10.643 + 0.74AOVCEE + 0.44AOVD + 0.20AUV
Gender	Man	UPVACS = 15,990 + 0.51 AOVCEE + 0.62AOVD
	Woman	UPVACS = 5.259 + 1.02AOVCEE + 2.33HJVFS + 0.44AOVD
High school course	First	UPVACS = 20.159 + 1.18AOVD
	Second	UPVACS = 7.703 + 1.04 AOVCEE + 0.31AUV
	Third	UPVACS = 20.524 + 0.73AOVCEE
	Fourth	UPVACS = 15.738 + 0.91AOVCEE
Play online with classmates from the school	Yes	UPVACS = 24.361 + 0.55AOVCEE
	Do not	UPVACS = 8.085 + 0.90AOVCEE + 0.58AOVD
	Sometimes	UPVACS = 27.691 + 0.86AOVE

4. Discussion and Conclusions

Currently, video games and digital games are part of our culture and idiosyncrasies [37]. Dealing with education from the digital point of view implies a change of perspective. This change must begin with the students as the main actors in the training process.

In this sense, after the study carried out, it has been proven that secondary school students consider that the perceived usefulness of videogames regarding the learning of secondary content (UPVACS) [38,39]., is conditioned by the aptitude observed in these before culture in educational success (AOVCEE) [23] and before diversity (AOVD) as recorded by References [3,6,40], as well as the use of video games (AUV) in line with the results of References [39–41].

Therefore, in terms of these aspects, under the prism of perception of the students of secondary education, which explain the usefulness of the game in the process of learning, it doesn't go against the studies already carried out [4,10], where it is able to manifest the attribution that will give to these resources for their progress in the learning process [15,42]. In the same way, the usefulness of the games in this acquired knowledge of content, becomes the keys to unfold as active and efficient citizens of the XXI century, impinges on the job that made of the same, an aspect to consider when promoting political education to address the addictions and issues of use of these resources [21].

In the same way, the usefulness of the games in this acquired knowledge of content, becomes the keys to unfold as active and efficient citizens of the XXI century, impinges on the job that made of the same, an aspect to consider when promoting political education to address the addictions and issues of use of these resources [21]. In addition, the students of secondary education explain the usefulness of the game in the process of learning, in addition to, concerning the above aspects, the competition that the same offers to the question of diversity, manifested in different ways to learn and understand the reality [4,13] which knowledge of these contents produces.

Answering the other question raised, referring to whether the explanation of the usefulness of video games in the learning process affects sociodemographic elements, we stop our attention to gender, it has been observed that there are no differences between both genders in terms of the usefulness they perceive in video games regarding the learning of secondary content in a different way [42,43]. However, while men determine the suitability seen in video games before culture in the educational success (AOVCEE) and to diversity (AOVD), women do in fitness observed in video games to the culture in the educational success process (AOVCEE), hours playing the weekend (HJVFS), and before diversity (AOVD). Therefore, women consider a new aspect, the hours playing on the weekend, and men do not, to explain the perceived utility of videogames regarding the learning of secondary content.

With respect to the study of the course where the participants are enrolled, the explanatory equation of the usefulness they perceive in videogames regarding content learning differs from one to another; being defined by a single variable in the first one (aptitude observed in videogames before diversity –AOVD); third and fourth (both conditioned by the ability observed in video games before culture in educational success -AOVCEE- although uneven in the coefficient). Meanwhile, second-year students require two variables (at the level observed in video games in the face of culture in educational success -AOVCEE- and, at altitude towards the use of video games-AUV-), to explain the utility they perceive in videogames regarding content learning [26].

According to the game modalities, in what refers to network play with classmates of the educational center, whether it is done or not, it is another circumstance that modifies the utility that is perceived in video games regarding the learning of secondary content (UPVACS) [26,44].

The results should be taken with caution, due to the sample number; although it complies with the recommendations of Reference [36]. However, considering their prudence, they can help future studies on the variables that explain the usefulness that secondary school students perceive in videogames regarding secondary content learning, thus, favoring possible educational proposals.

Author Contributions: Conceptualization, V.M.-D.; Methodology, B.E.S.-R.; Validation, B.E.S.-R.; Writing—review and editing, V.M.-D. and I.M.F.

Funding: This research is part of the ACORDA project: Learning curricular content measured by collaborative educational digital resources (2017-4-2001) and which has been funded by the University of Cordoba through the 2018–2019 call for projects.

Acknowledgments: In this section you can acknowledge any support given which is not covered by the author contribution or funding sections. This may include administrative and technical support, or donations in kind (e.g., materials used for experiments).

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

References

1. Belli, S.; Raventós, C.L. Breve historia de los videojuegos. *Ath. Dig. Rev. Pens. E Inves. Soc.* **2008**, *14*, 159–179.
2. Scolari, C.A. Hacia la hipertelevisión: Los primeros síntomas de una nueva configuración del dispositivo televisivo. *Diálogos Com.* **2008**, *77*, 1–9. Available online: https://repositori.upf.edu/bitstream/handle/10230/25464/Scolari_DialCom.pdf?sequence=1&isAllowed=y (accessed on 25 November 2019).
3. Marín Díaz, V.; Martín, J. ¿Podemos utilizar los videojuegos para el desarrollo del currículo de la etapa de infantil? *NAER J. New Appro. Edu. Res.* **2014**, *3*, 20–25. [CrossRef]

4. Del Moral, M.E.; Fernández, L.C. Videojuegos en las aulas: Implicaciones de una innovación disruptiva para desarrollar las Inteligencias Múltiples. *Rev. Comp. Edu.* **2015**, *26*, 97–118. [CrossRef]
5. Marín, V.; García, M.D. Los videojuegos y su capacidad didáctico formativa. *Pixel Bit. Rev. Medios Y Edu.* **2005**, *26*, 1113–1119.
6. Collado, J.C. *El Sector de los Videojuegos en España*; Editorial AEVi & Llorente & Collado: Madrid, Spain, 2018.
7. Gros, B. Análisis de las presentaciones de los juegos digitales para la docencia universitaria. *Rvta. Inter Uni Form. Prof.* **2014**, *79*, 116–128.
8. Galindo-Domínguez, H. Los videojuegos en el desarrollo multidisciplinar del currículo de Educación Primaria: El caso Minecraft. *Pixel Bit. Rev. Medios Y Edu.* **2019**, *55*, 57–73. [CrossRef]
9. Molloy, D. *Cómo Jugar Videojuegos Puede Ayudarte a Conseguir un Mejor Trabajo*; BBC News: London, UK, 2019; Available online: https://www.bbc.com/mundo/noticias-49523939 (accessed on 25 November 2019).
10. Barr, M. *Graduate Skills and Game-Based Learning: Using Video Games for Employability in Higher Education*; Palgrave Macmillan: London, UK, 2019. [CrossRef]
11. Martínez, F.J.; Del Cerro, F.; Morales, G. El uso de Minecraft como herramienta de aprendizaje en la Educación Secundaria Obligatoria. In *Claves Para Una Educación Diversa*; Navarro, J., Gracia, M.D., Lineros, R., Soto, F.J., Eds.; Consejería de Educación, Cultura y Universidades: Murcia, Spain, 2014; pp. 1–12.
12. Brazo, A.B.; Muñoz, J.M.; Castro, C. Aprendiendo léxico y ortografía francesa en la universidad mediante el videojuego SCRIBBLENAUTS. *EDMETIC Rev. Edu. Mediá Y TIC* **2018**, *7*, 18–28. [CrossRef]
13. Guerra, J.; Revuelta, F.I. Videojuegos precursores de emociones positivas: Propuesta metodológica con Minecraft en el Aula Hospitalaria. *Int. J. Educ. Res. Inno.* **2015**, *3*, 105–120.
14. Marín–Díaz, V.; Figueroa-Flores, J.F. The Development of digital competencies through videogames. *World J. Soc. Sci.* **2015**, *2*, 32–41.
15. Arrieta, G.J.G.; Jáuregui, M.M.C.; Medina, R.A.O. Relación ocupacional del desempeño escolar y videojuegos en estudiantes de 8 a 10 años de edad. *Ciencia y Salud Virtual* **2018**, *10*, 24–35.
16. Barr, M. Video games can develop graduate skills in higher education students: A randomised trial. *Comp. Edu.* **2017**, *80*, 86–97. [CrossRef]
17. Del Moral, E.; Guzmán, A.P.; Fernández, L.C. Game-Based Learning: Increasing the Logical-Mathematical, Naturalistic, and Linguistic Learning Levels of Primary School Students. *NAER J. New Appro. Edu. Res.* **2018**, *7*, 31–39. [CrossRef]
18. Barendregt, W.; Bekker, T. The influence of the level of free-choice learning activities on the use of an educational computer game. *Comp. Edu.* **2011**, *56*, 80–90. [CrossRef]
19. Al-Hileh, M.M.; Ibrahim, N.S.I. The Advantages and Disadvantages of Electronic Games Played by Children Aged (3–6) Years, from Mothers and Kindergarten Teachers' Point of View. *Inter. J. Appl. Eng. Res.* **2018**, *13*, 1805–1812.
20. Hsu, C.Y.; Tsai, M.J.; Chang, Y.-H.; Liang, J.-C. Surveying in-service teachers' beliefs about game-based learning and perceptions of technological pedagogical and content knowledge of games. *Edu. Tech. Soc.* **2017**, *20*, 134–143.
21. Papadakis, S. The use of computer games in classroom environment. *Int. J. Teach. Case Stu.* **2018**, *9*. [CrossRef]
22. Zaidan, S. Videogames as education. In *The International Encyclo Pedia of Media Literacy*; Hobbs, R., Mihailidis, P., Eds.; Wiley & Sons: Hoboken, NJ, USA, 2019. [CrossRef]
23. De Camps, W.; Ferguson, C.J. The impact of degree of exposure to violent video games family background and other factors on youth violence. *J. Youth Adolesc.* **2017**, *46*, 388–400. [CrossRef]
24. Ricoy, C.; Ameneiros, A. Preferencias, dedicación y problemáticas generadas por los videojuegos: Una perspectiva de género. *Rev. Comp. Edu.* **2016**, *27*, 1291–1308. [CrossRef]
25. Pérez-Rubio, C.; González, J.; Garcés, E.J. Personalidad y burnout en jugadores profesionales de e-sports. *Cuad. Psico. Deporte* **2017**, *17*, 41–50.
26. Marín-Díaz, V.; Morales-Díaz, M.; Reche-Urbano, E. Educational Possibilities of Video Games in the Primary Education Stage According to Teachers in Training. A Case Study. *NAERJ. New Appro. Edu. Res.* **2019**, *8*, 42–49. [CrossRef]
27. Greitemeyer, T. The spreading impact of playing violent games on aggression. *Comput. Hum. Behav.* **2018**, *80*, 216–219. [CrossRef]
28. Ding, D.; Guan, C.; Yu, Y. Game-Based Learning in Tertiary Education: A New Learning Experience for the Generation Z. *Int. J. Inf. Edu. Technol.* **2017**, *7*, 148–152. [CrossRef]

29. Lloret, S.; Ferreres, A.; Hernández, A.; Tomás, I. El análisis factorial exploratorio de ítems: Análisis guiado basado en datos empíricos y software. *Anal. Psic.* **2017**, *33*, 417–432. [CrossRef]
30. Mavrou, I. Análisis factorial exploratorio. Cuestiones conceptuales y metodológicas. *Rev. Nebrija. Ling Apli. Ens. Leng.* **2015**, 71–80. [CrossRef]
31. Pestana, M.H.; Gageiro, J.N. *Análise de Dados para Ciências Sociais*, 6th ed.; Ediciones Silabo: Lisboa, Portugal, 2014.
32. Coe, R.; Waring, M.; Hedges, L.V.; Arthur, J. *Research Methods & Methodologies in Education*, 2nd ed.; SAGE: London, UK, 2017.
33. Etxeberria, J. *Regresión Multiple*, 2nd ed.; La Muralla: Madrid, Spain, 2007.
34. Hancock, G.R.; Stapleton, L.M.; Mueller, R.O. *The Reviewer´s Guide to Quantitative Methods in the Social Sciences*, 2nd ed.; Routledge: New York, NY, USA, 2019.
35. Pérez, C. *Técnicas de Análisis Multivariante de Datos. Aplicaciones con SPSS*; Editorial Pearsons: Madrid, Spain, 2015.
36. López-Roldán, P.; Fachelli, S. *Metodología Investigación Social Cuantitativa*; Universidad Autónoma de Barcelona: Barcelona, Spain, 2015.
37. Novak, E.; Tassell, J. Using video game play to improve education-majors' mathematical performance: An experimental study. *Comput. Hum. Behav.* **2015**, *53*, 124–130. [CrossRef]
38. Jiménez-Porta, A.M.; Díaz-Martínez, E. Impacto de videojuegos en la fluidez lectora en niños con y sin dislexia. El caso de Minecraft. *RELATEC* **2019**, *17*, 77–90.
39. Soto, L.M.; Melo, L.; Caballero, A.; Luengo, R. Análisis cuantitativo de las opiniones de los estudiantes de Grado de Educación Primaria sobre el uso de los videojuegos como recursos educativo. *Inves. Cuali. A Educ.* **2019**, *1*, 169–178.
40. Martín, M. Videojuegos y aprendizaje colaborativo. *Exp. Torno A Etapa Educ. Primaria EKS* **2015**, *16*, 69–89. [CrossRef]
41. Herbert, C.; Jenson, J. Digital game bases pedagogy Digital Game-Based Pedagogy: Exploring Teaching Strategies for Classroom Teachers in the use of Video Games in K-12 Classrooms. In Proceedings of the 11th European Conference on Game-Based Learning, University of Applied Sciences, Gaz, Austria, 5–6 October 2017.
42. Retrepo, S.M.; Arroyave, L.; Arbolada, W. El rendimiento académico escolar y el uso de videojuegos en estudiantes de básica secundaria del municipio de La Estrella-Antioquia. *Rev. Educ.* **2019**, *43*, 2215–2644. [CrossRef]
43. Lorca, A.A.; Cuenca, J.M.; Vázquez, B.; Velo, S. Actitudes de los docentes en formación sobre videojuegos. *Digit. Educ. Rev.* **2017**, *31*, 39–60.
44. Marín, V. La Realidad Aumentada al servicio de la Inclusión educativa. Estudio de caso. *Rev. Retos XXI* **2018**, *2*, 60–72. [CrossRef]