Edutainment, Gamification and Nutritional Education: An Analysis of Its Relationship With The Perception of Organizational Culture in Primary Education

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Abstract

The application of edutainment and gamification resources as complementary methodologies allows to reinforce and facilitate the internalization of learning, although there are hardly any studies that relate its use to the organizational culture of educational establishments. This research aims to assess the effectiveness of the *Foodball* gamification program, applied to nutritional education as a strategy for innovation and learning and, specifically, its relationship with the teacher perception of organizational culture in education. A transversal methodology was used with students between 7 and 10 years old ($n = 185$), and teachers ($n = 55$) from 14 public primary schools in Rome and Ostia (Italy). *Ad hoc* assessment scales and the Organizational Culture Inventory (OCI) were used in the collection of information. For the analysis of the data, descriptive and inferential tests were carried out. The results associate the potential of these resources with an active participation and motivation in the learning process, as well as with the internalization of the information. Likewise, the teachers who participated in the educational entertainment crossmedia format obtained higher scores in the perception of the organizational culture, revealing significant differences according to gender and the acceptance of error as a unit value, and age with the perception of innovation. It is concluded in the need to deepen in these results through the design of longitudinal studies on the use of gamification resources and its effective incidence in the organizational culture.

Keywords

edutainment, gamification, *Foodball*, eating habits, educational technology, active learning, organizational culture.

Introduction

The codification of concepts used by the entertainment industry determines the emergence of the "edutainment" genre -educational entertainment- with its own specific rules and languages, and of "gamification" -use of game codes in "non-game" contexts- as one of its main tools. This term was first used by Nick Pelling in 2002, and has become widely used since 2010 (Liu et al., 2017).

The concept of "gamification" is based on the integration of the elements of the game in websites, portals, communities, organizations and services and, in general, in all those contexts not strictly related to the game. The aim is to involve participants, produce a change in their behavior and solve problems (Hamari et al., 2014).

It is not a question of turning the educational context into a game, nor of using some of its elements, points or badges as an end in itself (Araújo, 2016). Its effects represent human needs and desires for fun and participation. Fuchs (2017a) defines it as the impregnation of our society with methods, metaphors, values, and attributes of games.

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The concept of edutainment, on the other hand, can be considered as a genre of its own that uses codes and language for educational purposes, extending its use in the field of entertainment and leisure to educational establishments. In this context, its application has a relevant potential in areas that require a direct involvement of the student, with the purpose of transmitting notions and concepts in an attractive way and getting their attention. In this genre, new technologies are also included.

Literature Review

Gamification and Education. In the meta-analysis carried out by De Sousa et al. (2014) on gamification, 357 articles were reviewed, 48 of which were related to educational research and innovation. The results suggest that most studies focus on investigating how gamification can be used to motivate students, improve their skills, and maximize learning. In the same line, the study of systematic mapping of indexed articles and conferences on the application of gamification in education, carried out by Dicheva et al. (2015), concludes in a lack of evidence on the effectiveness of incorporating elements of the game and of an adequate evaluation. However, most of the authors share the opinion that gamification, well designed and correctly used, has the potential to improve learning, so it can be a powerful strategy to motivate groups of people in training.

The strength of gamification in non-playful contexts lies in this capacity to motivate, especially in complex situations that require collaboration and perseverance to overcome them (Deterding et al., 2011). The peculiarities of the elements of the game do indeed make the users achieve the pre-established objectives.

Authors such as Egenfeldt-Nielsen et al. (2008) defend video games as a "cultural force," which influences social imaginaries and interacts with other media and artistic expressions, such as cinema or music (Salen & Zimmerman, 2004). In this way, these authors legitimize video games as cultural objects, despite the criticism and disdain received from different perspectives due to its commercial nature and frequent association with violence.

The gamification activates intrinsic and extrinsic motivation mechanisms, as well as short and long term reinforcement. In this line, its effectiveness to enhance attention is due to the fact that it adopts intrinsically rewarding elements of the game such as rules, victory conditions, rewards, punishments and personal narratives. Arnold (2014) points out the association of fun with learning as one of its potentialities. A connection is produced in the student with the idea of the game, the development of his/her curiosity to know more and the desire to win, which makes him enjoy the experience, participate and thus make learning possible.

In recent years, there has been a marked trend toward gamification or ludification as a learning strategy in various social areas (business, health, marketing, politics and education, among others), even to promote pre-scientific vocations (Pérez-Manzano & Almela-Baeza, 2018). Along these lines, Cortizo et al. (2011) state that gamification in the world of marketing contributes to building user loyalty through challenges or rewards, to turning boring tasks into fun and motivating ones, and to encouraging participation, aspects that can be transferred to the educational field.

Numerous studies foresee an increase in the use and incorporation of digital devices and applications in the educational field (Horizon Report NMC, 2014). In this line, some authors point out an increase in the interaction with the learning environment to modify behavior (González & Mora, 2015; Prieto et al., 2014). In this sense, the university environment is ideal for its use, with an average profile of students very similar to that of the gamer or typical video game player (Barragán et al., 2015).

Other more critical authors such as Bogost (2007) and Fuchs (2017b, 2018) refer to the persuasive and expressive power of video games, which invite interaction, argument building and influence on the players, as well as their subversive and sometimes unreliable applications of digital media, and the internationalization and subversion of roles through play.

Some authors (Durall et al., 2012) point out that it favors experiential learning through the simulation of real and meaningful situations for the students' lives. The games encourage interaction and motivation for learning, collaboration and problem solving, and decrease the fear of making mistakes. By having a game mechanics based on rules and challenges, they generate commitment in the participants (Cortizo et al., 2011).

Tomaselli et al. (2015) point out that these methodologies increase concentration, effort, and motivation based on recognition, achievement, competence, collaboration, self-expression, and all the educational potentialities shared by play activities. For gambling to be successful, games must be attractive to arouse interest, offer rewards and be flexible to be used individually and collectively in the classroom.

The Impact of Gamification Processes in the Educational Organizational Culture. The use of playful methodologies and the perception of the organizational culture of the educational establishments, the main objective of this research, no studies have been found that link them. However, numerous researches associate the processes of innovation in schools with an improvement in its organization and culture (Gil López et al., 2018, 2019; Hartnell et al., 2019; Neeleman, 2019).

The analysis of organizational culture has received relevant attention in higher education contexts (Gaus et al., 2019). Köse and Korkmaz (2019) demonstrated predictive relationships between the performance of higher education institutions based on innovative team cultures and its effectiveness (impact). Likewise, from the university educational field, the study of organizational culture from the concept of quality culture, such as leadership and commitment to quality or shared attitudes, has also received attention by recent studies, such as the one conducted by Hildesheim and Sonntag (2020). However, no research has been found on the theoretical-practical principles of organizational culture and innovation mediated by gamifying technologies in primary education.

Within the concept of organizational culture, it is important to know the pedagogical principles shared by the teaching team of each school (De la Fuente-Anuncibay et al., 2016) to understand the possible positions of openness or rejection toward innovations and less traditional methods. Culture resists change and, if strong, can create conflicts and delays in the acceptance of processes that want to be innovative within a traditional pedagogical method.

In this sense, the research by Gil López et al. (2018) concludes that educational organizations willing to learn establish spaces for training and innovation, where learning processes result in significant changes for the educational organization. These organizations are more open to change and innovation. These authors stress the importance of educational innovation as a philosophy of life, work, and coexistence in school action, proposing new challenges (learning to undertake).

In this context, the present research analyzes the educational effectiveness of gambling and edutainment techniques in learning correct eating habits and a healthy life and, specifically, the relationship of the introduction of these innovative practices with teachers' perception of the organizational culture in schools. To this end, the metaphor of soccer and sport is used, from the *Foodball* program, as a vehicle of active transmission of these learnings.

Material and Methods

Participants

Participants were selected through an incidental non-probabilistic sampling with faculty and students aged 6 to 10 years, whose selection responded to the capacity of the research team and authorization of the educational establishments to access the field of study. The total sample participating in the full program was 1,598 students (♂ = 52%, ♀ = 48%) between 7 and 8 (29%) and 9 and 10 years old (71%), and 87 teachers (♂ = 18%, ♀ = 82% female) from 14 public elementary schools in the city of Rome and Ostia (Italy). Considering the quasi-experimental character without control group of the present research and, therefore, the impossibility of achieving a comprehensive control of extraneous variables, which could affect the accuracy of the results, and of randomizing the experimental units, this study presents the results obtained in two random samples, drawn from the total number of participants (n = 185 students, n = 55 teachers; participating teachers-n = 34- and non-participating teachers—n = 21- in the gamification program).

Instruments

Foodball was used as a methodological strategy, a cross-media format for educational entertainment run by the start-up *foodball srl*, which holds the rights to it (UIBM, Ministero dello Sviluppo Economico). The contents it addresses are the following: correct and healthy food, and designation of origin in Italy (guarantee of origin and quality of Italian food products); food waste, healthy life and fresh air; pleasure of taste; producing territory and knowledge of the characteristics of the products of the Mediterranean diet.

The *Foodball* format aims to internalize these concepts and contents through the use of gamification techniques on soccer and sport. Its development includes the *Foodball Game*, a game for mobile applications (Figure 1).

Foodball is an open content database in which each user contributes with the creation and insertion of information about food products, proper nutrition, nutritional values and other interesting data. In this game, based on the gamification model, children play while learning the rules of optimal nutrition: the child chooses the food products, which become soccer players, and creates a card with informative graphics, places of origin and seasonality of the products.

The Football Verification Questionnaire (FVQ), designed *ad hoc*, was administered to a random sample of 185 children 12 months after program implementation. This questionnaire aimed to evaluate the effectiveness of the activities carried out in the educational establishments for the acquisition of concepts, and the degree of acceptance of the multimodal format. It consists of 15 multiple choice items organized in four thematic areas: (1) "Knowledge of the food pyramid and the food information channel"; (2) "Perception of notions of food culture"; (3) "Understanding the game"; and (4) "Evaluation of the experience'." The performance time was 20 min.

In addition, the Playful Format in Educational Contexts (PFEC) questionnaire, also designed *ad hoc*, to 34 participating teachers, was used for data collection. Through the use of Osgood's semantic differential, we
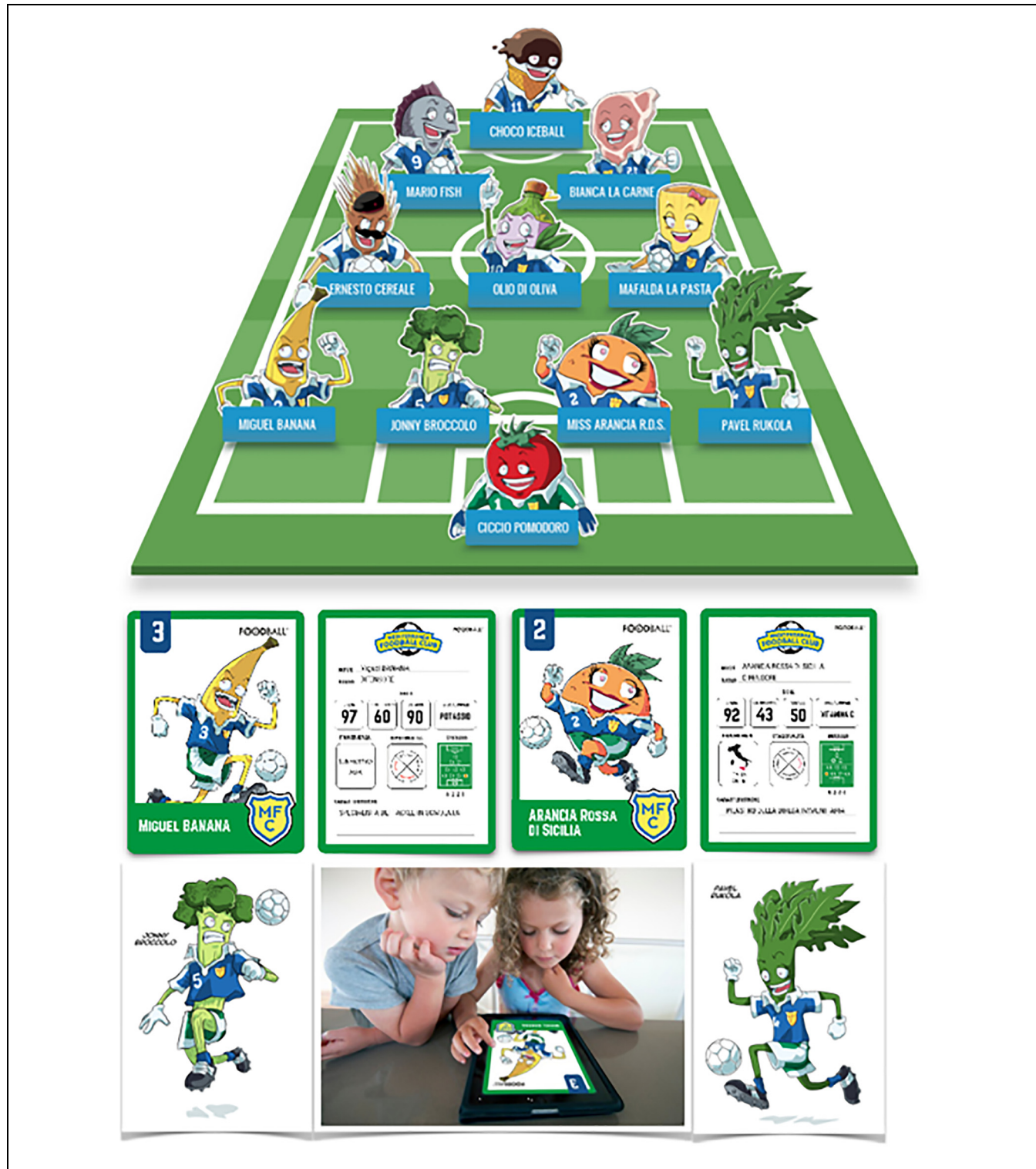
Figure 1. *Foodball Game.*

Source. Prepared by the authors.

explored the assessment and attitude of teachers toward the *Foodball* gamification strategy as a learning method. The questionnaire includes 27 pairs of opposite qualifying adjectives, 6 focused on edutainment, 7 on gamification, 7 on personal appreciation, and 7 on the appreciation of the playmate.

Table 1. Project Phases and Instrumental Application.

Phase	Technique/instrument	Place	Period of application
1	Foodball didactic workshops	School	November–December 2015 September–October 2016
2	Mediterranean Foodball Club[a]	Argentine Theatre (Rome)	November–December 2015
3	Application of the FVQ and the PFEC	School	December 2016
4	Application of the OCI	Online	October–December 2016

[a]Theatrical show complementary to phase 1.

Finally, to evaluate the organizational culture of the educational establishments, the Organizational Culture Inventory (OCI) was used (Marcone & Martín-Del-Buey, 2003), which returned, in the context of this research, a total reliability of $\alpha = .96$. The instrument consists of 62 items, measured on a Likert scale from 1 (minimum agreement) to 5 (maximum agreement) points, and grouped into 14 first-order factors. These factors were reduced to 4 of second order: "Recognition of effort as a success factor" ($\alpha = .89$); "Managerial credibility and human relations" ($\alpha = .88$), "Leadership in management and communication" ($\alpha = .90$), and "Organizational equity" ($\alpha = .73$). In order to verify the existence of statistically significant perceptions of the organizational culture of the schools involved in the program, this questionnaire was applied to a random sample of participating ($n = 34$) and non-participating ($n = 21$) teachers in the gamification program implemented.

Design and Procedure

In the analysis of the educational effectiveness of the Foodball program, a cross-sectional methodology was used through the application of questionnaires (FVQ, PFEC, and OCI), and educational workshops, which included the implementation of a performance of the Mediterranean Foodball Club theater show. The development of the program lasted 6 months.

The phases of the project were the following: (1) Development of the Foodball educational workshops on the rules of the game, materials and realization of activities focused on the subdivision of food groups (Sapio, 2015), in collaboration with the Roma Tre University (Italy). The aim was to arouse children's curiosity to discover or deepen their knowledge on subjects related to food and the quality of food life, and to help them make appropriate and healthy choices in food-related situations; (2) Realization of Mediterranean Foodball Club in the Argentine Theatre in Roma, a show, written and produced specifically for children's audiences, using drama techniques, staging and typical codes of the genre. The show represented the core of the format and sought,

on the one hand, to transmit to the students, in a scenic way, some of the notions of nutritional education worked in the educational workshops. On the other hand, it tried to provide the teachers with applied examples of some of the codes of the edutaiment with gamification tools; (3) Application of the FVQ and the PFEC; and (4) Application of the OCI (Table 1).

Participation in Foodball involved access to the Fanta Market, a digital soccer and food market from which the Foodball player could be created. Each player on the team was matched with a food from one of the following categories: cereals, vegetables, fruits, meats, fish, eggs and dairy products. In the game, an information card had to be filled out for each of them (foodball cards), either by downloading them directly from the website (www.foodball.org) or by filling them out at schools and/or in the theater (Figure 2). Once the food/players' cards were created, the foodball team was formed. The strongest team was composed of the players/foods that best fit the balance of the rules of the game and the variety of foods, according to the Mediterranean diet food pyramid.

In this way, the Mediterranean Foodball Club accesses the field with a 4-3-2-1 scheme of the pyramid: defense (4 players/food), a balance in midfield (3 players/food), strength and power (2-1 players/food) in attack. The premise to be a good Foodball player was the respect to the rules of a balanced diet, established from the Mediterranean diet.

In all phases, the privacy standards were met, taking into account the code of protection of personal data (Legislative Decree 196/2003), of anonymity and informed consent.

Data Analysis

Descriptive analyses (means and standard deviations) and inferential analyses (one-way ANOVA with post hoc DMS test) have been performed, once the compliance with the parametric assumptions of normality (Kolmogorov-Smirnov test) and homocedasticity (Levene's test) ($p > .05$) has been evidenced. Likewise, it

Figure 2. Creation of the *foodball* player and the FB card.
Source. Prepared by the authors.

has been applied the semantic differential (Osgood) to explore the assessment and attitude of teachers toward the *Foodball* gamification strategy as a learning method.

The *Foodball* educational workshops were evaluated according to the criteria of 100% correct answer, 70% correct answer and incorrect answer. Descriptive data was analyzed from two segmentation groups: age and sex. The results are presented from the frequencies obtained. Likewise, for a detailed analysis of the obtained data in the OCI, the results are presented according to five analysis factors: (1) Participation in the gamification program; (2) Years of teaching experience; (3) Gender; (4) Age; and (5) Number of students from the school of origin. For the treatment and analysis of the data, the statistical package IBM SPSS v.25 was used.

Results

Educational Workshops

532 cards were distributed on the subdivision of food groups. 78% of the cards for the fish group were completed, compared to 53% for the fruit group and 56% for the vegetable group. The hits were 83% for fish, 9% for fruit and 8% for vegetables. Sixty-two percent ($n = 991$) completed the questions correctly, 36% ($n = 576$) completed them partially, and 2% ($n = 31$) did not answer them correctly.

Depending on the sex, 60% of the boys totally completed the questions as opposed to 40% of the girls. 2% of the boys did not complete them, compared to 1% of the girls. Data on responses by age group indicate that students ages 9 to 10 completed 70% of the cards versus 43% of students ages 7 to 8.

On the other hand, the design (89%) was more highly valued variable, followed by the player's name (82%), seasonality (81%) and the role he played (defense—fruits and vegetables—or attack—fish) (76%). Against these scores, the variable "origin of the food" was the one that obtained less response (37%), and the variables related to the D/C/A values (defense, center, and attacker), the "special power" (calcium, vitamins, potassium…), the origin, the module (tactics of the players to place themselves in the field related to the food pyramid of the Mediterranean diet) obtained values close to 50%.

Table 2. Descriptive Statistics of the Sub-dimensions of the Construct "Organizational Culture."

Sub-dimension	n	Min.	Max.	M	SD
Performance friendly environment	55	1.3	5.0	3.42	0.99
Commitment and enthusiasm in the achievement of the objective	55	1.8	5.0	3.89	0.66
Acceptance of the error as a unit value	55	1.8	5.0	3.81	0.76
Communication and staff integration	55	1.0	5.0	3.57	0.89
Communication and historical evolution of the school	55	1.0	5.0	3.19	1.09
Equity in school life	55	2.0	5.0	3.85	0.72
Emphasis on human relations	55	1.1	5.0	3.39	0.94
Recognition of effort	55	2.0	5.0	3.75	0.68
Organizational entropy and negentropy	55	2.0	5.0	3.32	0.68
Overcoming and commitment to the educational task	55	1.7	5.0	3.78	0.69
Recognition of effort as a success factor	55	1.3	5.0	3.65	0.77
Credibility and organizational learning	55	1.5	5.0	3.50	0.88
Recognition and fairness in reward	55	1.0	5.0	3.19	1.01
Leadership in educational management	55	1.5	5.0	3.35	0.87

In relation to the acquired knowledge, the seasonality was the variable with more correct answers (92%), followed by the role (71%) and the origin (69%), to the detriment of the "special power" with 37% of successes.

Foodball Verification Questionnaire (FVQ)

The gender distribution of the randomized sample of students who completed the program was 104 boys and 81 girls aged 8 (7.6%), 9 (57.3%), 10 (32.4%) and 11 (2.7%), from Rome ($n = 127$) and Ostia ($n = 58$). The results on previous knowledge of the food pyramid, and on the food culture information channel indicate that 50% have acquired it at school, 25% through television and 25% declared to have no previous knowledge. By sex, the percentage of previous knowledge is greater among women (76.8%): 20.7% acquired it through television and 56.1% in school. In contrast, 28.4% of men acquired it through television and 45.1% at school.

The results by age are progressively increasing: 57.1% of the children of 8 years old had no previous knowledge, being this percentage of 20.6% in the case of the children of 10 years old. The main information channel is the school.

In relation to the notions of food culture (healthy food, importance of food, its origin and Mediterranean diet) perceived through the *Foodball* format, very high success rates are reflected, exceeding, in almost all cases, the 90% threshold. The concept of "healthy living" obtained a score of 77.2%.

Regarding the understanding of the game, it is higher in boys (84.1%) than in girls (77.8%). The percentages also increase according to age: from 79.7% in children of 8 years to 83.8% in children of 11 years.

The results on the evaluation of the experience reflect that 55.3% enjoyed participating in it (♂ = 56.3%;

♀ = 54.1%). In addition, 44.3% state that they acquired new knowledge (♂ = 43.0%; ♀ = 45.9%) and, in one case, it is stated that they lost time (0.4%). Finally, as age increases, the playful aspect increases from 52.2% in children of 8 years to 60% in children of 11 years. However, it is higher in children of 10 years (61.5%).

Playful Format in Educational Contexts (PFEC)

In the evaluation of the *Foodball* format, the participating teachers ($n = 34$) highlighted aspects such as its fun, beneficial, educational, innovative, attractive, recommendable and adaptable design, with values between 77% and 94% and, in contrast, its antagonistic adjectives: boring, unnecessary, excluding or rigid, with values between 3% and 10%.

Edutainment is often perceived by teachers as a mainly digital activity, which uses, to a large extent, tools linked to audiovisual media, websites and social networks. They also declare their lack of educational experience in the multiple use of media.

Organizational Culture Inventory (OCI)

Regarding the teaching perception of the organizational culture of the educational establishments participating in the gamification program, Table 2 shows the main results obtained in each of the sub-dimensions of the construct "organizational culture."

All sub-dimensions' score above 3. The best rated sub-dimension was "commitment and enthusiasm in the achievement of the objective"' ($M = 3.89$), while "communication and historical evolution of the school" and "recognition and fairness in reward" received the most unfavorable ratings ($M = 3.19$).

The dimensional results reveal little difference in terms of teacher participation in the program, with no

Table 3. Descriptive Statistics and ANOVA of the Dimensions "organizational Culture" According to Teaching Experience.

		n	M	SD	F	p
Recognition of efforts as a success factor	a	6	3.48	0.65	0.447	.64
	b	13	3.72	0.69		
	c	15	3.76	0.56		
	Total	34	3.69	0.62		
Management credibility and human relations	a	6	3.56	0.78	0.101	.90
	b	13	3.72	0.91		
	c	15	3.61	0.76		
	Total	34	3.64	0.80		
Leadership in management	a	6	3.37	0.96	0.288	.75
	b	13	3.64	0.98		
	c	15	3.68	0.71		
	Total	34	3.61	0.85		
Communication and Organizational Equity	a	6	3.18	0.73	0.204	.81
	b	13	3.47	1.13		
	c	15	3.45	0.90		
	Total	34	3.41	0.95		

a.Less than 10 years; b. 11 to 20 years; c. More than 20 years.

significant differences identified in any factor of the scale ($p \geqslant .09$). Nevertheless, it can be stated that the scores are higher in the participating teachers ($n = 34$) in all the dimensions and sub-dimensions, and similar in the sub-dimensions "overcoming and commitment to the educational task" and "recognition of effort as a success factor" ($M = 3.7$).

Likewise, there are no significant differences in any of the sub-dimensions analyzed ($.64 \leqslant p \leqslant .90$) in relation to years of teaching experience of participating teachers. However, teachers with more work experience obtain higher overall scores in the second order dimensions (Table 3).

Also, the results report little difference in the scores of the dimensions and sub-dimensions of the construct "organizational culture" in men and women. In fact, although men obtain higher scores in all of them, except in the sub-dimensions of "commitment and enthusiasm in achieving the objective"($M\male = 3.81$; $M\female = 3.90$) and in "organizational entropy and neguentropy"($M\male = 3.31$ $M\female = 3.33$), this difference is very slight. This last variable is related to aspects about the impossibility of achieving changes that positively transform the life of the school (entropy) and the ease of reconstructing life in the school from written evidence, which indicates order and attention to the internal life of the educational center (neguentropy).

However, there are significant differences in the sub-dimension "acceptance of the error as a unit value"' ($p = .03$). This sub-dimension values error as part of our own nature and as a necessary step, many times, for learning, sharing the idea that error is a deferred success.

In these differences, the results point to higher scores by men.

Although no significant differences have been found in any other dimension according to sex ($.13 \leqslant p \leqslant .96$), they have been identified in the following sub-dimensions according to age: "performance friendly environment" ($p = .03$), with lower scores for middle-aged teachers (46–55 years) ($M = 3.04$); "recognition of effort as a success factor" ($p = .01$), with higher scores for younger teachers (ù 45 years) ($M = 3.96$), and lower scores for middle-aged teachers ($M = 3.32$); and "recognition and fairness in reward" ($p = .05$), with lower scores for middle-aged teachers ($M = 2.81$) than for other age groups ($M = 3.49$ and $M = 3.47$). Likewise, it can be assumed that there are approximate significant differences in the sub-dimension of "emphasis on human relations" ($p = .07$), which obtains lower scores in teachers of intermediate age ($M = 3.06$) in comparison with the rest of the age groups ($M = 3.64$ and $M = 3.65$).

With respect to the dimensions of the construct, there are no significant differences according to age, with approximate differential values in variables "recognition of effort as a success factor" ($p = .08$) and "leadership in management" ($p = .08$). In these variables, people of intermediate age score lower in all the dimensions, being the youngest teachers (<45 years) and the oldest (>55 years) those who obtain the highest scores. Nor does it depend on the number of students in the center of origin ($.11 \leqslant p \leqslant .98$), although a differential approach is observed in the sub-dimension "performance friendly environment" ($p = .74$), with higher scores in small educational establishments (300–700 students) ($M = 3.61$).

Table 4. Differences in the Perception of Innovation According to Age.

Age	n	M	SD
Less than 45 years old	17	3.91	0.501
From 46 to 55 years old	24	3.39	0.890
More than 55 years old	14	3.83	0.616
Total	55	3.66	0.750

Finally, the results indicate that most teachers have responded with values between 3 and 5 in the items related to innovation. With an average of 3.66 out of 5 points, it is evident that there is a high predisposition of teachers toward educational innovation. Although the difference in means between their adherence to the project ($M = 3.71$) and the absence of participation ($M = 3.62$) is slightly greater among the teachers who participated in the program, these differences are not significant ($p = .67$).

However, significant differences have been identified ($p \leqslant .05$) in relation to innovation according to the age of the teachers. Table 4 reflects the comparison of averages between age groups and the perception of innovation in their school.

Despite the lack of significant differences ($p = .40$) according to the sex of the teachers, the scores on perception of innovation are higher in men ($M = 3.87$) than in women ($M = 3.63$).

Discussion and Conclusions

From the project carried out in the schools of Rome and Ostia, it was intended to verify the effectiveness of gamification and edutainment methods for the acquisition and consolidation of new nutritional concepts, and to assess the perception of organizational culture and innovation linked to the participation of teachers in the implemented project.

The results obtained show its effectiveness as an innovative methodology for the acquisition of learning, in this case, related to food, healthy living and healthy habits. This format has involved an important number of schools and teachers improving their active participation, being this and the combination of analog and digital, physical and virtual resources, the main factors of success. In the case of students, digital natives, these tools are an integral part of their daily lives, in which the use of touch screens or media such as social networks are not configured in their experience as elements of innovation.

The results of the workshops offer a high number of correct answers about the acquisition of concepts, being higher in children aged 9 to 10 years, which indicates its suitability for this educational level. Television has also

been identified as an important information channel (25%), reaching 28.4% of boys.

Differences in the understanding of the game among boys can be interpreted from their likely differential familiarity with the theme, language, and codes of soccer. It was felt, however, that once the student could be involved in the game, the reference to soccer would be overshadowed. In this sense, the assessment of the experience was very similar in both cases.

With regard to teachers, edutainment is perceived by many teachers as a mainly digital activity, which uses, to a large extent, tools linked to audiovisual media, websites and social networks. Despite the fact that, in many cases, their schools were well equipped with these technologies, teachers stated that they were not used to working with multiple media.

The overload of work and the passive consideration (19%) of a sector of the teaching staff, perhaps because of their connection between gamification and video games, reveal certain reticence and ignorance of these methods. Likewise, the results confirm that, when teachers integrate a traditional teaching method to the use of gamification tools, it is not perceived as an element of innovation of the educational project.

On the other hand, it has been detected a high and positive perception of teachers toward innovation related to organizational culture. In these perceptions, there are differences according to age groups, with the group from 46 to 55 years old obtaining the lowest scores. In relation to sex, a differential significance is identified between the sex of the teacher and the sub-dimension of organizational culture "acceptance of error as a unit value."

The results of the present research are in line with those of some authors (Soler & Vilanova, 2010), who have assessed , from other areas of knowledge, the impact of gamification in physical education as a learning and motivation strategy to promote healthy life habits, and aerobic resistance tasks in Secondary Education students. Prieto et al. (2014) showed the effectiveness of various models to the gamification of subjects in the university environment, as the model "flipped classroom with just in time teaching" (JITT/FC).

Likewise, in other contexts, the study on correlations between play and learning, conducted by Lillemyr et al. (2011), obtained results that point to the interest and

positive attitude toward play as a method of learning in primary schools in the United States, Australia and Norway on a sample of 1.076 students from 8 to 11 years. However, Lillemyr points out the low presence of play in the classroom, especially in the United States and Australia, despite being considered by students as a resource that improves learning.

The Horizon Report NMC (2014) points out effective results of the mechanisms of video games in the educational field. The significant increase in learning based on games, "serious games" and gamification lies in the recognition by teachers of their educational potential, from an effective design aimed at productivity, creativity and motivation of students.

Culture is considered a key factor in the success of school organizations. The analysis of perceptions provides a vision of what is shared ideologically and allows reflection on the needs and strengths of the existing culture to meet the challenges (De la Fuente-Anuncibay et al., 2016). The results of the study point to improvements in the analysis, knowledge and transformation of teaching practice; although no other research has been found that directly relates gamification with perception of organizational culture; nor with potentially related factors such as years of teaching experience, age or gender.

The results are consistent with those obtained by Gil López et al. (2018) on the impact of culture and learning structure on the innovativeness of schools. These results, obtained from a sample of 221 Secondary Education teachers, further conclude that innovation is related to the search for discrepancy by teachers. The involvement of teachers in the educational organization involves the use of participation and negotiation strategies consistent with cooperative approaches. Likewise, they are in line with the results of study by Zhu (2015), in which was demonstrated the close relationships between factors traditionally associated with organizational culture and university faculty perceptions/responses to technology-mediated innovation.

Design applied to the field of food education has influenced innovation, blurring the boundaries between play and learning. The use of gambling methodologies means a greater involvement and motivation of teachers in innovative processes. It is about mobilizing teaching groups toward a situation of challenge with initiatives or institutional challenges, which transform reality, based on experiences or activities that impact and generate results in people.

As limitations of the study, it is important to underline the need to deepen, with wider samples and with the realization of pre-tests as an initial reference-value (prior to the implementation of the gamification program), the impact of innovative methodologies based on gamified strategies and on the organizational culture of the educational establishments. In this sense, despite the difficulties in achieving optimal quasi-experimental validity (internal and external), due to the difficulties in controlling the intervening variables, it would be advisable to propose new pretest-posttest designs with a non-equivalent control group, characteristic of social and educational research. These designs, which include two groups (control and experimental), seek to measure the potential differential improvements obtained after the application of the treatment or intervention on the experimental group. These limitations should serve as a starting point for future studies.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be constructed as a potential conflict of interest.

Ethics Statement

The Bioethics Commission of the University of Burgos (Spain) (IR 15/2018) approved the research project thus guaranteeing the ethical-philosophical commitment and indeclinable respect for human dignity, privacy, physical and moral integrity as well as the protection of personal data in the treatment of the survey and throughout the course of the research.

Informed Consent

The informed consent of the study participants was obtained, guaranteeing the confidential treatment of the data collected. The objective and characteristics of the research were explained to them. The privacy standards were met, taking into account the code of protection of personal data (Legislative Decree 196/2003), of anonymity and informed consent.

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