SERIOUS GAMES, FOOD EDUCATION AND HEALTHY HABITS AT SCHOOL: A PEDAGOGICAL PERSPECTIVE

SERIOUS GAMES, EDUCAZIONE ALIMENTARE E SANI STILI DI VITA A SCUOLA: PROSPETTIVE PEDAGOGICHE

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ABSTRACT
The increasing use of technologies in educational setting is progressively modifying time, space and learning environments, determining not only different way of access knowledge, but also the didactic methodologies, way of learning and academic outcomes. The present paper aims to describe use of SG and Gamification for promoting healthy eating habits in children and adolescents, highlighting the pedagogical and methodological implications.

L'utilizzo delle tecnologie in ambito educativo sta progressivamente modificando gli ambienti di apprendimento, determinando non solo diverse modalità di accesso alle conoscenze, ma anche le metodologie, le modalità di apprendimento e il raggiungimento di obiettivi formativi. Il presente studio si propone di descrivere gli effetti dell'utilizzo delle tecnologie sull'educazione alimentare in bambini e adolescenti, sottolineando le implicazioni pedagogiche e metodologiche.

KEYWORDS
serious games; digital technology; eating behaviours
serious games; tecnologie educative; comportamenti alimentari

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Introduction[1]

Serious Game importance has been evidenced in last decade literature. Digitalization and Gamification of the learning processes represent the focus of different studies (Limone, 2016). Scientific evidence shows how Gamification influences inclusive didactics and how this innovation is still improving digital competences in learning communities, such as primary and secondary schools (Toto & Limone, 2022; Van Der Lubbe et al., 2021). Modern society, which can be defined knowledge society, is imposing the necessity to develop ability to be in connection with other people through network phenomena with the help of physical means, such as computer or smartphone, which can be considered a consistent part of people everyday life. The didactics learning innovation can be better understood as a sort of process which has been started thousands of years ago (Toto & Limone, 2022). Technologies exist since the humanity has born. However, technologies can be considered in their digitalized form since only 21st century beginning thanks to the computer and network phenomena creation (Toto & Limone, 2022). Anyway, the material result of digitalization is linked to videogames data system building. However, last decades scientific literature point of interest is related to the behavior consequences on Videogames Users. We aim, in redacting the present paper, to analyze, thanks to these international European projects review, which are the effects linked to the use of Serious Game to promote food education and prevent unhealthy eating behaviors and what are implications must be considered from a pedagogical point of view. Literature referred to Serious Games using, evidence positive outcomes in different areas (Boyle et al., 2016). First area is closely related to knowledge acquisition in STEM subjects. Also, literature review evidence affective, behavioral, perceptual, cognitive, and physiological outcomes. However, we consider primarily behavioral implication with reference to healthy eating habit improvement. Chow et al. (2020) showed, in a literature review, that SGs have a real implication in different eating behavior as: a. increasing of fruit and vegetable intake, b. changes in snacking behavior, c. healthy food exploration, and e. in promoting healthy eating. Serious games based on food safety knowledge transmission, promote healthy lifestyle, reducing the risk of eating disorders and obesity (Nitsch et al., 2019). Experimental longitudinal study (Thompson et al., 2015) in which participated four hundred parent/child pairs, who

[1] For the purposes of scientific recognition, the introduction and conclusion are attributed to Alessandro De Santis, paragraph 1 to Martina Rossi, paragraph 2 to Domenico Monacis and paragraph 3 to Marco di Furia, the entire revision of the article is to be attributed to Leonardo Palmisano

were successfully recruited in approximately 8 months positively showed fruit-vegetable intake thanks to videogames based on promoting healthy behavior and diet in pre-adolescent children in post 1 ($p < 0.0001$) and post 2 ($p < 0.0001$). Results were significant and only associated to Action Group. Now we can consider SGs using as an intervention that is focused on prevention of developing pathology linked to eating disorder. Promotion and prevention in the context of food education can both be related to the risk concept, or rather the probability that some physiological negative events happen in individuals who have unhealthy eating habits. It's important to evidence that SG based on healthy behaviors promotion (i.e., positive eating behaviors), and interventions which focus their effort into a prevention phase which is linked to the obesity risk, are both a mirror face of the same coin. As just mentioned, SGs can be also applicated on obesity prevention. Mack et al. (2020) using a cluster randomized controlled trial aimed to develop and create SG which specifically had treatment and prevention childhood obesity as their intervention target. They involved school children (N = 122; Drop-out rate: 3.6%) aged 9 to 12 years and all children who were in the fourth grade of primary school. Children were divided in intervention group (IG) and control group (CG) and IG played the game twice over a 2-week (T1) period while CG in control condition received basic information about a healthy lifestyle via a brochure from the informational service of the Federal Ministry of Food and Agriculture. CG was engaged for 4-week follow-up (T2). They used different questionnaire to evaluate knowledge improvement in T1 (i.e., Emotions during game play measured using the validated self-assessment manikin; Acceptance of the game measured by the three items; Maintenance of knowledge measured by applying the knowledge) and T2 (Changes in dietary behavior measured using the "Ernährungsmusterindex"; Physical activity was measured by a validated questionnaire; Media consumption was measured by questions from the German Health Interview and Examination Survey for Children and Adolescents - KIGGS - questionnaire). The main Authors hypothesis was verified, showing that children gained sustainable knowledge about the food pyramid concept, the DED-P concept (i.e., dietary energy density principle), and about stress and stress-coping strategies can be used in difficult moments. This study also shows how powerful games can be for standardized knowledge transfer when correctly designed and when topics are presented appealingly to children (and adolescents and adults). Again, literature evidence the efficacy of serious games to improve knowledge for and/or behavioral changes among overweight or obese children (Dias et al., 2018). However, smartphone can be also an interesting means to spread SGs applications in the context of a healthy diet. Roh et al. (2022) divided brain health behavior in three categories: physical

activity, cognitive activity, and healthy diet. They used Mediterranean DASH Intervention for Neurodegenerative Delay Diet Score to evaluate the effectiveness of the intervention SGs smartphone mediated. 49 participants were randomly classed into the control group (n = 25) or intervention group (n = 24). However, in this case there were no significant associations in cognitive activity and following healthy diet between the two groups (p = 0.34). More studies are needed to evaluate the smartphone APP effect linked to SGs using in the context of food education. Anyway, scientific evidence shows the importance of new digital technology use with significant implication in promoting healthy eating behaviours knowledge disseminated thanks to the SGs. Following paragraphs will focus on pedagogical implication linked to the didactic SGs and how this methodology could be used to improve skills and competence in children and adolescent to prevent obesity risk and to promote healthy eating habits. Analysis will be conducted taking account European Projects which are focused on Food Education and healthy lifestyle.

1. New pedagogical perspectives: the relationship between technology and education

The use of new technologies to support teaching in recent years has grown exponentially and has profoundly changed the school system and the world of Higher Education (Lazzari, 2018). Therefore, the need emerges to provide learners with useful methods, tools, and skills to enable them to deal with an increasingly complex society characterized by new needs and pedagogical challenges (Di Palma & Belfiore, 2020).

Moreover, new technologies are not perceived by learners as something foreign as they are now part of individuals' everyday lives (Rossi & Tateo, 2021).

Conventionally, in the literature, the terminology "TEL" is used to describe Technology-Enhanced Learning. This term refers, as stated by Shen and Ho (2020), to the benefits of using information and communication technologies (ICT) in the learning and teaching process; or again, according to Dunn and Kennedy (2019), TEL can be considered as any form of electronic learning or as all those tools that can enhance classrooms through technology.

TEL and its application in the school system and the world of Higher Education incorporates the use of multiple tools and methodologies, which have important implications for learners. Examples include:

• Computer-Supported Collaborative Learning is the use of technologies to support collaborative and cooperative learning. This is a methodology that uses three main

classes of technologies (communication systems, resource sharing systems, group process support systems) in order to support learners in the co-construction of knowledge (Bonaiuti et al., 2017);

• Digital Storytelling, in which digital technologies are used with the aim of producing a transmedia narrative. DST is used in various contexts, including education as it has a strong inclusive and pedagogical value (di Furia et al., 2022);

• Project Based Learning (PBL), which is a teaching and learning model based on projects, which are complex tasks that collaboratively involve students in design, problem solving, decision making or research activities. Such projects culminate in the realization of authentic products, which can also be realized with the support of technological tools (Guo et al., 2020).

• The BYOD methodology, which stands for Bring Your Own Device, allows learners to use their own mobile devices (tablets, PCs, smartphones, etc.) for learning purposes (Panciroli & Macauda, 2018). This methodology proves to be very useful in solving the problem of the scarce presence of adequate technological equipment in classrooms.

The use of TELs has a strong value from a psycho-pedagogical point of view as the learner has an active role in the learning process and is more involved as he/she is called upon to produce and share knowledge; moreover, technologies allow learners to consolidate prior knowledge and acquire new knowledge, to develop soft skills such as problem solving, digital competence, decision making, critical thinking (Traetta et al., 2021).

TEL also includes the macro-category of Edutainment. This is a neologism given by the union of the terms "Educational" and "Entertainment", which refers to new strategies and forms of communication capable of making learning processes more engaging and entertaining (Pojani & Rocco, 2020). Edutainment approaches include Gamification strategies, Game-Based Learning, and the use of Serious Games (SGs). Gamification refers to the use of elements borrowed from games and game design techniques in non-game contexts (Sailer & Homner, 2020); the aim is to lead people to experience more involvement and enjoyment in everyday activities through play, fostering the active interest of users to change their behavioral data. Game-based Learning, on the other hand, is an educational strategy that uses play to teach a specific content or achieve a specific learning outcome (Bado, 2022). Serious Games, on the other hand, are games designed with a specific purpose other than mere entertainment (Dimitriadou et al., 2021). SGs belong to the so-called 'Educational Games', i.e., video games designed primarily for the purpose of teaching or transmitting certain knowledge and/or skills.

All the above-mentioned edutainment approaches allow for the active involvement of students, which is fundamental for achieving greater results in terms of effectiveness and goal attainment; from an educational and didactic point of view, it can be stated that SGs foster both cognitive enhancement and subject learning, affecting functions such as perception, attention, comprehension and memorization (Guarini et al., 2022).

The world of Edutainment and the use of SGs, is assuming an increasingly relevant role in the educational context, this because, as Rivoltella and Rossi (2019) state, play implies learning as it allows one to experiment with roles, to manipulate tools and materials by exploring everyday contexts and is useful for grasping constituent traits of the culture in which each of us lives. This has also had a strong impact and application in the world of nutrition education.

2. Digital Technology and Food Education: What Effects on Health Promotion?

In the field of health promotion and food education, the interest about the use of technologies in educational research has arisen during the last decade (Zeng, Lee, & Gao, 2023; Alghamdi & Bitar, 2023) leading to the design and development of Serious Games (SGs) and Exergames (EXGs).

Serious Games can be defined as gaming activities designed for educational purposes (Wattanasoontorn et al., 2013), and characterized by a playful approach, engaging, innovative and motivating for learners, able to solicit attention, improve attitudes and elicit behavioral changes (Baranowski et al., 2016). Exergames (EGs), on the other hand, refer to playful activities developed through interactive and immersive technology used to increase physical and movement activities, engagement and enjoyment allowing children to explore and adapt different motor tasks (Oppici et al., 2022).

To counter the growing epidemic of sedentariness and obesity, the World Health Organization (WHO) guidelines and recommendations suggest for children and adolescents the practice of at almost 60 minutes of daily physical activity to achieve positive effects on cognitive, motor, social and emotional development-affective (Bull et al., 2020). According to the international recommendations and guidelines (Healthy Diet, 2020; Herforth et al., 2019), correct eating habits and behaviors can reduce the risk of malnutrition, improving health status and preventing eating disorders (i.e., bulimia nervosa, binge-eating disorder, night eating syndrome, etc.), and reducing the environmental impact of food production (Kansra, Lakkunarajah, & Jay, 2021).

In this context, the role of the Educational Technology is important to structure learning episodes that respond to the changing didactic and educational needs of children and adolescents in the school setting by partially replacing teacher's direct instructions (i.e., about food education and benefits of being physically active) with active approaches oriented to meaningful and experience-based learning. In fact, according to recent findings the SGs are not only an effective strategy for improving attention and motivation but allow to obtain significant positive effects in improving children's healthy behaviors with a better dietary intake (Espinosa-Curiel et al., 2022), and reducing childhood obesity (Limone, Messina & Toto, 2022).

The study of Chow et al. (2020) highlighted that gamified interventions and SGs can determine better eating behaviors, increasing the daily consumption of fruit and vegetables through the improvement of food and nutritional knowledge.

However, theoretical constructs are needed to ensure the best effectiveness of the interventions based on the use of SGs, EGs and other digital technologies (Gamification, Augmented Reality, etc.) aimed at reducing overweight and obesity in the developmental age (Fernández-Sánchez, González-Fernández, & Acevedo-Borrega, 2023).

For example, the study of Puigdomenech et al. (2019) evaluated changes in dietary behaviour, physical activity, anthropometric characteristics and sleep quality through the PEGASO Fit for Future (PEGASO) App. This App provided movement analysis through accelerometers and mini-games to motivate teens to adopt and maintain active and healthy lifestyles, and it was structured on Behavior Change Wheel constructs (BCW; Michie et al., 2011).

This theory includes 19 areas of behavior's change according to the following categories: ability, opportunity, and motivation. This model recognizes that behavior is part of a complex system in which social, cultural, legislative, economic, psychological, physiological, and physical factors converge, and is influenced by the interaction of all these components, while the study of Mâsse et al., 2020 evaluated the effectiveness of a gamified App aimed at reducing BMI and promoting healthy eating habits, using, the Self-Determination Theory (SDT; Williams & Deci, 1996) as theoretical framework. The SDT holds that all human beings are motivated by three universal psychological needs (autonomy, competence, and relationship), the satisfaction of which is associated with high levels of psychological well-being.

On the other side, studies have highlighted some guidelines and recommendations on how to structure and which characteristics should be considered when developing SGs. In a recent systematic review of the literature, Alghamdi & Bitar (2023) evaluated the effectiveness of gamified interventions oriented to food education, to promote active lifestyles and reduce the percentage of overweight

and obesity in childhood. The included studies, published between 2018 and 2021, underlines the significant improvement not only of nutritional knowledge, but also of children's eating habits and behaviours. The recommendations and guidelines aimed at reducing childhood obesity for researchers, engineers and health authorities, can be summarized as follows: (1) associating intervention with well-defined constructs and theoretical reference models; (2) define the age group for the intervention; (3) customize and adapt the gaming experience; (4) adapt the gaming experience on the basis of the socio-cultural factors of the target audience; (5) use and, if possible, improving existing tools and projects (Alghamdi & Bitar, 2023).

In another study, Nørlev et al. (2021) identified 7 game mechanism used in SGs helping children with Type-1 diabetes (T 1 D) to self-manage, described as follows:

1. Narrative contexts: the games' background should be attractive, funny and happy, and the story could be based both on helping a character with T 1 D and on a health professional who helps patients with T 1 D;
2. Feedback: output from the game informs players about progression and/or performance, and on the correct/incorrect game's choice, contributing to learning reflection, metacognition, and self-management. Moreover, rewards can be considered a special kind of feedback, including points, coins, tokens, advantages, and praise. It could also act as a means to help children to make correct decisions;
3. Avatars: the virtual user's representation during gameplay should be characterized by appropriate self-management to transfer and share positive eating behaviors models;
4. Simulations: the exploration and experimentation in a controlled environment can led children to practice different self-management situations observing realistic outcomes without real-life consequences, helping users to highlight meaningful connections between events and eating chooses;
5. Goals: the aims that the players should challenge in terms of knowledge's acquisition, skills' learning and behavior's adoption, solicit intrinsic motivation and contributing to make the game fun and engaging;
6. Levels: the game should be structured in several small steps at increased difficulty allowing the gain of new knowledges and/or rewards until the content/skill was well understood or learned, enhancing competence, self-competence and intrinsic motivation;
7. Social interactions: the possibility to communicate with other players or health professionals, friends or family can best promote peer support, social learning, the building of self-esteem and knowledge, enhancing motivation to improve health behavior for learning.

Therefore, although international literature has highlighted the effectiveness of SGs and digital technologies to promote better eating habits and healthy lifestyles in children and adolescents, it is clear, however, the need to strengthen the theoretical frames of reference in which to place the experimental interventions, opening new research paths and guidelines that can be adapted to the socio-cultural context (for example validating and/or reworking some theories' variables and constructs). Moreover, it would be appropriate to contextualize the experimental interventions in specific theoretical frameworks and in pedagogical-didactic and methodological fields to stimulate the hedonic dimension, linked to positive experiences (positive emotions, awareness, resilience) the eudemonic dimension, linked to the motivational and self-realization aspects (involvement, self-efficacy and enjoyment), and the social dimension, promoting social inclusion and the development of links between projects and interventions.

3. Educating the new generations on nutrition and healthy living: projects, trends, and goals at the European level

In a present shaped by environmental crises on the one hand and public health emergencies on the other, the future well-being conditions of the new generations waver between a state of uncertainty, exacerbated by the traumatic experience of the pandemic (Glowacz & Schmits, 2020), a desire for self-rescue, as witnessed by the numerous activist movements present on social networks, and a thirst for knowledge, coinciding with a growing demand for innovation in the educational field. It is therefore the task of the institutions to create pathways and educational programs that respond to the present urgencies, training the new generations in the values of sustainability, in various aspects, from nutrition to the use of resources, towards a generalized well-being that starts with the individual and spreads to the surrounding ecosystems and social nets. In this sense, educational institutions and other stakeholders involved in the design of education and/or dissemination of knowledge are becoming increasingly committed to the themes of food education and the promotion of healthy and eco-sustainable lifestyles.

In this respect, several experimental experiences have recently been activated in some school environments aimed at promoting healthy lifestyles within growth and development programs. The aim of some virtuous programs is to work, with the youngest, on Food Literacy (FL), which can be defined, as stated in Elsborg et al. (2022), in five specific competences: food-related knowledge, cooking skills, sensorial skills related to taste, sense of care for oneself and others, and willingness to take a stand on food choices. In the study by Elsborg and colleagues (2022), 640

Danish students (mean age 12-13 years) were involved in an outdoor education project focused on food literacy, health literacy and school wellbeing, called FOODcamp; after the intervention, the authors found a positive effect on Food Literacy in particular, suggesting that the integration of teaching practices that are not necessarily classroom-centered and that train on specific nutrition-related skills can have a tangible impact on food-related knowledge and Health Literacy (HL), with a possible wide-ranging effect on psychological and physical wellbeing of individuals. Another significant model is that of the biodiverse edible schools described by Fischer and colleagues (2019), imagined to respond to two urgent needs of the younger generations: on the one hand, food education and the promotion of healthier lifestyles, aimed at combating childhood obesity (EU, 2014); on the other hand, the need to bring the youngest children closer to nature, trying to reinforce an increasingly feeble contact with plants and animals (Soga & Gaston, 2016). Biodiverse edible schools involve the cooperative management and use of a school garden, as well as the cultivation of local produce that, together with other foodstuffs from the local area, are used as healthy ingredients in the school kitchen. This is a case where contemporary educational and social urgencies transform not only teaching practices, but the very architectural structures of school environments.

On a systemic level, moreover, educational establishments have a significant environmental impact (Féret, 2020), so it is necessary to involve school communities as much as possible in projects aimed at moderating the management of food resources, avoiding waste as much as possible (in particular, the example given by Féret refers to the "Pesa e pensa" (Weigh and Think) project, conducted in over 20 Catalan schools with over 2000 students, and aimed at discouraging food waste. School education projects based on food education have a double potential: firstly, they can have an impact on students' dietary behavior, with the aim of positively influencing their health status; secondly, they can contribute to the triggering of environmentally sustainable practices that can improve the perceived levels of environmental well-being.

The importance and pertinence of pursuing educational interventions of this kind is highlighted by the large number of Strategic Partnerships for school education concluded over the past decade on the topics of Food Education and/or healthier and more eco-friendly lifestyles and nutritional choices, within the framework of Erasmus+ funding activated by the European Union: since 2014, over 300 projects in this areas have been registered (data are available at https://erasmus-plus.ec.europa.eu/projects/), including completed and still ongoing projects, with a peak in 2016, with 58 Strategic Partnerships formed. Below is an overview of the

related projects presented in the last three-year period (from 2020 to 2022, excluding the current year):

Name	**End date**	**Coordinator**	**Topics**
CLIMATE CHANGE EDUCATION	31 March 2023	PROFESSIONSHOJSKOLEN ABSALON (DK)	New Innovative Curricula
GLOBAL ROOTS	30 September 2022	Kulturprinsen (DK)	New Innovative Curricula
Household without chemicals	31 August 2022	Kállósemjéni Diákokért és Ifjakért Egyesület (HU)	Health And Wellbeing
From Seed to Spoon	31 August 2022	Catholic University of the Sacred Heart (IT)	Health and Wellbeing
Plastics Plastics Everywhere	31 August 2022	County Council Of The City And County Of Cardiff (GB)	Environmental Responsibility
Space Detectives	31 August 2022	Scoala Gimnaziala Nr 195 (RO)	New innovative curricula
Taking care of forest for protecting local and global ecosystems and human life	30 June 2022	Conselleria De Cultura, Educacion E Universidade (ES)	Environment And Climate Change
S.W.I.T.C.H. – Lifestyles	31 December 2021	FURNESS ACADEMIES TRUST (GB)	Health And Wellbeing

Food and Nutrition In ECEC	31 October 2021	Galileo Progetti Nonprofit (HU)	Health and Wellbeing
DEMETER	31 August 2021	VANERSBORGS KOMMUN (SE)	New Innovative Curricula
Fruit Super Squad: Healthy Schools	31 August 2021	Associação Portuguesa Contra a Obesidade Infantil (PT)	Health And Wellbeing
Kitchen Lab for Kids	31 August 2021	Akademia Ignatianum (PL)	New Innovative Curricula
Learning by Doing	31 August 2021	Stockwell Primary School (GB)	Key Competences
Eco gardens in our Kindergartens	30 June 2021	GRAD LUDBREG (HR)	Environment And Climate Change
StudEnts fight food and packaging waste throuGh entrepreneurial education and Game-baSed learning	31 May 2021	Bank Zywnosci w Olsztynie (PL)	Environment And Climate Change
TACKLING ADOLESCENT OBESITY AND PROMOTING INCLUSION THROUGH NUTRITION TRAININGS FOR	28 February 2021	Safe Food Advocacy Europe (BE)	Health And Wellbeing

DISADVANTAGED YOUTH			
Education from Field to School	31 August 2020	THE SOIL ASSOCIATION LIMITED (GB)	New Innovative Curricula
FOOD-AWARE -	31 December 2020	DOUKA EKPAIDEFTIRIA AE (GR)	Environmental Responsibility
SUSTAIN	31 December 2020	Rijksuniversiteit Groningen (NL)	Environment And Climate Change
Culture and Communication of Taste	31 July 2020	Istituto Professionale Servizi per l'enogastronomia e l'ospitalità alberghiera (IT)	New Innovative Curricula
Farm the City	17 March 2020	PRISMS (MT)	Environment And Climate Change

Table 1. Overview of Strategic Partnerships for school education built to promote Food Education and/or sustainable nutrition and utilisation of natural resources (from 2020 to 2022).

Conclusions

Review provides an overview of research interventions using serious games as strategies to promote healthy eating habits and good practice in adolescent and children taking account European Projects intent which are principally focused on eco-sustainable lifestyles and environmental protection themes. Educational strategies, in the context of Higher Education, focused on this kind of intervention can contribute positively to community wellbeing and improve learning didactics

techniques in primary and secondary school's teachers. A transversal modality to environment safeguard can be represented by the moderation of people eating habits, to prevent unuseful food waste which contribute negatively to environmental pollution. Thanks to International Projects analysis it's possible to better understand eating behavioural consequences and fundamental need of future research to changes in long-term healthy behaviours and dietary habits through the using of digital applications to better understand the effectiveness and efficacy of digital learning tool. As mentioned before, we analysed and categorized different European Projects related to Erasmus+ policy. The principal aims of this EU action plan is to establish Strategic Partnership between countries to promote general start guideline where all member states can begin to guarantee achievement of objectives and distribution of resources. In the context of promotion of healthy eating behaviours and obesity risk prevention, as mentioned before, the EU Action Plan on Childhood Obesity (2014-2020) recommends that children should be educated about nutrition, healthy lifestyle, sustainability issues, along with practical food skills in an integrated manner which utilises the existing curriculum as opposed to piecemeal additional components (EU, 2014). Present contributes aims to evidence the necessity to use new technologies which can be considered facilitators in obstacle overcoming. In this case, the use of SGs can be considered a useful strategy to achieve health objective and disease prevention linked to food non-criteria abuse. Thanks to the immersive experience, SGs guarantee a new kind of didactic learning to favourite correct knowledge acquisition about food risks and right behaviours to prevent these last. Serious Games interventions seem to be promising interventions to influence healthy habits such as non-sedentary lifestyle or modifications of eating patterns, promoting behavioural changes in users. The aspect of Serious Game and gamification is particularly attractive for different reasons related to different constructs: badges, points, levels, avatars, rankings, missions, rewards, and instant feedback play a fundamental role in the social interaction between players, and they increase motivation, which is considered a direct effect of gamification. Guidelines and good practices are needed to disseminate and make available and applicate real European and members State intents linked to a world characterized by an elevated complexity degree.

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