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Education for Sustainable Development: What Matters?

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Abstract: There is a raising of concerns about the need to change environmental behaviours through economic and social activities. Education plays a significant role in this process, with schools enhancing the necessary behaviour adoption by youngsters and their community. Thus, the present study examines the relationship between different variables, such as sustainability (green public procurement, healthy food activity) and education (course, impact, interactive teaching methods/technology). We developed a survey regarding education for sustainable development (ESD), with five sections considering the referred variables. We applied it to 385 Romanian educators and teachers from kindergarten and primary school. An SEM model was formed to evaluate the relationship between the associated variables. The results showed that an organisation or school with a long-term plan incorporating green public procurement will positively stimulate initiatives that help the next generation adopt good eating habits. Moreover, this eco-sustainable approach affects the creation of interactive teaching methods and the courses and classes. Consequently, the changes in interactive methods will positively affect the overall impact. Nevertheless, the relationship between courses and impact was not significant. This means management decisions regarding green strategies can lead to a broader change in a school setting, fostering the ESD.

Keywords: sustainable curricula; cultural transformation; green procurement; interactive learning; eco-friendly behaviours

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1. Introduction

The current economic climate, characterised by significant social and environmental challenges, necessitates a critical re-evaluation of strategies for the younger generation. The United Nations' 2030 Agenda for Sustainable Development, which outlines 17 goals [1], serves as a guiding framework for this research. We specifically focus on three of these goals as follows:

Goal 3: good health and well-being; involving promoting healthy eating habits and physical activity from early childhood can foster a healthier population with reduced healthcare needs.

Goal 4: quality education; leveraging technology and interactive teaching methods can engage students and cultivate creativity, fostering stronger teacher–student relationships.

Goal 12: responsible consumption and production; implementing sustainable public procurement (SPP) in educational institutions can enhance corporate social responsibility

and reduce environmental impact. Educating young people about recycling, repair, and upcycling is crucial for long-term sustainability.

These goals are also the subject of research worldwide, implying even cooperation between states [2]. It is recognised that teachers with a coursework focus on education for sustainable development (ESD) were more supportive of the SDGs [3,4]. Furthermore, practical solutions for ESD can be materialised through innovation, smart consumption, green public procurement (GPP), driving the circular economy [5], smart alimentation, the sport for all programme, and agile management. The understanding that education for sustainability should be developed from young ages to older ones with professionals (e.g., teachers, dietitians) leads to learning about waste management and ecological and health behaviour [6]. Developing sustainable healthy habits for the young generation should be considered an investment in the future [7] through the protection of living environments, new job creation, healthy lifestyles, innovation, and competitive advantages [8].

Green sustainable education and physical education (PE) might be a solution for the future's legacy and developing a healthy lifestyle. PE offers special opportunities for ESD once the students get into contact with the physical and social environment, with the possibility to have active learning. The development of PE for ESD is recent, being pointed out as one of the first programmes, the "Klima bewegt"! [9]. It is highlighted that they achieve "practical goals such as sufficient exercise time and fulfilling the purposes of the PE curriculum achieved. It should be emphasised that PE content and ESD topics are on the same level in our program, the exercises do not neglect PE contents, and both aspects are addressed simultaneously" (p. 12, [9]). However, the authors point out that one of their limitations is that the environmental factors were not included, namely the teacher's perceptions and actions.

Currently, we can count on several digital resources (e.g., Internet of Things, blockchain, virtual and augmented reality) that could help to provide and implement green sustainable education. These resources are and contribute to innovative and competitive solutions, at the same time contributing to ESD. Some examples can be found on Eco Ed Hub [10]. Interestingly, besides the major technological developments in learning methods, Finland's early childhood emphasis on environmental responsibility has contributed to its strong environmental policies and high living standards [11]. New Zealand's approach, centred on child-led learning and teacher–student collaboration, fosters engagement and development [9]. The Japanese incorporation of ESD through hands-on activities like gardening and recycling cultivates a sustainable mindset [12]. Costa Rica's focus on environmental education supports its eco-tourism industry and overall sustainability goals [13].

Even with the resources and knowledge that currently exist, there are barriers to ESD, such as disciplinary silos in teacher training and curricula, a focus on high-stakes assessments, insufficient support for teachers (this includes inadequate preparation/professional development, little time for collaboration/curriculum development, and lack of effective curricular materials), a focus on the cognitive dimension of learning, and a poor quality of Earth science education [14]. Furthermore, when we are talking about ESD, we may also take into account environmental peacebuilding processes [15] and water management and use [16,17]. Political conflicts or security instability, such as are present in Palestine and Israel, as well as administrative and financial constraints, make it difficult to implement ESD activities [15]. However, the discourse of water scarcity as constructed and reproduced in textbooks can provide best practises and aims at shaping environmental behaviours [16]. In some cases, textbooks have referred to religious texts to argue in favour of altering the person's behaviours to become more environmentally friendly, emphasising individual responsibility instead of the responsibility of political institutions [17].

To gain a better perspective about ESD in Romania, we developed a brief analysis of publications in WoS on subjects such as green sustainable education (topic) and 2018–2022 (Year Published), physical education and sports (all fields), and green public procurement (all fields), and articles or review articles were selected (document types). As a result, only 406 papers were presented, which were then grouped by theme. Once again, we

do not aim to provide a systematic review of the topic through this process. This scientific literature technique helps us support the study's background and rationale. We selected certain references based on their accessibility, as their titles and abstracts captured our attention (Figure 1). The research outlined addresses a crucial gap in understanding how ESD is integrated into Romanian educational settings, particularly within kindergarten, primary, and secondary schools. While ESD practises are globally emphasised, there remains limited research on Romanian teachers' perceptions and actions in implementing these strategies. This focus on Romania is significant, as cultural, economic, and political factors uniquely influence the application of ESD principles, making this study essential in contributing a more nuanced perspective on ESD's role and challenges across various contexts. By examining teachers' views, this research sheds light on the facilitators and barriers they encounter, offering insights into their impact on students' sustainable behaviours and development. Furthermore, the study spans multiple educational levels, emphasising the importance of establishing sustainable habits from early childhood onward. Investigating the role of interactive learning and digital technology in advancing ESD, particularly in Romanian schools, can provide valuable information for educators and policymakers aiming to strengthen ESD integration.

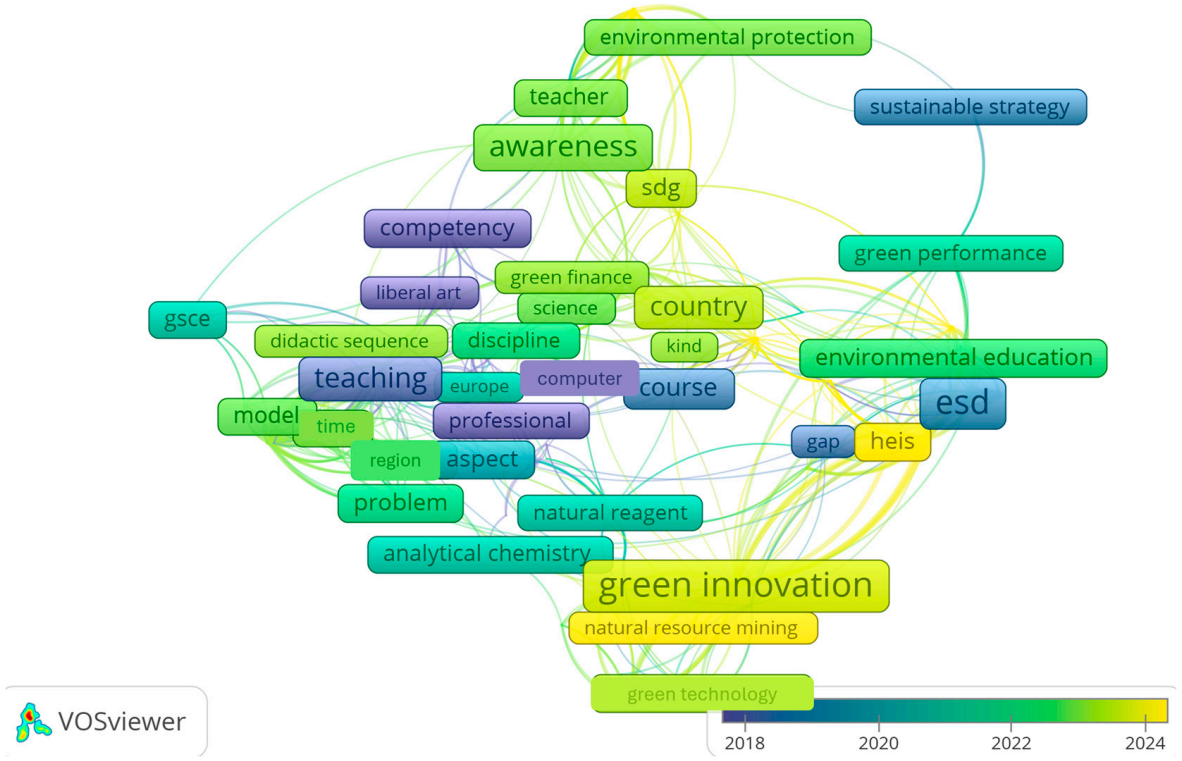

Figure 1. Cluster in ESD. Source: adapted from VOSviewer (open source) [18].

2. Theoretical Framework Based on Web of Science Research

Embedding ESD in education is essential for building a sustainable future, since it helps cultivate environmental stewardship, social responsibility, and future-ready skills. In this way, ESD can empower young people to address global challenges and seize opportunities. Aiming to better understand ESD, this research analysed it according to the following five complementary dimensions: (1) healthy eating initiatives, (2) GPP strategies, (3) teacher expertise in creating engaging educational materials, (4) interactive course applications, and (5) the impact of digital technology on healthy living in physical education and sports (PES). Through those, we consider the development of a survey and an analysis of the Romanian context.

The first section focused on healthy eating behaviour, which is a common activity of the participants, resulting from a composed reflective variable, Activities. It is formed by items referring to food quality, the importance and ways of recycling food waste, and the effects of being under/overweight on health and school activity. This aligns with the physical education curriculum, namely the issues about pupils' body weight [9] and the UN's 2030 Agenda.

The second section focused on GPP strategies and activities as a determinant factor for healthy behaviour, resulting in the Green Strategy (GS) variable. It is recognised that GPP implementation and monitoring are relevant to changing organisations and individuals' behaviours and that effective communication and good practise models are crucial for achieving GPP goals [5,7,19–21]. GPP key components to enhance sustainability and healthy eating include sustainable sourcing, nutrition education, waste reduction, local partnerships, policy implementation, community engagement, and staff training [22]. Leaders should implement GPP plans in educational institutions to model sustainable practises for the community. Aligning GPP with ISO 20400 standards [23] can foster a "green" mindset, which is crucial for cultivating environmental responsibility.

The third section explored applied courses to impact young generations. Key themes such as recycling, science education, and fostering critical thinking are well related to ESD and are aligned with new sustainable consumption and production (SCP) principles [24]. It is pointed out that there is a need to develop and expand digital access and address disparities to enhance SCP and ESD [25]. Indeed, sustainability integration requires interdisciplinary teaching, experiential learning, and technology [26]. Interactive methods and collaborative learning are essential [27], and key strategies include flipped classrooms, problem-based learning, and personalised learning [28]. These approaches foster teamwork, student empowerment, and future readiness [29,30]. Also, enhancing digital competencies for teachers and students is crucial [31], since ongoing development, technology integration, and evaluation are essential and part of cultivating a sustainable school culture [32].

The fourth section concerns the professor's knowledge regarding methodologies and technologies in creating significant content for kids. Summing up the questions of this section resulted in the Met_Teh variable. Social media platforms offer innovative teaching and learning approaches, enhancing classroom communication and developing essential digital skills for future careers. The complex and dynamic digital landscape for professional development necessitates a focused approach to digital equity as a social responsibility. A more comprehensive strategy is needed to foster learners' online navigation for educational purposes and to help them achieve their personal and professional development goals [33]. Addressing learners' needs in this evolving digital environment requires a sophisticated and personal approach that explores how participants organise their learning and align it with their (teacher/educator and learner) goals.

Section five examined interactive teaching and digital technology's impact on youth health. Cloud computing challenges traditional education, while current approaches often fall short in digital health and physical education [34]. Innovative methods using fitness apps, wearable technology, and tailored plans help to promote active lifestyles [35]. Moreover, these resources can be used for collaborative learning and health education, consequently fostering wellness. Additionally, schools can cultivate healthy habits through active lifestyles [35–37], contributing to positive youth development. Technology is considered as facilitator of learning [34,35,37,38].

The variables derived from each section (Tables 1–3) were interconnected to form the eco-sustainable model. Furthermore, an impact of the school's green strategy model was developed based on these variables and their corresponding indicators (Figure 2).

Table 1. Questionnaire variables: Healthy Food Activity and Green Strategy description and the supporting literature.

Variable	Label	Description
Healthy Food Activity (HFA) To develop healthy eating behaviour, preschoolers and schoolchildren carry out different activities, such as discussions, drawings, songs, moulds, etc.	FoodCant	the amount of food adequate for consumption [5,22]
	FoodQuality	food quality: vegetables/fruits, white meat, unprocessed cheeses, low carbohydrates, and unadulterated foods [5,22]
	Recycling	importance and ways of recycling food waste [3,4]
	Protect Environment	ways to protect the environment to benefit from healthy food waste [3,4]
	Weight	normal weight and the effects of being under/overweight on health [6]
Green strategy (GS) The institution where I work	Strategy	has a well-implemented strategy for serving a healthy menu to children [19–21]
	Eco	organised ecological purchases for children's menus
	GPP	has drawn up the specifications to organise green procurement quickly [22,24,25]

Notes regarding questionnaire variablesQuestionnaire Variables: The GPP section questions were developed based on the international ISO 20400 standard [23] for sustainable procurement, a global benchmark for organisational sustainability. Our previous research [7] further validated these questions. The survey questions and interactive teaching methods were developed by drawing on two sources namely (1) validated online surveys and (2) the authors' experience from attending international courses on "Quality, Equity, and Inclusion in Education: Post-Pandemic Response" and "Leadership Program for Education Authorities (LPEA)—Improving Learning Outcomes at the School Level Post-Pandemic" (developed by the International Development Institute [26]). Our previous research [34] also informed the design.

Table 2. Questionnaire variables: Course and the interactive teaching methods/technology description and the supporting literature.

Variable	Label	Description
Course	Toys	design of toys from recyclable materials [38]
	WaterCircuit	we explain and simulate the water circuit in nature [26,27,32]
	Plant	we plant flowers/trees in the schoolyard or other areas [28]
	Clean	we clean the institution, sorting the garbage by categories [28]
	Movie	we watch videos demonstrating the negative effects of pollution on the bioclimate [27]
	Repair	we view scientific drawings/films (such as Fixiki/Discovery/Nat Geo, etc.) to teach the children to preserve and repair objects/the environment [27]
	Creativity	we watch videos that stimulate creativity, critical thinking, and a positive attitude toward problem-solving [27,32]
	Ethic	we watch videos to stimulate the ethical sense

Table 2. *Cont.*

Variable	Label	Description
Interactive teaching methods/technology (Met_tech) How educators can produce relevant information (courses tailored to the situation, each kind of sport)	Know	through thorough, up-to-date knowledge, interest, and passion [9,32]
	Method	by involving new methodologies in teaching [9,32]
	Tools	by using new high-performance equipment [36]
	Tech	using new technologies [9,37]
	Passion	through passion [9,37]
	Other	other [37]

Table 3. Questionnaire variable: Impact description and the supporting literature.

Variable	Label	Description
Impact		impact of innovative teaching technologies and methods (Met_Tech) used in PES on healthy lifestyle of the young generation
	Sport	to comply with the principle "Man sana in corpore sano", physical education and sports classes are held within the institution [31,37]
	Health	health [9]
	Fitness	fitness (primary prophylaxis) [9,30,37]
	Body	body modelling [9,30]
	Control	educational, social physical control [9,37]
	Move	assimilation of movement concepts [30,33,37]
	PersDev	personal, psychosocial, and moral development
	Fun	enjoyable education via solitary and group activities (recreational) [9,37]
	Respect	promotes tolerance, cooperation, and respect [36,37]
	Attitude	understanding physical and sporting effort leads to the creation of a positive attitude toward victory and defeat [36,37]
	Discrimination	removes cultural, gender, and ethnic discrimination [9,36,37]

Source: own elaboration.

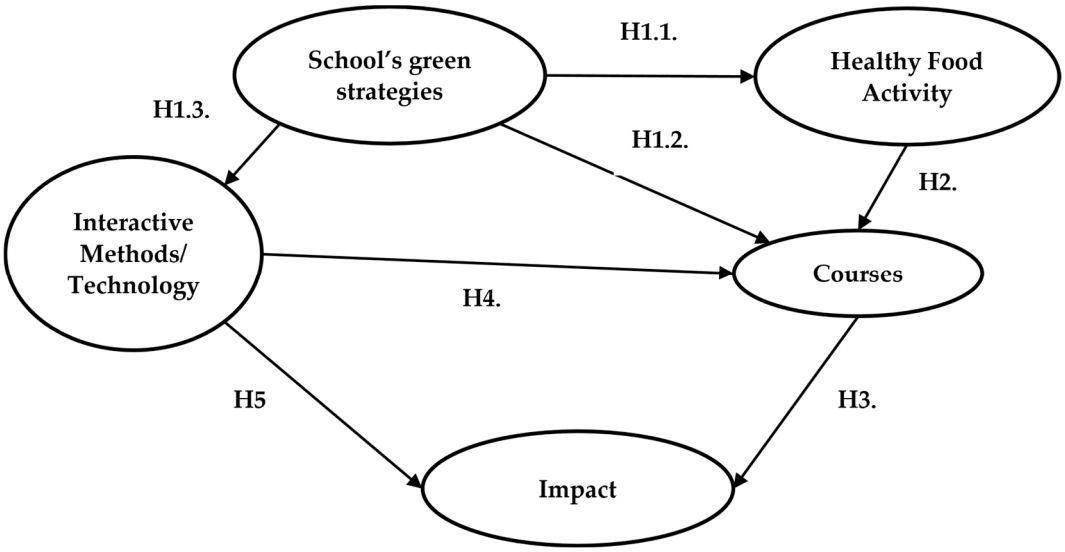

Figure 2. Model to understand the impact of the schools. Source: own elaboration.

Therefore, we hypothesise that implementing GPP, a GS, positively impacts students' healthy eating behaviours, facilitates the development of engaging and innovative teaching methods and courses with concerns to sustainable elements, and ultimately promotes an impact of interactive teaching methods and digital technology on youth health and well-being.

3. Materials and Methods

This study examines Romanian kindergarten, primary, and secondary teachers' perceptions of ESD actions in their school setting. The following hypotheses were tested:

H1.1. *Schools that implement sustainable strategies positively impact activities and healthy behaviours.*

H1.2. *Schools that implement sustainable strategies have a positive impact on ESD courses.*

H1.3. *Schools that implement sustainable strategies positively impact innovative and integrative teaching methods.*

H2. *Schools developing activities and promoting healthy food behaviours positively influence ESD courses.*

H3. *Schools that develop ESD courses positively impact the lifestyles of new generations.*

H4. *Schools that develop innovative and interactive learning methods positively impact ESD courses.*

H5. *Schools that develop innovative and interactive learning methods positively impact the lifestyles of new generations.*

3.1. Participants

A total of 385 Romanian participants (82% professors and 16% educators) contributed to the study. The sample represented both urban (64%) and rural (36%) areas, with participants aged under 30 (13%), 31–40 (29%), 41–50 (40%), and over 50 (19%). Gender distribution was almost equal (51% male, 49% female). Most participants worked in multiple settings, with secondary schools (44%), primary schools (26%), and kindergartens (16%) being the primary affiliations. Sport clubs (12%) and centres for children with disabilities (2%) were also represented. The option of grouping kindergarten, primary, and secondary teachers together is due to a holistic perspective on ESD implementation across educational stages, which is essential for fostering consistent sustainable behaviours from early childhood onward. While teaching methods vary, examining these levels collectively provides insights into shared challenges and adaptable strategies, supporting cohesive ESD integration throughout students' educational journeys. This unified approach helps identify systemic changes needed to embed sustainability comprehensively, aligning efforts across all educational levels rather than isolating them. Five incomplete responses were excluded. To comprehensively analyse the data, construct reliability and validity, discriminant validity, and collinearity statistics were assessed.

3.2. Procedures

To investigate the hypothesised relationships outlined above, a survey instrument was developed based on the variables and their corresponding indicators, incorporating the supporting literature from which the questions were derived (Tables 1–3). These tables provide a clear breakdown of each question's formulation, highlighting the specific previous studies referenced and the exact sources from which questions were adapted for our survey. The survey was designed for Romanian school staff, focusing on kindergarten and primary

school teachers, and the data collection period spanned from April to November 2023. The questionnaire was administered in two ways, namely online through a secure Google Form (https://forms.gle/rLuHqFR2TYgpAhtS7, accessed on 1 April 2023) and in person, where the authors met a subset of teachers to provide detailed information about the survey and answer any questions regarding the content.

Before completing the questionnaire, participants were presented with a disclosure agreement. By submitting their responses, participants were considered to have consented to the study.

Considering the assumptions of the planned statistical analyses, we employed structural equation modelling (SEM) with a partial least squares (PLS) approach using the *SmartPLS* v. 3.2.9. software. SEM-PLS enabled the simultaneous analysis of latent variables, even with smaller sample sizes. We chose path analysis SmartPLS because it is a reliable regression approach, and it (a) reduces the variance in endogenous construct residuals; (b) has few restriction concerns such as normality; (c) produces relevant findings even with small sample sizes; and (d) primarily blends formative and reflective components. It is advised to use path analysis or PLS-SEM (partial least squares SEM) when the structural model becomes extremely complex, the sample is relatively small, and the hypothesis includes both formative and reflecting parts [39]. PLS-SEM is the best method when conducting research that includes predictions or theory development (including contributions to theory development). Predictive analysis and the deciphering of complex relationships are its main uses [40]. Data normality is very difficult to achieve in behavioural studies. In general, structural equation modelling makes it possible to analyse samples in which normality is not verified, making it suitable for this kind of analysis.

4. Results

4.1. Construct Reliability and Validity

SmartPLS offers various tests to ensure data reliability and validity. Table 4 outlines the validation procedures used in this study according to the recommendations of Vinzi et al. [39]. All variables exhibited excellent composite reliability, Cronbach's alpha, rho_A (>0.7), and average variance extracted (>0.5) values, supporting model consistency. The average variance extracted (AVE) was calculated to assess convergent validity. All constructs (GS—0.743, HFA—0.521, Course—0.544, Met_Teh—0.666, Impact—0.753) exceeded the 0.5 threshold, confirming convergent validity (Table 4). Teacher perceptions indicate that schools adopting sustainable strategies foster positive behaviours, innovative teaching, and improved student outcomes. These strategies contribute to a more sustainable and inclusive educational environment.

This section is divided by subheadings and will provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

AVE values in Table 4 indicate the average degree of positive correlation between variables and their respective constructs. The results indicate strong positive correlations between variables and their respective constructs, as shown by high AVE values (above 0.5), signifying that the model is well suited to the data. Furthermore, the constructs (GS—0.897, HFA—0.840, Course—0.892, Met_Tech—0.921, Impact—0.955) demonstrate excellent reliability, with high composite reliability and Cronbach's alpha scores, confirming the robustness of the model and providing solid support for our hypotheses.

Table 4 and Figure 3 present Cronbach's alpha (CA) values for GS (0.897), HFA (0.847), Course (0.895), Met_Tech (0.915), and Impact (0.955). These high CA values indicate the strong internal consistency and reliability of the scales. Given the acceptable Cronbach's alpha range of 0.6 to 1, with 0.7 as the standard, the results demonstrate the reliability of the analysis. All loading factors for the subitems of variables are higher than 0.6, meaning that these subitems form strong latent constructs (GS, HFA, Courses, Met_Tech, Impact).

Table 4. Model validation criteria.

Variable	Label	LF	CA	rho_A	CR	AVE	VIF
	Threshold	**>0.6**	**>0.6**	**>0.7**	**>0.7**	**>0.5**	**<3**
Healthy Food Activity (HFA)	FoodCant	0.689	0.847	0.87	0.84	0.521	1.875
	FoodQuality	0.591					1.914
	Recycling	0.970					1.865
	Protect Env	0.708					2.455
	Weight	0.582					1.668
Green Strategy (GS)	Strategy	0.872	0.897	0.9	0.897	0.743	2.399
	Eco	0.841					2.893
	GPP	0.873					3.200
Course	Toys	0.826	0.895	0.9	0.892	0.544	1.845
	WaterCircuit	0.707					2.291
	Plant	0.701					1.642
	Clean	0.801					1.880
	Movie	0.746					3.407
	Repair	0.697					3.960
	Ethic	0.669					2.715
Impact	Body	0.838	0.955	0.96	0.955	0.753	3.856
	Control	0.883					4.783
	Discrimination	0.842					3.197
	Fitness	0.801					3.332
	Health	0.921					4.052
	Move	0.921					4.456
	Respect	0.863					3.804
Interactive teaching methods/technology (Met_Tech)	Know	0.898	0.915	0.93	0.921	0.666	3.450
	Method	0.853					4.079
	Tools	0.863					4.223
	Tech	0.844					3.978
	Passion	0.852					2.854
	Other	0.529					1.308

Source: SmartPLS analysis (reprinted from a free version of SmartPLS software, version 3.2.9, created on 20 August 2024) [40].

To determine whether the variables were significant, 5000 samples plus the 95% bootstrapping method were used to calculate the variance inflation factor (VIF) for each construct. Figure 4 presents a summary of the results. This test's *p*-values are less than 0.01. As a result, we may conclude that there is no multicollinearity across each factor in the overall VIF (Table 4). All variables have a VIF of less than three, which suggests that multicollinearity is not likely to exist.

PLS path modelling analysed relationships between school-based healthy eating, green strategies, instructional quality, and teacher content and their impact on PES participation and youth health. Impact's correlation efficiency (R^2) is 0.641, with the model explaining 64.1% of its variation (Table 4).

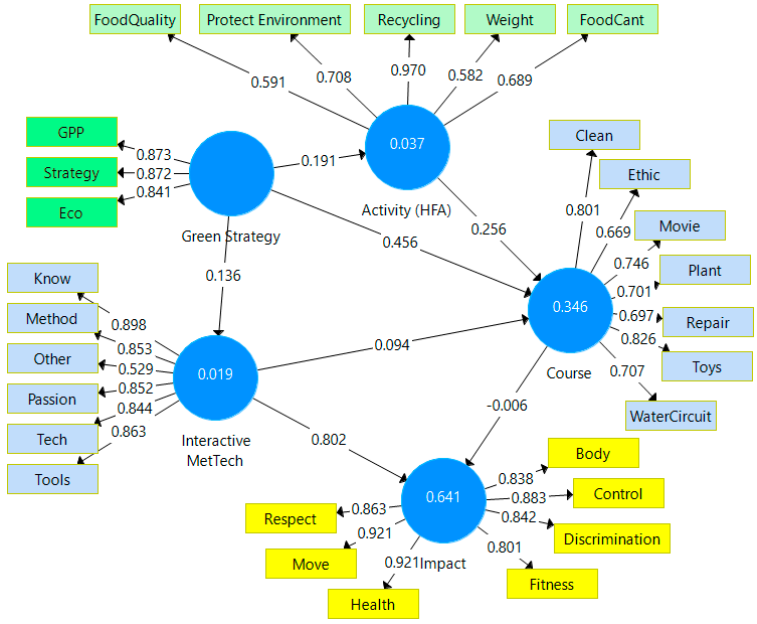

Figure 3. Cronbach's alpha for the following variables: Activity, Green Strategy, Met_Tech, Impact, and Courses. Source: SmartPLS analysis (reprinted from a free version of SmartPLS software, version 3.3.9, created on 20 August 2024) [40].

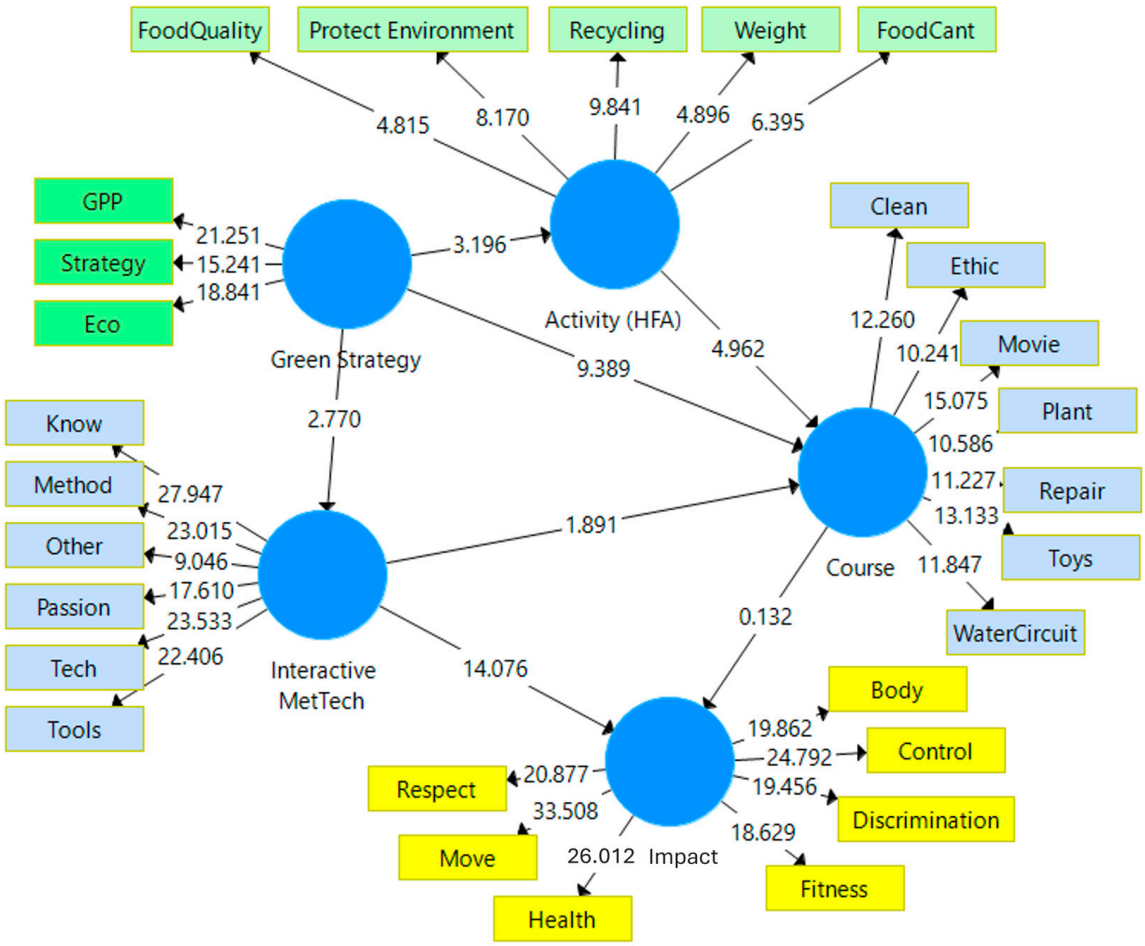

Figure 4. Bootstrapping analysis and t-values. Source: SmartPLS analysis (reprinted from a free version of SmartPLS software, version 3.2.9, created on 20 August 2024) [40].

The path coefficient analysis (Table 5) shows significant relationships ($p < 0.05$) between the variables, with GS having a small positive effect on HFA (β = 0.191) and a moderate effect on Course (β = 0.456), but minimal influence on Met_Tech (β = 0.136). HFA also showed a small positive influence on Course (β = 0.256). Notably, Met_Tech had a strong positive impact on Impact (β = 0.802), while the effects of Course and Met_Tech on Impact were minimal (β = −0.006 and β = 0.094, respectively).

Table 5. Path coefficients.

Variable	Path Coefficients	Sample Mean	Std. Dev.	T Statistics	*p*-Values
H1.1 Green Strategy → HFA	0.191	0.198	0.057	3.383	0.001 *
H1.2 Green Strategy → Course	0.456	0.453	0.049	9.401	0.000 *
H1.3 Green Strategy → Met_tech	0.136	0.135	0.049	2.769	0.006 *
H2 HFA → Course	0.256	0.258	0.055	4.652	0.000 *
H3 Course → Impact	−0.006	−0.006	0.043	0.135	0.893 **
H4 Met_Tech → Courses	0.094	0.099	0.051	1.863	0.063 **
H5 Met_Tech → Impact	0.802	0.796	0.054	14.774	0.000 *

* Not rejected; ** rejected. Source: SmartPLS analysis (reprinted from a free version of SmartPLS software, version 3.2.9, created on 20 August 2024) [40].

The path coefficient analysis confirms that GS significantly influences HFA, Course, and Met_Tech, supporting hypotheses H1.1, H1.2, and H1.3. Additionally, HFA impacts Course (H2), and Met_Tech has a significant effect on the impact of new generations (H5). However, no significant relationships were observed between Course and Impact (H3) or Met_Tech and Course (H4), indicating that while H1, H2, and H5 are supported, H3 and H4 are not. Figure 3 shows Cronbach's alpha values for HFA, GS, Met_Tech, Impact, and Course, illustrating the relationships between the variables and highlighting that a school's GS influences interactive Met_Tech, Course, and HFA, which, alongside innovative teaching and teacher engagement, play a critical role in promoting youth health.

4.2. Discriminant Validity

The model demonstrates statistical power by meeting the Fornell–Larcker criterion (Table 6). All values are below or near 0.7 and smaller than the diagonal, indicating discriminant validity between scales.

Table 6. Discriminant validity.

	Met_Teh	HFA	Course	GS	Impact
Met_Teh	0.816				
HFA	0.136	0.722			
Course	0.191	0.356	0.737		
GS	0.136	0.191	0.518	0.862	
Impact	0.800	0.075	0.147	0.114	0.868

Source: SmartPLS analysis (reprinted from a free version of SmartPLS software, version 3.2.9, created on 20 August 2024) [40].

The estimated model shows a superior fit compared to the saturated model, with an SRMR of 0.06, indicating excellent model fit (Table 7). Although d_ULS and d_G values were higher, the significantly lower chi-square value further confirms the estimated model's advantage. An NFI of 0.823 also reflects a very good overall model fit [39].

Table 7. Fit summary.

	Saturated Model	Estimated Model
SRMR	0.056	0.060
d_ULS	1.258	1.451
d_G	0.759	0.762
Chi-Square	1518.641	1519.371
NFI	0.823	0.823

Source: SmartPLS analysis (reprinted from a free version of SmartPLS software, version 3.2.9, created on 20 August 2024) [40].

4.3. Collinearity Statistics VIF

Bootstrapping with 5000 samples and a 95% confidence level was conducted to assess multicollinearity. VIF values below five and t-values exceeding 1.96 confirm the absence of multicollinearity (Figure 4, Table 6). Nonparametric bootstrapping was employed to determine the significance of 500 findings, including path coefficients, Cronbach's alpha, and R^2 [39,41]. This method involves resampling the data to make inferences about the population.

Based on the above criteria and respective results, this research may argue that H1.1., H1.2., H1.3., H2, and H3 were not rejected. However, according to the results, H4 was rejected (Table 4, Figure 4).

5. Discussion

This study investigated the impact of sustainable education on student health in Romanian kindergartens and primary and secondary schools. The hypothesis that sustainable school practises positively influence healthy behaviours, sustainable education courses, innovative teaching methods, and healthy eating habits was tested. A survey collected the teachers' perceptions about their own and their school's practises. Cronbach's alpha values demonstrated strong reliability, and a VIF analysis confirmed the absence of multicollinearity among variables. Through the PLS path modelling, we analysed the relationships between school-based initiatives, green strategies, instructional quality, and teacher practises with our model to understand the impact of the school's green strategy (Figure 2), explaining 64.1% of the variance. The path coefficient analysis supported most hypotheses with minimal error.

The results reinforce the importance of adopting green strategies, namely GPP [24,25], in schools to foster internal changes (e.g., courses and educational learning methods) and lead by example for the school and the wider community. Furthermore, this aligns with the UN's 2030 Agenda emphasising GPP, and the EU has outlined GPP criteria [42]. The governmental states should assume the political agendas of each person, since they are of concern to us. As previously seen, the GS variable underscores the positive environmental impact of sustainable practises [19–22,24,25], and GPP prioritises environmentally friendly goods and services, influencing production and consumption patterns [43]. Implementing GPP can shape sustainable consumption, expand green markets, and reduce environmental impact. The schools can and should adopt GPP through sustainable food sourcing, nutrition education, waste reduction, partnerships, and policy changes [5,22].

The Romanian education system is similar to other European systems at the kindergarten and school levels due to shared goals from EU policies, emphasising quality education, digital integration, and sustainable development from early childhood onward. Additionally, European frameworks that encourage consistency in early education across member states influence curriculum standards and pedagogical approaches, fostering comparable educational experiences for young learners.

So, our findings suggest integrating sustainability into the curriculum through innovative teaching methods and digital technologies to create engaging learning experiences [2,26,27]. To accomplish this, teachers should develop competencies in different

methods and strategies such as flipped classrooms, gamification, problem-based learning, digital tools, experiential learning, collaborative and interdisciplinary projects, personalised learning, and ongoing assessments [37,38]. Also, the use of different textbooks can help to enhance ESD [16,17]. Teachers will foster dynamic and modern learning environments through these approaches, preparing students for future challenges. Furthermore, integrating digital and information technology has transformed teaching and communication by promoting digital skills [43]. Equipping teachers and students with digital competencies are crucial, especially in fields like physical activity and sports sciences. We must consider that social media platforms offer innovative teaching and learning opportunities, developing essential digital skills for career success [30,31,33–37]. Strong social connections between friends, relatives, coworkers in the workplace, and members of groups with similar interests has occurred on social networks [44]. However, there are disadvantages to digital resource use, and addressing digital equity as a social responsibility is essential to meeting learners' needs in the evolving digital landscape for professional development [33].

Innovative technologies have and continue to lead to educational transformations, challenging traditional teaching methods. Traditional approaches, such as observation and measurement, fall short of meeting lifelong learning needs. To address this, innovative teaching methods incorporating gamification, interactive learning, digital tools, personalisation, collaboration, experiential learning, health education, and long-term impact strategies can enhance physical education programmes according to learners' motivation and interests and by interactivity [35–37]. By integrating technology, schools can foster lifelong healthy habits and positive attitudes toward physical activity. Additionally, physical education can serve as a transdisciplinary platform for holistic learning and development [30,31,33–37].

Several examples of how ESD initiatives are implemented in daily kindergarten, school and university activities, being empirically proven and evidence-based, are compiled [44,45]. The use of board games or digital and online tools, outdoor activities, the triangulation of children–school–family, social participation, diverse teaching pedagogical content knowledge models, and activities to develop critical thinking with a transdisciplinary approach comprise some of these ESD initiatives. So, ESD in schools offers substantial societal and economic advantages by cultivating environmental awareness, social responsibility, and essential skills. ESD empowers students to become responsible citizens and drive innovation. It can help to enhance health, well-being, and community engagement while fostering critical thinking for a green economy. ESD's potential to stimulate entrepreneurship, reduce environmental costs, and build economic resilience highlights its long-term impact. As observed in our study, it is important that the school sets their own green strategies and develop healthy food activities, interactive teaching methods, and interactive courses to foster the impacts on youth development regarding education for sustainable development.

6. Conclusions

The long-term impact of education should be considered when planning educational processes, balancing short-term outcomes with future implications. Organisations and schools with sustainable plans can integrate sustainable procurement practises with initiatives promoting healthy eating habits among future generations. This approach aligns with sustainable development principles by prioritising balanced progress.

Given the rapid pace of change, institutions implementing long-term SPP plans should leverage innovative teaching methods and digital technologies. Advances in knowledge, methods, equipment, and technology can transform learning and nurture future generations. Designing and delivering interactive engaging classes is crucial for successful SPP implementation, as they are significantly influenced by organisational or school strategies.

Engaging innovative lessons positively impact young people's health. Teachers increasingly design interactive classrooms and integrate digital technologies, yet this process is ongoing. These cutting-edge teaching methods, including those in physical education,

significantly contribute to young people's commitment to healthy lifestyles. Ultimately, a sustainable organisational plan will further enhance these positive outcomes.

Research on ESD in Romania can provide valuable insights for other countries by illustrating how sustainability education is adapted within a unique socio-economic and cultural context. Romania's approach to integrating ESD in resource-constrained settings can offer strategies and teaching methods adaptable to similar contexts in Europe or globally.

The correlational design establishes relationships but cannot determine causality. Future research should combine quantitative and qualitative methods to explore interactive teaching practises and teacher perspectives in diverse contexts. ESD implementation should be examined separately within kindergarten, primary, and secondary levels to understand the stage better, since each one presents unique challenges and opportunities, allowing for more tailored educational strategies. This will enhance the understanding of technology's impact and inform effective strategies. Replicating the study in various settings is recommended.

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References

1. United Nations (UN). 2030 Agenda for Sustainable Development—Sustainable Development Goals (SDG). 2015. Available online: https://sdgs.un.org/goals (accessed on 22 January 2023).
2. Oh, H. A Case Study on the Application of a German Whole-Institution: Implication for Transition of Sustainable General Education. *J. Learn.-Centered Curric. Instr.* **2022**, *22*, 355–371. [CrossRef]
3. Nousheen, A.; Zai, S.A.Y.; Waseem, M.; Khan, S.A. Education for sustainable development (ESD): Effects of sustainability education on pre-service teachers' attitude towards sustainable development (SD). *J. Clean. Prod.* **2020**, *250*, 119537. [CrossRef]
4. Ferguson, T.; Roofe, C.; Cook, L.D. Teachers' perspectives on sustainable development: The implications for education for sustainable development. *Environ. Educ. Res.* **2021**, *27*, 1343–1359. [CrossRef]
5. Lăzăroiu, G.; Ionescu, L.; Uță, C.; Hurloiu, I.; Andronie, M.; Dijmărescu, I. Environmentally Responsible Behavior and Sustainability Policy Adoption in Green Public Procurement. *Sustainability* **2020**, *12*, 2110. [CrossRef]
6. Kim, J. Implications of Global Sustainable Food Education Practices by School Levels. *Korean J. Food Cook. Sci.* **2021**, *37*, 328–339.

7. Bucea-Manea-Țoniș, R.; Martins, O.M.D.; Ilic, D.; Belous, M.; Bucea-Manea-Țoniș, R.; Braicu, C.; Simion, V.-E. Green and Sustainable Public Procurement—An Instrument for Nudging Consumer Behaviour. A Case Study on Romanian Green Public Agriculture across Different Sectors of Activity. *Sustainability* **2020**, *13*, 12. [CrossRef]
8. Bucea-Manea-Țoniș, R.; Šević, A.; Ilić, M.P.; Bucea-Manea-Țoniș, R.; Popović Šević, N.; Mihoreanu, L. Untapped Aspects of Innovation and Competition within a European Resilient Circular Economy. A Dual Comparative Study. *Sustainability* **2021**, *13*, 8290. [CrossRef]
9. Bucht, C.; Mess, F.; Bachner, J.; Spengler, S. Education for sustainable development in physical education: Program development by use of intervention mapping. *Front. Educ.* **2022**, *7*, 1017099. [CrossRef]
10. Eco Ed Hub. 2024. Available online: https://www.ecoedhub.com/environmental-education-in-costa-rica.html (accessed on 8 May 2024).
11. Vesterinen, M. Sustainability competences in environmental education: Research on guidebooks for teachers at Finnish primary schools. *Cogent Educ.* **2023**, *11*, 2286120. [CrossRef]
12. Shibakawa, H. A Whole-School Approach to Building Communities of Practice of ESD: A Case Study of Two Japanese High Schools. In *Whole School Approaches to Sustainability*; Wals, A.E., Bjønness, B., Sinnes, A., Eikeland, I., Eds.; Sustainable Development Goals Series; Springer: Cham, Switzerland, 2024. [CrossRef]
13. Kelly, J.R.; Abel, T.D. Fostering Ecological Citizenship: The Case of Environmental Service-Learning in Costa Rica. *Int. J. Scholarsh. Teach. Learn.* **2012**, *6*, 16. [CrossRef]
14. Parry, S.; Metzger, E. Barriers to learning for sustainability: A teacher perspective. *Sustain. Earth Rev.* **2023**, *6*, 2. [CrossRef]
15. Ide, T.; Tubi, A. Education and Environmental Peacebuilding: Insights from Three Projects in Israel and Palestine. *Ann. Am. Assoc. Geogr.* **2020**, *110*, 1–17. [CrossRef]
16. Hussein, H. A critique of water scarcity discourses in educational policy and textbooks in Jordan. *J. Environ. Educ.* **2017**, *49*, 260–271. [CrossRef]
17. Hussein, H.; Al-Ajarma, K. Exploring the framings of water scarcity in Palestinian textbooks. *Contemp. Levant* **2023**, *8*, 3–15. [CrossRef]
18. Van Eck, N.J.; Waltman, L. *Manual for VOSviewer Version 1.6. 15*; Universiteit Leiden: Leiden, The Netherlands, 2020.
19. Ye, M.; Ma, Y.; Liu, J. Why do public sectors perform high-level green public procurement practice? A new insight with fsQCA approach. *J. Environ. Plan. Manag.* **2021**, *65*, 2719–2747. [CrossRef]
20. Ma, Y.; Liu, Y.; Appolloni, A.; Liu, J. Does green public procurement encourage firm's environmental certification practice? The mediation role of top management support. *Corp. Soc. Responsib. Environ. Manag.* **2020**, *28*, 1002–1017. [CrossRef]
21. Liu, J.; Ma, Y.; Appolloni, A.; Cheng, W. How external stakeholders drive the green public procurement practice? An organizational learning perspective. *J. Public Procure.* **2021**, *21*, 138–166. [CrossRef]
22. Niškanović, J.; Stojisavljević, D.; Stojisavljević, S.; Djikanovic, B.; Manigoda, D. Exploring possibilities for the development of healthy eating habits in preschool settings: Parent's and teacher's perspectives. *Food Sci. Nutr.* **2023**, *12*, 1616–1626. [CrossRef]
23. *ISO 20400:2017(en)*; Sustainable Procurement—Guidance. International Organization for Standardization: Geneva, Switzerland, 2017. Available online: https://www.iso.org/obp/ui#iso:std:iso:20400:ed-1:v1:en (accessed on 22 January 2023).
24. Kopnina, H. Education for the future? Critical evaluation of education for sustainable development goals. *J. Environ. Educ.* **2020**, *51*, 280–291. [CrossRef]
25. Pittman, J.; Severino, L.; DeCarlo-Tecce, M.J.; Kiosoglous, C. An action research case study: Digital equity and educational inclusion during an emergent COVID-19 divide. *J. Multicult. Educ.* **2021**, *15*, 68–84. [CrossRef]
26. Ahmad, N.; Toro-Troconis, M.; Ibahrine, M.; Armour, R.; Tait, V.; Reedy, K.; Malevicius, R.; Dale, V.; Tasler, N.; Inzolia, Y. CoDesignS Education for Sustainable Development: A Framework for Embedding Education for Sustainable Development in Curriculum Design. *Sustainability* **2023**, *15*, 16460. [CrossRef]
27. Chou, P.I.; Wang, Y.T. The representation of sustainable development goals in a national curriculum: A content analysis of Taiwan's 12-Year Basic Education Curriculum Guidelines. *Environ. Educ. Res.* **2023**, *30*, 591–608. [CrossRef]
28. Lin, M.; Pan, F.; Wang, S.; Chang, Y.; Xu, L. Research on Hybrid Teaching Method Based on PBL and Innovative Thinking. In Proceedings of the 2023 35th Chinese Control and Decision Conference (CCDC), Yichang, China, 20–22 May 2023; pp. 1120–1123. [CrossRef]
29. International Development Institute. A Strategic Future [Supplemental Material]. Available online: https://idiworldwide.net/ (accessed on 18 May 2024).
30. Kearney, C.; Kelly, R. Innovative Teaching and Learning Practices: The Student Perspective. In Proceedings of the 8th International Conference on Higher Education Advances (HEAd'22), Valencia, Spain, 15–17 June 2022; Editorial Universitat Politècnica de València: Valencia, Spain, 2022; pp. 1287–1294. [CrossRef]
31. Guillen-Gamez, F.D.; Pena, M.P. Univariate Analysis of Digital Competence in Physical Education: An empirical study. *Retos* **2020**, *37*, 326–332.
32. Araneo, P. Exploring education for sustainable development (ESD) course content in higher education; a multiple case study including what students say they like. *Environ. Educ. Res.* **2023**, *30*, 631–660. [CrossRef]
33. Griffiths, M.A.; Goodyear, V.A.; Armour, K.M. Massive open online courses (MOOCs) for professional development: Meeting the needs and expectations of physical education teachers and youth sport coaches. *Phys. Educ. Sport Pedagog.* **2022**, *27*, 276–290. [CrossRef]

34. Gao, Z.; Lee, J.E. Emerging technology in promoting physical activity and health: Challenges and opportunities. *J. Clin. Med.* **2019**, *8*, 1830. [CrossRef]
35. Bucea-Manea-Țoniș, R.; Vasile, L.; Stănescu, R.; Moanță, A. Creating IoT-Enriched Learner-Centered Environments in Sports Science Higher Education during the Pandemic. *Sustainability* **2022**, *14*, 4339. [CrossRef]
36. Insaf, S.; Jean-François, D.; Moôtez, M.; Abderraouf, B. Impacts of Teacher's Pedagogical Approach on the Inclusion of Adolescents with Exceed Weight into Physical Education and Sports in Emirate of Ajman (United Arab Emirates). *Ann. Appl. Sport Sci.* **2022**, *10*, 2. [CrossRef]
37. Cojocaru, A.M.; Bucea-Manea-Țoniș, R.; Jianu, A.; Dumangiu, M.A.; Alexandrescu, L.U.; Cojocaru, M. The Role of Physical Education and Sports in Modern Society Supported by IoT—A Student Perspective. *Sustainability* **2022**, *14*, 5624. [CrossRef]
38. Valero-Valenzuela, A.; Gregorio, G.D.; Camerino, O.; Manzano, D. Hybridization of the Teaching Personal and Social Responsibility Model and Gamification in Physical Education. *Apunt. Educ. Física Deportes* **2020**, *141*, 63–74. [CrossRef]
39. Vinzi, V.E.; Wynne, W.; Chin, J.; Henseler, H.; Wang, E. *Handbook of Partial Least Squares: Concepts, Methods, and Applications*, 1st ed.; Springer: Berlin/Heidelberg, Germany, 2010. [CrossRef]
40. Ringle, C.M.; Wende, S.; Becker, J.-M. *SmartPLS 3 Boenningstedt*; SmartPLS GmbH: Boenningstedt, Germany, 2015; Available online: http://www.smartpls.com (accessed on 15 July 2022).
41. Reinartz, W.J.; Haenlein, M.; Henseler, J. An Empirical Comparison of the Efficacy of Covariance-Based and Variance-Based SEM. Retrieved from Social Science Research Network Electronic Library. 2009. Available online: http://ssrn.com/abstract=1462666 (accessed on 18 May 2024).
42. European Commission. Green Public Procurement Criteria and Requirements. Available online: https://green-business.ec.europa.eu/green-public-procurement/gpp-criteria-and-requirements_en (accessed on 29 June 2024).
43. European Commission. Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee, and the Committee of the Regions. 2008. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008DC0400 (accessed on 29 June 2024).
44. Palade, T.; Gheorghe, G.; Ciolca, S.; Badea, D. Contribution of social networks to the development of football technique. In Proceedings of the 4th International Scientific Conference "eLearning and Software for Education" eLSE, Bucharest, Romania, 19–20 April 2018. [CrossRef]
45. Rieb, W.; Mischo, C.; Shcarenberg, K. Effectiveness of Education for Sustainable Development (ESD) in Kindergarten, School and University: Empirical Educational Research Perspectives. 2022. Available online: https://www.mdpi.com/si/70403#mdpisustainability (accessed on 15 July 2022).