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The Relationship Between Sustainability and Food Consumption in Teacher Training

Patricia Esteve-Guirao, Isabel Banos-González and
Magdalena Valverde Pérez
University of Murcia, Murcia, Spain

Abstract

We explore the relationships that future teachers establish between food consumption and sustainability, as well as their intentions to act and their competences in ESD, after a training program. Three instruments were designed and analyzed within the methodological framework of qualitative content analysis. The results showed that, although the future teachers set adequate relationships, they still had significant difficulties in accepting the need for ambitious changes in their diets. Their educational proposals are focused on the diagnosis of the problems instead of the assessment of the sustainability of eating habits and the empowering of learners to take responsible decisions and actions.

Keywords: competences in ESD, food consumption, future primary school teachers

Introduction

The complex nature of current sustainability issues requires competent citizens to act upon the wicked socio-ecological problems (Olsson et al., 2022; Salite et al., 2021). One strategy to face these problems is to move towards more sustainable food consumption patterns (FAO, 2006). The trend towards meat-based diets is unsustainable, as it puts intense pressure on the biosphere, in the form of deforestation, greenhouse gas emissions, and invasive alien species, as well as increasing inequality and poverty (Alexander et al., 2015).

Citizens must be involved in meeting these socio-ecological challenges, so that they recognize themselves as agents of change and contribute to sustainability through their daily decisions (Bakker & Dagevos, 2012). Nevertheless, there are different factors associated with knowledge, personal incentives, cultural background, or emotions, which condition the acquisition of responsible eating habits (Stoll-Kleemann & Schmidt, 2017). In addition, it should be noted that habitual dietary choices and behaviors tend to be resistant to information provision, “unless accompanied by a disruption of the environmental cues that trigger them to change” (Verplanken & Wood, 2006, p. 90).

In this sense, education plays an important role in shaping future sustainable attitudes, beliefs and behaviors (Brandisauskiene et al., 2020). Thus, the focus of educational outcomes needs to shift from the information-deficit model of education towards sustain-

ability competences (Redman, 2013). In this respect, different authors have suggested the Education for Sustainable Development (EDS) as a “key enabler” to address the multiple socio-ecological challenges of our times and to develop sustainable solutions (Adefila et al., 2021; Olsson et al., 2022).

Albeit much has been theorized about the suitability of ESD, the analysis of specific educational proposals and their effects on students’ knowledge, consumption intentions, and pro-environmental behaviors is less frequent (Banos-González et al., 2021). Hence, this study focuses on the progression of ideas and willingness to act of future teachers in the face of problems related to food consumption, and on how they approach their teaching in schools.

Responsible Consumption Within the Framework of ESD

To move towards sustainability, citizens need to recognize how their consumption interferes with this process and to act responsibly (Sahakian & Seyfang, 2018). This close link between sustainability and consumption can be of particular interest in the field of ESD, understood as a “teaching approach where action competence for sustainability is at the very core of education” (Olsson et al., 2022, p. 405). Thus, in the context of responsible consumption, EDS can promote a critical analysis of habits, a reflection on their effects on nature conservation, and an empowering learner to implement responsible decisions to achieve sustainable futures (UNESCO, 2014).

To this end, contexts related to food consumption can be interesting, as it has been observed that young people maintain a naive view on the effects of food production and distribution (Esteve-Guirao et al., 2019). In addition, these contexts also allow students to have the opportunity to work with authentic problems in a democratic and pluralistic way, what Olsson et al. (2022) called “action-oriented experiences” in teaching.

Therefore, it seems necessary for teachers to be able to create opportunities for students to recognize the complex connections between individuals and wider systems, such as economic and cultural systems, and to encourage commitments to responsible consumption (Sahakian & Seyfang, 2018; Stoll-Kleemann & Schmidt, 2017). To this end, addressing ESD in initial teacher education is essential (Brandt et al., 2019).

The Role of Initial Teacher Training

There is international consensus on the importance of training future teachers to acquire ESD-related competences (Goller & Rieckmann, 2022). However, recent reviews on knowledge, attitudes, and teaching skills show that integrating ESD into initial teacher education programs remains a challenge (Pegalajar-Palomino et al., 2021).

This training requires the mobilization of knowledge, skills, values, attitudes, and experiences. In terms of knowledge, several studies pointed to the limited understanding that future teachers have about the complex effects of our food consumption on sustainability (Banos-González et al., 2021). Future teachers seem to have significant difficulties in developing a systemic reasoning which allows them to build solid relationships between the social, ecological, and economic dimensions, which are essential for a proper understanding of these issues (Vega-Marcote et al., 2015).

Regarding their attitudes, future teachers show positive attitudes towards nature conservation. However, these attitudes do not necessarily imply the development of

pro-environmental behaviors. In fact, Tuncer et al. (2014) stated that future teachers had difficulties in establishing adequate relationships between these issues and their consumption habits, which might condition their recognition of the necessary changes. In contrast, educational interventions specifically aimed at promoting sustainable consumption do seem to encourage future teachers to establish these relationships, with a greater willingness to incorporate changes in their forms of consumption (Banos-González et al., 2021; Brandt et al., 2019).

Regarding competences, these are considered as a “complex of knowledge, skills, and attitudes that enable successful task performance and problem solving” (Vare et al., 2019, p. 2). Although essential for the achievement of ESD goals, some authors have criticized the difficulties in operationalizing the competence framework (Farioli et al., 2017). In this regard, the United Nations Economic Commission for Europe proposed a set of competences that teachers would need in order to educate for sustainability. These were defined as observable and, therefore, operational actions to establish their level of development (UNECE, 2013). These UNECE competences were organized around four major blocks of learning: to know, to do, to be, and to live together. Although often cited, the UNECE proposal has been applied only rarely “as a guide for teachers training or for educators’ certification and assessment” (Farioli et al., 2017, p. 4963). Nonetheless, its development is considered essential to help teachers and future teachers acquire the skills to develop critical citizens who participate in a responsible and informed way in the face of the current socio-ecological crisis (UNECE, 2013).

This is even more relevant considering that the literature points out that future teachers show little competence in dealing with socio-ecological issues and also lack confidence in their disciplinary preparation (Pegalajar-Palomino et al., 2021). Some studies indicate that future teachers lack the skills to manage discussions on this type of controversial issue, and show some reluctance to address ethical or socio-political issues (Reis & Galvão, 2009). This reality can condition the way in which the school addresses the debate on how food consumption generates socio-ecological impacts, and how it critically addresses the necessary changes towards a more sustainable diet (Tidemand & Nielsen, 2017).

Therefore, the guiding of students in their acquisition of the knowledge, attitudes, skills and competences needed to adopt responsible consumption requires a reorientation of initial teachers’ education (Pegalajar-Palomino et al., 2021). Thus, according to Malandrakis (2018), there is still a need to investigate how educational interventions permit future teachers to progress in their knowledge of how their daily practices influence sustainability, in their food consumption intentions, and in their teaching competences, so that this issue can be addressed in their professional futures.

Research Questions

In this paper we pose the following research questions:

- How are future primary school teachers progressing in building relationships between food production and sustainability?
- What is the evolution of their intentions towards more sustainable food consumption?
- What are the “to do” competences for sustainability that future teachers are able to employ when designing their proposals to address this problem in primary education?

Materials and Methods

Participants

The research was designed in the context of an EDS program, implemented in the second year of the Primary School Degree at the University of Murcia (Spain). Sixty-nine future teachers participated, who had received training in science education and had done teaching practice in schools.

The Educational Intervention

The design focused on problem solving as a fundamental strategy for ESD (Redman, 2013), providing opportunities for students to build relationships between their daily consumption decisions and sustainability.

The designed problem, called “Sustainability on a Plate”, was posed through Mahmud’s story about the evolution of the peoples around Lake Victoria since the introduction of the Nile perch (*Lates niloticus*). This scenario reflects the strong connections of ecological-social-economic dimensions, and invites to assess the importance of consumption choices. The intervention, comprising two sessions of 2 hours each, was structured in four stages (Kuvac & Koc, 2019), described in Table 1.

Table 1

Description of the Contents and Main Objective of the Tasks Included in the Intervention

Stage	Development	Tasks
I. Identification of the problem	Students read the story and share their ideas about the effects of food consumption and the main culprits.	<ol style="list-style-type: none"> 1. Point out how food consumption can influence sustainability. 2. Indicate to what extent you consider yourself responsible for this situation and assess what you could do when buying and consuming food.
II. Solving the problem	Students research the impact of food consumption in Spain. They organize an outing to markets to record information on commonly consumed foodstuffs.	<ol style="list-style-type: none"> 3. Point out the impacts generated at the different stages of food production and distribution. 4. Indicate the importance of local varieties and their conservation. 5. Record different foods in various establishments according to their origin, season, price, production system, etc.
III. Evaluation of the learning process	Students draw their conclusions and discuss again what their role as citizens is, preparing the final report.	<ol style="list-style-type: none"> 6. Point out how food consumption can influence sustainability. 7. Indicate to what extent you feel responsible for this situation and assess what you could do when buying and consuming food.
IV. Application of the problem in the primary schools	Students design an activity to address this issue in the classroom.	<ol style="list-style-type: none"> 8. Design an activity to involve children in this issue. Detail its development in the classroom and its evaluation.

Instruments

Three instruments were designed for the collection of information. The Identification Sheet and the Conclusions Report were applied during Stages I and III of the problem, respectively. Both instruments made it possible to assess the relationships established between food consumption and sustainability by the future teachers, as well as their food consumption intentions. Although the students were organized in small working teams, these instruments were completed individually.

The third instrument was the Activity Design Sheet (stage IV), which was handed out in groups, gathering a total of 28 proposals. This instrument made it possible to identify which UNECE “to do” competences (Figure 1) they employ when raising this issue in primary schools.

Figure 1

Analyzed Competences (UNECE, 2013)

“TO DO” COMPETENCES. The educator is able...		
C.18 To create opportunities for sharing ideas and experiences from different disciplines/ places/cultures/generations without prejudice or preconceptions	C.19 To work with different perspectives on dilemmas, issues, tensions, and conflicts	C.20 To connect the learner to their local and global spheres of influence
C.21 To critically assess processes of change in society and envision sustainable futures	C.22 To communicate a sense of urgency for change and inspire hope	C.23 To facilitate the evaluation of potential consequences of different decisions and actions
C.24 To use the natural, social, and built environment, including their own institution, as a context and source of learning	C.25 To facilitate participatory and learner-centered education that develops critical thinking and active citizenship	C.26 To assess learning outcomes in terms of changes and achievements in relation to sustainable development

Data Analysis

Relationships Between Food Consumption and Sustainability

Four categories were established to analyze how the students viewed the effects of food production and distribution on sustainability (tasks 1 and 6), adapted from Banos-González et al. (2021):

- No relationship (FS1): students do not identify how the food system influences sustainability.
- Imprecise relationships (FS2): students recognize certain impacts, but use imprecise explanations, with a low level of concreteness.
- Linear relationships (FS3): students use a simple causal reasoning, so they are able to specify direct effects on the environment, referring to pollution processes or direct threats to nature.
- Complex relationships (FS4): students refer to indirect impacts, reflecting a more complex view of the relationships between food production and sustainability.

Sustainable Consumption Intentions

The analysis of the future teachers' intentions towards more sustainable food consumption (tasks 2 and 7) was carried out according to the different transition levels, adapted from Bakker and Dagevos (2012):

- Sustainability by Stealth (SI1): students are rather passive and do not feel the need to make changes in their food consumption.
- Moderate Involvement (SI2): students seem to be willing to take very feasible concrete actions for more sustainable consumption, without major changes in their habits.
- Diet Change (SI3): this encompasses more ambitious changes in the consumption style, derived from a higher degree of food awareness, where students put more sustainable behaviors before their consumption desires.

Competences in Education for Sustainable Development

For this analysis, nine ESD competences regarding "Learning to do" identified by UNECE (2013, p. 15) were considered as criteria; and, as indicators, the fulfilment or non-fulfilment of these criteria (Figure 1).

The answers to the tasks (Table 1) and the descriptions of the educational proposals were analyzed within the methodological framework of qualitative content analysis (Schreier, 2012). To validate the categories, a randomly selected 25 % subsample of the data was re-analyzed by another independent researcher (rater), to obtain interrater reliability statistics. The interrater Cohen's kappa coefficients were calculated by examining the percentage accordance of the raters' categorization of the data input. The Cohen's kappa scores ranged between .83 and .94, indicating an 'almost perfect' agreement between the raters (McHugh, 2012).

Finally, to assess the progression in these variables between Stage I and Stage III of the problem, the W Wilcoxon test was applied, and the significance level was established at a p value of < .05. SPSS statistics software was used.

Results

Relationships Between Food Consumption and Sustainability

At the stage of identification of the problem, nine students failed to make any link between the food system and sustainability (FS1). More than half of the students (n = 40) focused their assessments on the damage generated, with significant difficulties in specifying their answers (FS2); such as student 31 (here on St 31): "*Producing some food can damage the environment*". The others established some direct relationships (FS3), referring, basically, to pollution processes and some events of overexploitation of fishing resources. Occasionally, they pointed out positive aspects, such as the fact that the consumption of native varieties favors biodiversity due to their adaptation to the environment.

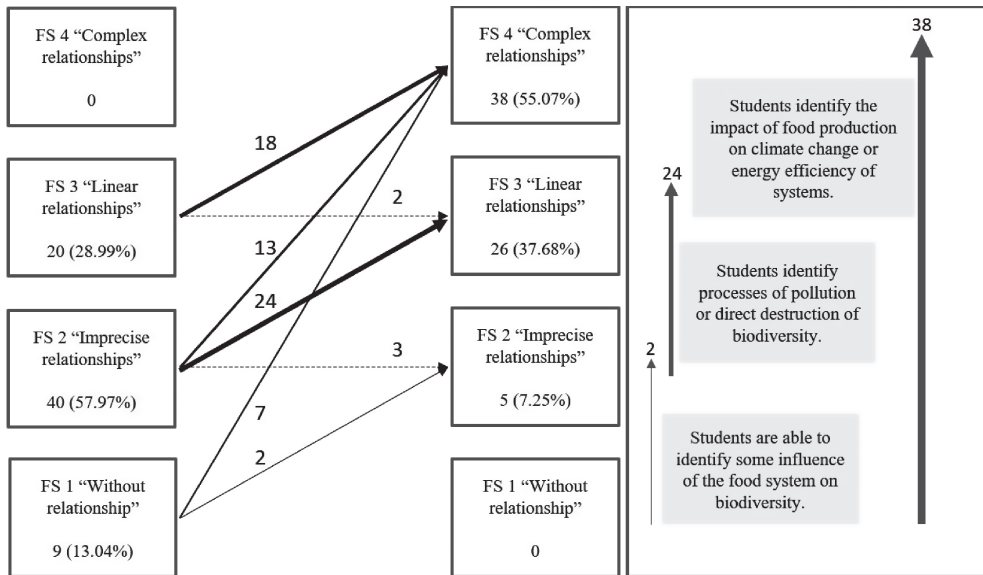
At the stage of the evaluation of the learning process, no student was in the FS1 category and only five students established imprecise relationships (FS2). Meanwhile, 26 were able to recognize several environmental problems directly linked to the food system (FS3); in particular, deforestation and pollution phenomena linked to the production of livestock products: "*Pig farms generate slurry, which could contaminate ground-*

water, affecting these ecosystems” (St 21). In addition, 38 participants managed to establish indirect relationships (FS4). They referred to the low efficiency of a diet based on animal consumption and its consequences: “Most people think that meat provides more protein than vegetables, but, in reality, you get more from a hectare of vegetables than from a hectare used for raising livestock. To get the same energy you need more crops, more pesticides, more water” (St 13).

When assessing the progression between the two stages, the development of the problem seems to have favored greater precision in the answers (Z: -6.531; $p < .001$), since, during the evaluation stage, the students managed to specify direct and indirect phenomena (Figure 2).

Figure 2

Progression in the Levels of the Relationship Between the Food System and Sustainability



Sustainable Consumption Intentions

When assessing prospective teachers’ consumption intentions, two groups with a similar frequency are distinguished at stage I. The first group (n = 34) blamed governments or businesses (SI1), “who should regulate or even ban the sale of perch” (St 52). The other group (n = 35) assumed more personal responsibility, and suggested not consuming perch. They also suggested improving their knowledge of how the food they eat was produced and spreading the word about the problem among their acquaintances (SI2).

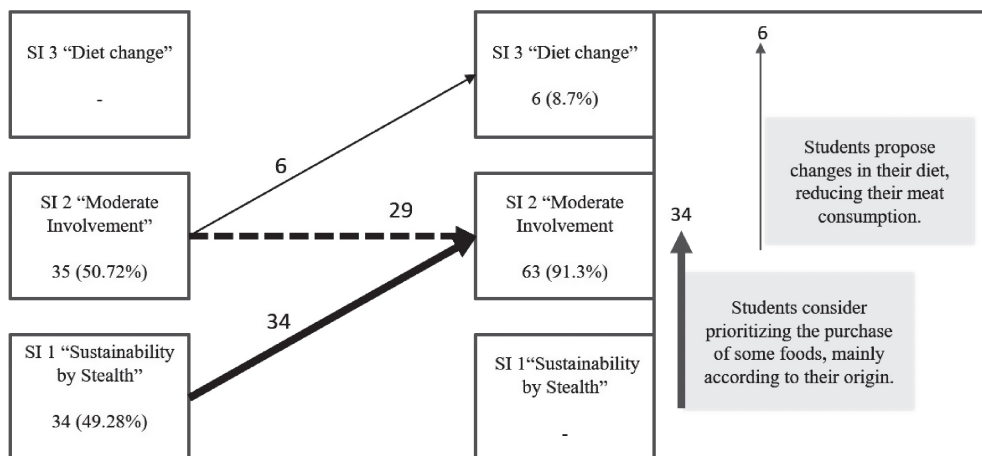
At the stage of evaluation of the learning process, almost all the students made proposals for more sustainable food purchasing. In particular, they proposed the prioritization of local products, which they considered would both reduce environmental effects and contribute to the regional economy. Nevertheless, they did not propose changing the way they eat, but rather to satisfy their desires with more sustainable versions (SI2). Only six students were willing to make changes in their diet (SI3), like

student 49: “I eat cold meat every day. I am going to change this, once or twice a week I will not eat meat, to make my diet more sustainable”.

When assessing the progression, the changes are statistically significant ($Z = -5.203$; $p < .001$). Mostly, they occurred among those who shirked personal responsibilities in the beginning (SI1) and then reached the “Moderate Involvement” category ($n = 36$). Nonetheless, 29 students remained in the latter category, without any progression (Figure 3).

Figure 3

Progression in the Sustainable Consumption Intentions of Future Teachers



Competences in ESD

For almost all the educational proposals, the future teachers displayed two out of nine competences (Table 2). They proposed an outing to a market to record the foodstuffs on sale, paying attention to their origin and the way they are produced. Thus, these future teachers were able to use their own environment as a context and source of learning (C.24). In addition, they focused on creating opportunities for children to share their ideas and experiences about different ways of buying and consuming food (C.18). For example, in proposal 4 they stated, “In class, pupils will share the results [of the food records]. The idea is that they discuss whether it is logical to sell vegetables from other countries when here they are grown a lot”.

Only a third of the analyzed proposals emphasized that schoolchildren should critically evaluate consumption and the factors involved (C.25). Likewise, future teachers presented proposals aimed at the evaluation of different decisions, since they specified strategies for schoolchildren to identify the consequences of their actions and build relationships between consumption and sustainability (C.23). This is the case of proposal 22, which focuses on fish consumption. In it, the pupils first explore the effects on the marine ecosystem of the different ways of catching fish. Then, during an outing, the pupils record the origin and type of the catch. Finally, they hold a group discussion to assess how to encourage sustainable fish consumption among the citizens.

Table 2
Competences “to do” Employed in the Proposals

Competences	Proposals																												Total (n)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
C18	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	22
C19																	x					x							4
C20					x				x					x												x	x		6
C21					x			x																	x	x			5
C22																											x		2
C23				x	x	x											x	x	x										9
C24	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	25
C25						x			x								x	x	x										11
C26																													0
Total	2	1	2	3	5	4	0	2	5	0	2	1	1	3	4	4	7	1	4	3	2	5	3	2	5	6	4	3	84

The other competences are implemented in an even more *ad hoc* manner. As a starting point, there is a tendency to provide evidence from explanations, rather than using conflict situations or different perspectives on the problem (C.19). They remain largely local in their approach, with few connections to their impacts at different scales (C.20). They offer little space for pupils to appreciate the distinct ways of eating, or the changes needed to achieve food sustainability and the urgency of adopting them (C.21 and C.22).

Proposal 17 is one of the most complete, since it states: “*Pupils will use the labels on the food they eat over several days to analyze how sustainable their food is, and may consider making some changes when shopping [...]. We will use short reports, as we have done with the case of perch [...]. We will look at what happens in some areas of the world to produce these foods [...]. Pupils will assess what will happen to our almond crops and our farmers if most of the almonds they eat are from the USA. [...]. We will prepare a poster to put up in different supermarkets to promote the consumption of local products*”.

Finally, in no proposal is the educator able to assess learning outcomes in terms of achievements in relation to sustainable development (C.26).

Discussion and Conclusions

The sustainability of food consumption is a controversial context of great interest within ESD. It offers opportunities to consider values, attitudes, and behaviors, and to highlight the different perspectives and conflicts of interest involved (Goller & Rieckmann, 2022). Furthermore, it seems to encourage recognition of the interconnections between our consumption patterns and sustainability (Palmberg et al., 2017).

In this paper we analyze how the ideas and intentions to act of future teachers’ progress, together with the “to do” competences (UNECE, 2013) they display, after a short educational intervention based on problem solving. In line with Kuvac and Koc (2019) and Vega-Marcote et al. (2015), it seems that this strategy was effective, since it helped future teachers progress in the construction of appropriate relationships between the food production and distribution system and sustainability. It seems that direct relationships were easier to construct for them, such as the effects of different processes of atmospheric and water pollution and the loss of biodiversity through deforestation, whereas the identification of indirect, causal relationships that required a systemic vision (Schuler et al., 2018) was less frequent.

In terms of their intentions, raising this type of problem seems to make it easier that future teachers establish action strategies even if they are reluctant to make profound changes in their habits (Banos-González et al., 2021). We are aware that these intentions do not necessarily imply that they will change their habits. The acquisition of pro-environmental behaviors involves a wide range of factors and numerous obstacles (Fröhlich et al., 2013). However, it is interesting that future teachers may recognize their potential as citizens to contribute to sustainability through their daily decisions and that expectations for change are generated (Bakker & Dagevos, 2012).

To this end, the fact that the future teachers kept food records seems to have favored their recognition of certain inconsistencies in the current system of food production and distribution. They were quite unfamiliar with the origin of foodstuffs which they consumed regularly. Their analysis led them to prioritize local food, pointing out the lesser

impact on the natural environment, as well as the advantages for the economy and the way of life in their region. Integrating environmental, social, and economic dimensions is the key in ESD, but difficult to establish spontaneously (Banos-González et al., 2021). In this sense, bringing the problem closer to situations in which they feel involved seems to make it easier for them to recognize aspects beyond the environmental ones.

Nevertheless, in this study, also the reluctance to the reduction of meat consumption was found. This could be related to the cultural background and to what Stoll-Kleemann and Schmidt (2017) called the “meat paradox”. Thus, citizens put their consumption desires above information about the effects of meat production, which they tended to avoid. This highlights the importance of emphasizing critical attitudes towards consumption, as knowledge about impacts – although necessary – is not sufficient to adopt more sustainable behavior.

This research shows that when future teachers design their proposals for addressing the sustainability of our food in the classroom, these proposals reflect the training they have received. In particular, they propose trips to markets, where they re-emphasize the importance of pupils analyzing the origin of foodstuffs. This reflects the importance of addressing these issues in initial teachers’ training to increase their confidence in promoting EDS from schools (Tidemand & Nielsen, 2017).

It seems that these future teachers are able to use the students’ environment as a context and source of learning, and they pay great attention to generating spaces for sharing ideas and generating discussion about the different ways of buying and consuming food. However, these proposals are not contextualized around authentic issues. This may limit children’s ability to relate the reality of the food market and its socio-ecological impacts to specific situations (Olsson et al., 2022). Furthermore, their proposals seem to offer little opportunities for children to assess the sustainability of their food choices and strategies for action.

Hence, these are approaches that concentrate on the diagnosis of the problem, rather than on the identification and adoption of changes in eating habits. Therefore, their proposals seem to follow an information-deficit model of education (Redman, 2013). Then, the future teachers showed that they did not have sufficient skills to empower their students to make decisions and act in a sustainable way (Pegalajar-Palomino et al., 2021).

Therefore, during initial teacher training, future teachers need to be able to explore and discuss how their forms of consumption influence sustainability and propose changes in their habits. However, emphasis must also be placed on their didactic knowledge of this content and the acquisition of competences in ESD (Brandisauskien et al., 2020; Goller & Rieckmann, 2022). In this sense, more initial training programs are needed that balance disciplinary and didactic content, opportunities to practice ESD, and its assessment in relation to sustainable development.

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Correspondence concerning this paper should be addressed to Isabel Banos-González, Departamento de Didáctica de las Ciencias Experimentales, University of Murcia, Murcia, Spain. Email: ibbg1@um.es