Received 20 February 2021
Revised 2 June 2021
24 August 2021
Accepted 24 August 2021

Food education in Finnish primary education – defining themes and learning objectives using the Delphi technique

Aija Liisa Laitinen, Tanja Tilles-Tirkkonen and Leila Karhunen
Department of Clinical Nutrition, School of Medicine, University of Eastern Finland, Kuopio, Finland, and
Sanna Talvia
School of Applied Educational Science and Teacher Education, University of Eastern Finland, Joensuu, Finland

Abstract

Purpose – The importance of food education in primary schools has been globally recognised. However, more detailed definitions of its learning objectives are rarely found. The study aimed to define multisectoral themes and learning objectives for food education in primary education in Finland.

Design/methodology/approach – A descriptive three-round Delphi study was conducted with experts in food education in various organisations. In the first questionnaire, the participants were asked to define possible objectives for food education related to general objectives for basic education. Respondents of the first questionnaire formed a research panel (n = 22). These panellists were then invited to complete the second (n = 16) and third questionnaires (n = 12), where the objectives were further modified. Qualitative content analysis and Bloom's taxonomy were applied in the process of creating the learning objectives.

Findings – In the iterative process, 42 learning objectives for food education in primary schools were defined. Further, "Sustainability and ethics of food systems" was defined as the cross-cutting theme of food education. In addition, 13 subthemes were defined, which fell into three thematic categories: personal (e.g. feelings), practical (e.g. eating) and intangible (e.g. culture) issues.

Originality/value – The defined learning objectives for a holistic food education may be used in advancing primary school curriculum in Finland and perhaps other countries.

Keywords Schools, Primary education, Curriculum, Education, Food and nutrition education

Paper type Research paper

Introduction

Food education can be defined from various perspectives and by using different terms. The specific term "nutrition education" is used specifically when diet quality, nutrient intake and other goals related to health are emphasised (Lakka *et al.*, 2019; HLPE, 2018), and the ultimate

The authors gratefully acknowledge the conscientious work of the experts in the research panel despite this being time-consuming. They also would like to acknowledge the Juho Vainio Foundation and Olvi Foundation for financially supporting this study. The Foundations had no role in the design, analysis or writing of this article.

Conflict of interest disclosure statement: All authors of this article declare they have no conflicts of interest.

British Food Journal
Vol. 123 No. 13, 2021
pp. 404-427
Emerald Publishing Limited
0007-070X
DOI 10.1108/BFJ-02-2021-0174

goal is to improve health and well-being (Contento and Koch, 2020b). Also, some definitions of food education emphasise the promotion of health and well-being alongside knowledge about culture, sustainable lifestyles and food systems (Elsden-Clifton and Futter-Puati, 2015; Sutter *et al.*, 2019). The aim of food education can also be awakening pupils to notice and reflect on food-related phenomena and information from different angles (Contento *et al.*, 1995). Thus, effective food education aims to increase pupils' food-related understanding and motivation and to foster behaviour change, when needed, considering local problems and needs (Contento *et al.*, 1995). For our purposes here, we use the term "food education" to refer to a holistic view of food-related education which aims to improve the understanding of food-related phenomena in a multidisciplinary manner (Janhonen *et al.*, 2015; Lakka *et al.*, 2019).

Finland provides governmental support to food education in basic education, which includes primary school (grades 1–6, age 7–12 years) and secondary school (grades 7–9, age 13–15 years). As required by law, schools in Finland have provided hot school meals for pupils free of charge since 1948 (The Basic Education Act, 628/1998). Finland's National Core Curriculum for Basic Education (Finnish National Agency for Education, 2016) highlights school meals as a significant factor for healthy growth and development, learning ability and food-related competencies. Eating at school is considered crucial break which increases pupils' coping and well-being, as well as supporting the teaching good manners and advancing food education. Finland's Recommendations for School Meals (Finnish Institute for Health and Welfare, 2017) also note that school meals are part of the food education provided in schools.

However, school canteens are not the only venues for food education in schools. In a Finnish primary school, a class teacher teaches several subjects to the same class. Although food education is not a specific subject in primary school, it may be attached to the objectives of transversal competencies defined in the national curriculum (Finnish National Agency for Education, 2016), and it is therefore integrated into other subjects. Food and nutrition are also themes mentioned briefly in the curriculum of environmental studies, which includes thematic subject areas of biology and health education. Furthermore, home economics can be provided as a voluntary subject.

Effective food education in primary schools should be supported by an evidence-based and consistent national policy (Micha *et al.*, 2018; Hawkes *et al.*, 2015; de Vlieger *et al.*, 2019). Teachers also need support for implementing food education in schools (Lee and Hong, 2015; Metos *et al.*, 2019; Waling and Olsson, 2017). The Finnish National Core Curriculum for Basic Education obligates schools to set specific objectives for providing food education. However, neither food education nor its objectives have been defined in the national core curriculum. The lack of consistent national definitions, objectives or models for food education in Finnish primary schools is an obvious obstacle both to setting specific objectives and to equalising food education across Finland – or even within any single municipality. The same obstacle to implementing food and nutrition education at school has also been identified internationally (Sutter *et al.*, 2019; Lee and Hong, 2015).

In Finland, food education in primary schools may have become taken for granted due to a healthy school lunch being provided for all pupils, free of charge. However, more guidance and practical tools are required to make schools and teachers plan and implement research-based food education: not only in the school canteens, but also in the classroom.

This study aimed to define multisectoral themes and learning objectives for food education in primary education in Finland. The study is based on the views of a wide range of food education experts from different fields. It has been suggested that cross-curricular and experiential learning approaches are the most effective strategies for implementing food education in primary schools (Peralta *et al.*, 2016; Jones *et al.*, 2012). Therefore, we chose a holistic and multidisciplinary perspective instead of considering food education exclusively

through one perspective – such as health or the environment (Elsden-Clifton and Futter-Puati, 2015; Nordin *et al.*, 2020; Smetana *et al.*, 2019).

Methodology

This descriptive study employed the Delphi technique, using a three-phase questionnaire to develop objectives for food education in primary schools. The Delphi technique was used to gather a collective opinion of the topic from expert panellists, with an assumption that group opinion is better than an individual judgement (de Villiers *et al.*, 2005). This method is useful in bringing together experts with a wide range of experience, who have no history of interacting with one another (Linstone and Turoff, 1975). Earlier studies have also shown the method to be useful for curriculum development and determining effectiveness in education (Clayton, 1997; Moynihan *et al.*, 2015; Ormshaw *et al.*, 2016).

We used an electronic questionnaire in the first and the second rounds and a posted paper form in the third and final round. Recruiting participants for the research panel commenced in April 2018 and concluded in October 2018 (see the timeline in Figure 1). The first questionnaire was open for entries during this period. The second-round questionnaire was available from April 2019 to July 2019 for all participants who had completed the first-round questionnaire. The third-round questionnaire was posted to all participants who had completed the first-round questionnaire. After responding to the questionnaire, the participants returned it to us, the researchers in December 2019.

After every round, we conducted data analysis. The responses to the first and the second questionnaire were analysed using qualitative content analysis. Panellists' responses to the third questionnaire were analysed using frequencies. All open comments were also taken into account when formatting the final version of learning objectives for food education in primary schools.

Participants

Purposive sampling was used in recruiting potential panellists for this study (Luciani *et al.*, 2019). We used several communication channels to recruit panellists, in order to ensure that the panel included a wide range of experts and covered a comprehensive point of view. Teachers, nutrition professionals and other experts in food education from various organisations were recruited via social media and direct email messages. Recruitment was carried out on the social media platform Facebook focussed primarily on social communities of primary school teachers. However, no participants were found by sharing the recruitment post on Facebook. In turn, direct email messaging targeted a wide range of predefined experts in areas of education, nutrition, environment, food production, food culture, cooking and sustainable development. A selection criterion for this second target audience was identifiable previous work in primary school-aged children's food education.

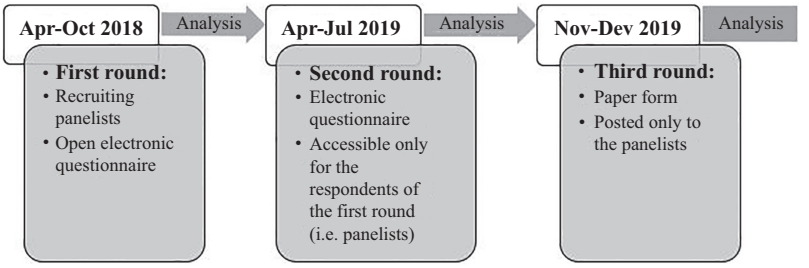

Figure 1.
Timeline of the Delphi rounds conducted in the present study

The research invitation contained information about the study and a link to the questionnaire. The invitation also contained a note stating that the respondent could give the name of another expert if he or she lacked the time or willingness to participate. In total, 122 emails were sent. After an initial email message, two reminder messages were sent. Six of the persons contacted by email replied that they did not belong to our target group. Finally, 22 eligible respondents replied.

Thus, the research panel consisted of those who responded to the first questionnaire ($n = 22$). The second and the third questionnaires were sent only to these respondents (i.e. panellists). Table 1 presents the research panel in more detail. The panellists' anonymity was secured during and after the research process, from other panel members.

Procedures and data analysis

The first round. In the first round, we used an electronic questionnaire (Formjack version 3.1, Eduix Ltd, Finland, 2008). We designed a questionnaire that contained two sections. In the first section, there was a short introduction regarding food education documents in Finnish schools: Finland's National Core Curriculum for Basic Education (Finnish National Agency for Education, 2016) and Recommendations for School Meals (Finnish Institute for Health and Welfare, 2017). The first section aimed to increase awareness and tune the topic of research. Furthermore, participants were asked open-ended questions to describe what food education in primary school means based on their viewpoint.

Variable	Description	*n* (%)
Gender	Female	21 (95)
	Male	1 (5)
Age	30 to <40	7 (32)
	40 to <50	8 (36)
	50 to <60	4 (18)
	60 to <65	3 (14)
Working region	Helsinki metropolitan area	12 (55)
	Southern Finland	3 (14)
	Western Finland	4 (18)
	Northern and Eastern Finland	3 (14)
Length of career (years)	5 to <10	3 (14)
	10 to <20	8 (36)
	20 to <30	7 (32)
	30 to <40	4 (18)
Special expertise*	Nutrition	8 (36)
	Education and pedagogy**	11 (50)
	Home economics	2 (9)
	Environmental education	2 (9)
	Food services	2 (9)
	Food politics	1 (5)
	Primary school teacher	2 (9)
	Agriculture and food production	2 (9)
Employer organisation	University	6 (27)
	Municipality	5 (23)
	Government institution	4 (18)
	Non-governmental organisation	7 (32)

Note(s): *Panelists had special expertise in one or two areas
**Education and pedagogy include educational science expertise or food education specialty

Table 1. Descriptive characteristics of the research panel ($n = 22$)

In the second section, Finland's statutory objectives of basic education referred to in the Basic Education Act (Finnish Ministry of Education and Culture, 2012) were used as stimulus material for creating objectives for food education in primary schools. Various general objectives of basic education were listed (total 17 subclasses). The participants were asked to define possible objectives of food education related to each general objective. There was also an opportunity not to give an open response but, instead, to choose from two pre-structured responses:

(1) Food education is related to the objective area, but I cannot define concrete objectives for it.

(2) I do not think food education is related to the objective area (give your reasons in more detail in the text box).

We analysed the responses of the participants ($n = 22$) to the first questionnaire using the qualitative content analysis method and coding. We used triangulation so that two researchers (AL and ST) analysed the data first independently and then together. At the end of this process, all the authors discussed together to agree with the results. This collaborative method was also repeated in the following rounds.

Before analysing the responses obtained in the first round, we consulted an expert who had participated in developing the National Core Curriculum for Basic Education (Finnish National Agency for Education, 2016). The conclusion of the discussion supported the idea that the objectives of food education should be verbalised as learning objectives for pupils instead of creating objectives for teaching. Further, we formed the objectives as goals that should be achieved by the end of primary education or sixth grade (i.e. by age 12 years). In the Finnish school system, the core curriculum provides the criteria for good performance for assessment at the end of grade 6 and the final assessment in grade 9.

During the first round, a combination of abductive and inductive thematic analysis was applied. We began the analysis by defining preliminary themes for food education: "Nutrition and Health ", "Sustainable Food", "Food Culture", "Food Preparation" and "Origin of Food". These were based on our previous knowledge of different dimensions of food education, not on any theoretical framework. Analysis began by categorising responses under these preliminary themes. However, the need to adjust the themes soon appeared. This was done inductively based on the responses. Thus, the original thematic framework was adjusted according to the data, making the analysis inductive. Responses were then further divided into three groups according to the type of the response: content of food education, pedagogical activity and learning objective.

After categorisation, we verbalised each idea as a learning objective with the guidance of Bloom's Taxonomy, a learning classification created by Benjamin Bloom in the 1950s (Bloom, 1984). The taxonomy has later become a standard for defining learning outcomes (Kennedy *et al.*, 2007; Krathwohl, 2002). The verbs used at the different levels of knowledge have been translated into Finnish earlier in another project (Honkala *et al.*, 2009).

The panellists' responses laid the foundation for the process of creating the learning objectives. The process included editing, focussing and translating the panellists' responses to form a coherent whole. We made efforts to reduce duplication. A holistic view of food education (see introduction) was used as a guiding principle for the process. Table 2 presents some examples of the panellists' responses and how these were defined as learning objectives. Some responses needed more subjective editing by the authors, for example, the first learning objective in Table 2, which was created by merging and editing two separate responses.

The second round. The second round began with presenting the results from the first round to the panellists in the electronic questionnaire (Formjack version 3.1, Eduix Ltd, Finland, 2008). First, the panellists were asked to comment on a figure presenting the themes

formed for food education. Then, they were asked to comment on the formed learning objectives for food education. The learning objectives were numbered in the questionnaire to make it easier for the panellists to comment on them. The following questions were used to encourage commenting:

(1) Is any of the objectives of no use?

(2) Is some important objective completely missing?

(3) Should some objectives be modified or combined with another objective?

In the analysis, we first organised the participants' ($n = 16$) comments from the second-round questionnaire into three categories: positive remarks, criticism and development proposals. In addition, we organised some general comments and comments related to the figure of themes separately. Some conflicting comments emerged, in which case the researchers aimed to find a solution that allowed keeping the majority of the panellists' opinions. We took into account all comments which contributed to the development of the learning objectives.

The panellists expressed their concern about some of the learning objectives. They considered them to be too difficult and complex for the pupils to achieve. The panellists were also concerned about the high number of individual objectives. As a result, during the analysis process, some closely related objectives were merged and some that were considered too difficult were deleted, which led to a smaller number of objectives.

To get an external opinion on the feasibility of the defined learning objectives for primary school pupils, an experienced primary school principal read through the list and commented on it before the third round was conducted. In summary, the principal found the objectives to be appropriate for sixth-grade pupils which was the purpose. Additionally, the principal made a few minor development suggestions.

The third round. In the third round of the data collection, we asked the panellists to freely comment on the figure that was formed of the themes and the matrix of learning objectives defined during the second round. Panellists also selected ten (10) objectives that they regarded as the most important. During the first and the second round, the electronic questionnaires had caused problems for some panellists. We decided that using a paper questionnaire form during the final round would eliminate any technical challenges and make it easier for the panellists to fill in the questionnaire. Using the paper form also made it easier for the participants to hand in their responses anonymously. Therefore, the third questionnaire was printed on paper and posted to the panellists. The panellists' postal addresses ($n = 22$) were collected via email. Sixteen (16) panellists replied to the message and provided their postal addresses. The remaining six (6) panellists did not reply to the inquiry. Therefore, the questionnaires were sent to their work addresses found online. Unfortunately,

Answer of a panellist	Defined learning objective
"adults give an example of appreciating themselves and their own bodies" *"food education provides opportunities for pupils to practice critical media literacy"*	Pupils should be able to critically examine the beauty ideals created by the media
"age-appropriate small cooking tasks (snacks)"	Pupils should be able to plan and prepare a nutritious snack
"knows table manners" *"pupils have adopted good eating manners"*	Pupils should be able to list proper manners related to different eating situations
"food hygiene and food safety"	Pupils should be able to describe how food is stored and handled hygienically and safely

Table 2.
Example of the data and how learning objectives were defined

a nationwide postal strike unexpectedly broke out in Finland immediately after the date for posting the forms. This postal strike (duration from 11th to 27th November in 2019) delayed the delivery of the questionnaires in which we had requested a response in two weeks. The response time was subsequently extended by another two weeks (bringing the total to 1 month), of which the panellists were informed via email. Finally, twelve (12) panellists completed the questionnaire.

The comments of the participants collected during this third and final round indicated agreement with the defined themes and learning objectives. The revisions suggested by the panellists included some final wordings and minor structural changes rather than a need to include any further content areas.

Results

The results of the first round

The analysis of the first round of responses resulted in 86 preliminary learning objectives divided into ten preliminary themes. The preliminary themes created the first version of Figure 2 (see Supplement Figure 1). In the figure, the themes were organised into four layers inside of a circle. The outermost layer was labelled "A Sustainable and Ethical Food Systems" which can be considered to gather all objectives together under a binding theme. The second layer had the following themes: "Health and Well-being", "Environment", "Culture", "Society" and "Food Production". The themes in the third layer, "Food Choice", "Food Preparation" and "Eating" brought concreteness to the themes mentioned earlier. In the centre of the circle, as the fourth layer, were the most personal themes: "Self-appreciation" and "Body and Senses".

The results of the second round

As a result of the second round's analysis, a preliminary version of Table 3 was formed. It included 42 learning objectives and 14 themes (see Table 3). A matrix of objectives and themes was developed so that one objective could be connected to multiple themes (see Table 3). The second version of Figure 2 was formed (see Supplement Figure 2), in which modified themes were replaced and the theme called "Sustainability and Ethics of the Food System" was placed on the top of the circle as the heading.

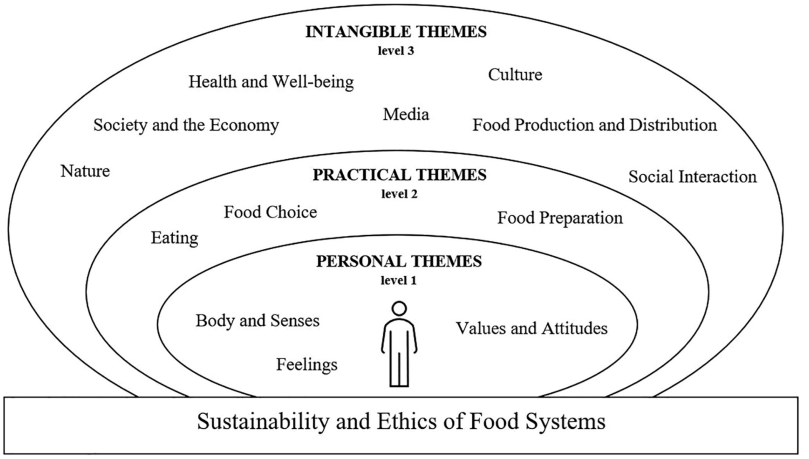

Figure 2.
The general themes of food education

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2					Level 3				
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Have a positive and balanced relationship with food (food is considered interesting and relevant but not something you constantly think about)	x	x	x	x	x	x							x
Have a positive relationship with their own body and respect diversity in themselves and in others	x	x	x									x	x
Compose a healthy meal by applying the plate model				x	x								x

(*continued*)

Table 3.
Learning objectives for food education in primary school and relationship of the objectives with the general themes of food education

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			*Level 2*						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Recognise issues that influence food choices during school meals and in grocery stores	x	x	x	x	x	x	x	x	x	x	x	x	x
Search for information related to food and nutrition and distinguish this from opinions and advertising		x						x			x		x
Diversely identify different basic food items					x		x		x				
Describe how lifestyle impacts their growth, development, learning and coping at school	x	x	x	x	x							x	x

(*continued*)

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Give examples of regular meal rhythms	x			x									x
Recognise the internal sensations of hunger and satiety	x		x	x									x
Describe individual, social and societal meanings of school meals	x	x		x	x		x	x	x	x		x	x
List proper manners related to different eating situations		x		x						x		x	
Describe ways to obtain food as a product, as a service, by cooking or growing your own food				x	x	x	x	x	x	x	x	x	

(*continued*)

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Describe how food is stored and handled hygienically and safely				x		x	x						x
Describe why food waste occurs and how it can be reduced		x		x	x	x	x	x	x	x		x	
Determine possibilities to influence their own health	x	x	x					x					x
Sort school meal waste and avoid littering		x		x				x	x				
Use units of measurement related to food and compare food prices in a grocery store					x	x		x					
Plan and prepare a nutritious snack					x	x							x

(*continued*)

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2					Level 3				
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Use all senses in observing and getting familiar with new foods	x	x		x	x	x							
Describe food and sensory experiences diversely and respect others' and their own, individual experiences	x	x	x	x						x		x	
Ensure adequate hygiene and cleanliness during school meals				x						x		x	x
Describe traditional dishes related to public holidays and their backgrounds		x		x		x	x	x		x		x	

(*continued*)

Table 3.

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Give examples of how eating and food choices vary in different religions and cultures		x		x	x	x		x		x		x	
Critically examine the claims made in food marketing		x	x				x	x	x		x		x
Illustrate the path from farm to fork for basic foods using examples					x	x	x	x	x				
Give practical examples of eating habits, foods and beverages that promote sustainable development		x		x	x	x	x	x	x	x		x	x

(*continued*)

At the end of grade 6 pupils should be able to …	The general themes of food education													
	Level 1			Level 2					Level 3					
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Explain the impact of different forms of food production and consumption on nature		x			x	x	x	x	x				
Perceive ethical aspects related to food based on examples	x	x	x	x	x	x	x	x	x	x	x	x	x
Assess how talking about food influences the atmosphere at the dining table	x	x	x	x						x		x	
Give examples of the importance of eating together at home or school		x		x								x	x

(*continued*)

Table 3.

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Give justified and constructive customer feedback on school meals to the meal provider		x		x			x	x				x	
Assess ways of talking about other people's bodies	x	x	x					x		x	x	x	x
Discuss emotions stirred by food and emotional eating	x	x	x	x	x					x			
Interpret labels on food packages and identify labels indicating food origin					x		x	x					

(*continued*)

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			Level 2						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Identify local operators involved in providing school meals and food systems				x			x	x	x	x		x	
Make observations on the food presentation, table setting and colours in a school meal	x	x		x	x		x			x			
Set common goals for behaviour during school meals	x	x		x	x			x		x		x	x
Describe Finnish food culture in the present and the past				x	x	x	x	x		x		x	

(*continued*)

Table 3.

At the end of grade 6 pupils should be able to …	The general themes of food education												
	Level 1			*Level 2*						Level 3			
	Body and senses	Values and attitudes	Feelings	*Eating*	*Food choice*	*Food preparation*	Food production	Society and economy	Nature	Culture	Media	Social interaction	Health and wellbeing
Describe the most common special diets and give reasons for why these are needed		x			x								x
Critically examine beauty ideals created by the media	x	x								x	x	x	x
Follow a basic recipe and know the basics of cooking						x					x		
Name examples of at the professions involved in the different stages of the food system				x			x	x				x	

Note(s): The theme called "Sustainability and Ethics of Food Systems" is an overarching theme and as such is present in all food education. The foundation of food education should be promoting sustainability and ethics

The results of the third round

As the final result of the Delphi study, we formed the final figure of the general themes of food education containing a total of 14 themes (Figure 2). The theme of the Sustainability and Ethics of Food Systems is a cross-cutting theme. It indicates that our food systems have a remarkable impact on individuals' diets, health and nutrition, environment, biodiversity, politics and even national stability (HLPE, 2018). The foundation of food education should promote sustainability and ethics. We grouped the other 13 subthemes into three layers (three levels). The innermost layer (level 1) consists of the most personal themes: "Body and Senses", "Feelings" and "Values and Attitudes". The themes in the second layer (level 2) consist of practical food-related themes: "Food Choice", "Eating" and "Food Preparation". The outermost layer (level 3) consists of intangible themes with sociocultural, societal or ecological dimensions: "Nature", "Social Interaction", "Food Production and Distribution", "Health and Well-being", "Culture", "Society and the Economy" and "Media".

The present study suggests that the objectives of food education become broader and deeper after pupils make the transition from early childhood education and care to primary school. However, the food education provided in primary schools should emphasise very practical and personal issues. Understanding food-related issues is easiest for pupils when these are related to their personal experiences. More complex and intangible food-related themes can then be gradually included in the curriculum for the upper classes in primary school. As Figure 2 illustrates, some themes are closer to pupils' day-to-day life experiences (themes presented in the inner circles) while others have more extrapersonal or intangible dimensions (outermost circle).

The third round of the Delphi study also resulted in 42 verbalised learning objectives for food education in primary school. These are presented in a matrix that also suggests how these may be related to the general themes of food education (Table 3). These connections should not be taken as the only correct solution but merely as one possible suggestion. During the third round of the Delphi study, each participant ($n = 12$) also selected ten objectives that they regarded as the most important. The objective of a positive and balanced relationship with food was ranked by all respondents among the most important objectives:

> At the end of grade 6 pupils should be able to have a positive and balanced relationship with food (food is considered interesting and relevant but not something you constantly think about).

Also, the objective concerning the relationship with one's body seemed to be most important to the panellists, as nine out of the 12 panellists selected it as one of the ten most important objectives:

> At the end of grade 6 pupils should be able to have a positive relationship with their own body and respect diversity in themselves and in others.

Discussion

Discussion of the results

This study had a pioneering role as it aimed to define multisectoral themes and learning objectives for food education in primary education in Finland. Furthermore, the inclusion of participants from a broad range of food and education-related backgrounds makes this study unique. Even though the importance of food education in primary schools is recognised in Finnish governmental guiding documents (Finnish National Agency for Education, 2016; Finnish Institute for Health and Welfare, 2017; Ministry of Agriculture and Forestry, 2017), its objectives are not clearly defined. This has led to a situation in which "food and nutrition education is everywhere and, at the same time, it is nowhere" (Padrão *et al.*, 2017). Thus, the themes and learning objectives for food education defined in the present study give class teachers tools to plan and evaluate food education practices. They enable food education to

become concrete and to be incorporated into primary school curriculum, lesson plans and everyday practice.

The themes for food education. Our results suggest that sustainability and ethics could be the foundation and overarching theme for food education, including other themes such as health, environment and food production. The theme of health was also purposefully included in the theme of Sustainability and Ethics of Food Systems by the authors. The choice is aligned with the UN's 2030 Agenda for Sustainable Development (United Nations, 2015), where health is clearly integrated into other goals of sustainable development.

The themes for primary school food education defined in the present study are similar to the themes defined by the Delphi method in an earlier study conducted in the USA (Sutter *et al.*, 2019). The themes identified by the study mentioned above, such as culture, production/system, food choices, social, media, health, food preparation and environment, also constitute a holistic approach that encompasses health aspects along with the environment, culture and society. Further, food literacy has previously emerged as a wider framework for food education and the development of skills and behaviours related to food (Vidgen and Gallegos, 2014; Truman *et al.*, 2017). In Finland, a parallel concept of food sense has also been developed (Janhonen *et al.*, 2018). Although there is no universally accepted definition for food literacy, it can be defined to include the effects of food on health and well-being as well as the whole food system including social, economic, cultural, environmental and political factors (Truman *et al.*, 2017; Vidgen and Gallegos, 2014). These similarities between the studies and concepts support the possibility that themes for food education are somewhat universal, at least in Western cultures. This could indicate that also the learning objectives defined in the present study are suitable for primary schools not only in Finland but in other countries as well. Nevertheless, there is a mutual, international goal for creating comprehensive standards for food education in primary schools to make it a desired, accepted and integrated part of school curriculum (Sutter *et al.*, 2019).

The learning objectives for food education in primary school. In the end, the study formulated 42 learning objectives. These provide a useful and concrete starting point for setting school-specific objectives for food education, as obligated by the national core curriculum (Finnish National Agency for Education, 2016) or for developing the national core curriculum in the future.

Two learning objectives, preliminarily evaluated as the most important by the panellists, were related to individuals' relationship with body and food (Talvia and Anglé, 2018). This result might reflect the current trend of emphasising positive body image and a relaxed relationship with food and eating within health promotion (Tylka and Wood-Barcalow, 2015; Warren *et al.*, 2017; Chapman-Novakofski, 2019). Many earlier studies have shown that the relationship with one's body is reflected in eating behaviour (Johnson and Wardle, 2005; Ribeiro-Silva *et al.*, 2018; Bibiloni *et al.*, 2013). However, because of the limited number of responses obtained from the third round of the Delphi study, the results on the importance of the learning objectives should be seen as tentative. The relevancy of the defined learning objectives could be studied further with a larger group of experts, including more teachers.

Discussion of the method used and its limitations

Sample size. The panel of experts was quite small and the response percentage diminished in every round. It was quite challenging to find people identifying themselves as food education experts. Only a few professionals appeared to perceive food education as their major area of expertise. Nine of the experts reported why they chose not to participate and six of them reported that they are not suitable respondents. Another possible reason for the rather small number of panellists during the first round of the Delphi study was that completing the first questionnaire was burdensome and time-consuming. Three potential participants chose not

to take part because of time constraints. Nevertheless, the first questionnaire required the respondents to think deeply about the topic and write down their own ideas, resulting in fruitful and rich data. Based on this, it can be concluded that the questionnaire was probably completed by those who had a genuine interest in food education.

Sample representativeness. Our purpose was to involve professionals, who are professionally interested in the topic of food education. That naturally means that participants were supposed to have a special interest in the topic, and the results are not representative of the general population. This study did not consult the opinions of laypeople, such as parents.

Only two primary school teachers participated in the study. Therefore, the suitability of the learning objectives to the primary school environment was probably not thoroughly evaluated during the process. Therefore, we additionally consulted an experienced primary school principal who evaluated and accepted the relevancy of the learning objectives from the perspective of a teacher and everyday school life. Moreover, experts in nutrition science were the biggest professional group in the panel, although we tried to minimise the bias of a potentially narrow interpretation of food education by recruiting panellists from many different backgrounds and organisations.

There was an unequal representation of genders in the panel (21 women, one man) which possibly influenced the results. Similar demographic distribution is seen among the food education professionals in Finland. Most of them are women, and therefore it is very hard to find male professionals who are involved in food education. An important goal in the future work within the field of food education is to have a greater number of men engaged in this topic.

Implementation of the questionnaires. One limitation was related to technical issues of the electronic questionnaire software used. The questionnaire did not allow respondents to save their responses and return later to finish the questionnaire. Some respondents had also problems with the questionnaire page not loading. These were the reasons why the third questionnaire was posted on a paper form. Unfortunately, the Finnish postal strike began immediately after the forms had been posted. This may have influenced the number of responses obtained from the third round.

Objectiveness of the results. Subjective decision-making could not be completely avoided when analysing the responses of the panellists and constructing the themes and objectives for food education. The background of the researchers lies in nutrition science, health promotion and education, which may have influenced the process. However, during the analysis of the panellists' responses, special emphasis was given to recognising all various aspects of food education in the research material and giving them equal importance.

Conclusions

The learning objectives of food education in primary education have not been studied extensively, and this research brings unique new knowledge in that field. According to the experts, the results show that food education in primary school should be multi-disciplinary and include issues from personal to societal dimensions.

We created an approach to present a holistic view of food education in primary school, and the defined learning objectives provide practical examples of food education content in primary school. The results show that it is important to explore different perspectives of food simultaneously and systematically rather than separately and consecutively (Macdiarmid *et al.*, 2012; Meybeck and Gitz, 2017). This is emphasised in choosing the "Sustainability and Ethics of Food Systems" as the overarching theme, which includes other themes such as health, environment and culture. A broad understanding of food education can help increase collaboration between different experts to build a sustainable future through education.

Implications

The results of the present study can be used in the planning and processing of food education curriculum at national, municipal and primary school levels in Finland. Largely, the learning objectives and themes identified in this study, such as "Food Production and Distribution", "Sustainability and Ethics of Food Systems" and "Body and Senses", could be considered as universal. Thus, these results can be applied also in other countries. However, possible cultural differences as well as differences in local steering documents such as national curriculum and food recommendations should be considered.

The learning objectives specify the goals set for food education implemented in primary schools (Contento and Koch, 2020a). Teachers can also use these results when planning education activities and apply them as a tool for evaluating pupils' food-related competencies. However, it is essential to tailor the objectives according to local challenges and situations at schools and not use them all as such (Contento *et al.*, 1995).

Another implication of our results is that the concept of food education can be varied and broad in its interpretations. Food as a multi-faceted phenomenon requires collaboration between many disciplines and professionals to implement food education comprehensively and appropriately for children of all ages. This can potentially contribute to children's well-being, health and the development of a sustainable lifestyle.

Broader institutional discussion is also required to reach a greater consensus of the learning objectives of food education in primary school. These results lay a firm foundation for developmental work and advancing the curriculum for primary education. This article can thus serve as a starting point for a further conversation. A critical review of learning objectives is necessary, especially together with experts in education and pedagogy. Future research should investigate the utility of the learning objectives for food education and best practices for integrating these consistently into the primary school curriculum. Future research could include a more accurate classification of the objectives for the levels of knowledge (according to Bloom's Taxonomy) and a shaping of the objects suitable for different grades of education.

Human subjects' approval statement

The research study was reviewed and approved by the Committee on Research Ethics of the University of Eastern Finland.

References

Bibiloni, M.D.M., Pich, J., Pons, A. and Tur, J.A. (2013), "Body image and eating patterns among adolescents", *BMC Public Health*, Vol. 13, p. 1104.

Bloom, B.S. (1984), *Taxonomy of Educational Objectives: the Classification of Educational Goals. Handbook 1, Cognitive Domain*, Longmans, New York.

Chapman-Novakofski, K. (2019), "Eating competence", *Journal of Nutrition Education and Behavior*, Vol. 51 No. 8, p. 918.

Clayton, M.J. (1997), "Delphi: a technique to harness expert opinion for critical decision-making tasks in education", *Educational Psychology*, Vol. 17 No. 4, pp. 373-386.

Contento, I.R. and Koch, P.A. (2020a), "Indicating objectives: translating behavioral theory into educational objectives: step 4", in Koch, P.A. (Ed.), *Nutrition Education: Linking Research, Theory, and Practice*, Jones & Bartlett Learning, Burlington, MA.

Contento, I.R. and Koch, P.A. (2020b), "Nutrition education for today's complex world", in Koch, P.A. (Ed.), *Nutrition Education: Linking Research, Theory, and Practice*, Jones & Bartlett Learning, Burlington, MA..

Contento, I., Balch, G.I., Bronner, Y.L., Lytle, L.A., Maloney, S.K., Olson, C.M. and Swadener, S.S. (1995), "The effectiveness of nutrition education and implications for nutrition education policy,

programs, and research: a review of research", *Journal of Nutrition Education*, Vol. 27, pp. 355-364.

de Villiers, M.R., de Villiers, Pierre, J.T. and Kent, A.P. (2005), "The Delphi technique in health sciences education research", *Medical Teacher*, Vol. 27 No. 7, pp. 639-643.

de Vlieger, N., Riley, N., Miller, A., Collins, C.E. and Bucher, T. (2019), "Nutrition education in the Australian New South Wales primary school curriculum: an exploration of time allocation, translation and attitudes in a sample of teachers", *Health Promotion Journal of Australia: Official Journal of Australian Association of Health Promotion Professionals*, Vol. 30 No. 1, pp. 94-101.

Elsden-Clifton, J. and Futter-Puati, D. (2015), "Creating a health and sustainability nexus in food education: designing third spaces in teacher education", *Australian Journal of Environmental Education*, Vol. 31 No. 1, pp. 86-98.

Finnish Institute for Health and Welfare (2017), *Eating and Learning Together - Recommendations for School Meals*, THL, Helsinki.

Finnish Ministry of Education and Culture (2012), "Government decree on the national objectives for education referred to in the basic education act and in the distribution of lesson hours", 422/2012 (Finland).

Finnish National Agency for Education (2016), *National Core Curriculum for Basic Education 2014*, Finnish National Agency for Education, Helsinki.

Hawkes, C., Smith, T., Jewell, J., Wardle, J., Hammond, R., Thow, A.M., Kain, J. and Friel, S. (2015), "Smart food policies for obesity prevention", *The Lancet*, Vol. 9985 No. 385, pp. 2410-2421.

HLPE – High Level Panel of Experts on Food Security and Nutrition (2018), "Nutrition and food systems. A report by the high level panel of experts on food security and nutrition of the committee on world food security", *HLPE Report 12*, Food and Agriculture Organization of the United Nations, Rome.

Honkala, A., Isola, M., Jutila, S., Savilampi, J., Rahkonen, A. and Wennström, M. (2009), *This Is How You Set Learning Outcomes in Your Curriculum*, [in Finnish], W5W2-Project, Oulu.

Janhonen, K., Mäkelä, J. and Palojoki, P. (2015), "Basic education food education from nutrition to food sense", [in Finnish], in Janhonen-Abruquah, H. and Palojoki, P. (Eds), *Creative and Responsible Home Economics Education*, Publications in Home Economics and Handicrafts No. 38, Unigrafia, Helsinki, pp. 107-120.

Janhonen, K., Torkkeli, K. and Mäkelä, J. (2018), "Informal learning and food sense in home cooking", *Appetite*, Vol. 130, pp. 190-198.

Johnson, F. and Wardle, J. (2005), "Dietary restraint, body dissatisfaction, and psychological distress: a prospective analysis", *Journal of Abnormal Psychology*, Vol. 114 No. 1, pp. 119-125.

Jones, M., Dailami, N., Weitkamp, E., Salmon, D., Kimberlee, R., Morley, A. and Orme, J. (2012), "Food sustainability education as a route to healthier eating: evaluation of a multi-component school programme in English primary schools", *Health Education Research*, Vol. 27 No. 3, pp. 448-458.

Kennedy, D., Hyland, Á. and Ryan, N. (2007), *Writing and Using Learning Outcomes: A Practical Guide*, University College Cork, Cork.

Krathwohl, D.R. (2002), "A Revision of Bloom's taxonomy: an overview", *Theory Into Practice*, Vol. 41 No. 4, pp. 212-218.

Lakka, T.A., Talvia, S., Sääkslahti, A. and Haapala, E. (2019), "Physical activity and nutrition in promoting children's health - aiming of obesity, type 2 diabetes and arterial disease prevention", [in Finnish], in Pietilä, A. and Terkamo-Moisio, A. (Eds), *Views of Health and Health Promotion*, Publications of the University of Eastern Finland, General Series, Helsinki, Vol. 26, pp. 133-166.

Lee, J. and Hong, Y. (2015), "Identifying barriers to the implementation of nutrition education in South Korea", *Asia Pacific Journal of Clinical Nutrition*, Vol. 24 No. 3, pp. 533-539.

Linstone, H.A. and Turoff, M. (1975), *The Delphi Method: Techniques and Applications*, Addison-Wesley, London.

Luciani, M., Campbell, K., Tschirhart, H., Ausili, D. and Jack, S.M. (2019), "How to design a qualitative health research study. Part 1: design and purposeful sampling considerations", *Professioni Infermieristiche*, Vol. 72 No. 2, pp. 152-161.

Macdiarmid, J.I., Kyle, J., Horgan, G.W., Loe, J., Fyfe, C., Johnstone, A. and McNeill, G. (2012), "Sustainable diets for the future: can we contribute to reducing greenhouse gas emissions by eating a healthy diet?", *The American Journal of Clinical Nutrition*, Vol. 96 No. 3, pp. 632-639.

Metos, J.M., Sarnoff, K. and Jordan, K.C. (2019), "Teachers' perceived and desired roles in nutrition education", *Journal of School Health*, Vol. 89 No. 1, pp. 68-76.

Meybeck, A. and Gitz, V. (2017), "Sustainable diets within sustainable food systems", *Proceedings of the Nutrition Society*, Wallingford, Oxfordshire.

Micha, R., Karageorgou, D., Bakogianni, I., Trichia, E., Whitsel, L.P., Story, M., Peñalvo, J.L. and Mozaffarian, D. (2018), "Effectiveness of school food environment policies on children's dietary behaviors: a systematic review and meta-analysis", *PloS One*, Vol. 13 No. 3, p. e0194555.

Ministry of Agriculture and Forestry (2017), *The Food 2030 – Finland Feeds Us and the World*, Government report on Food Policy, Helsinki.

Moynihan, S., Paakkari, L., Välimaa, R., Jourdan, D. and Mannix-McNamara, P. (2015), "Teacher competencies in health education: results of a Delphi study", *PloS One*, Vol. 10 No. 12, p. e0143703.

Nordin, S., Isbill, J. and Qamar, Z. (2020), "Nutrition education for sustainable global food systems", *Journal of School Health*, Vol. 89 No. 1, pp. 68-76.

Ormshaw, M.J., Kokko, S.P., Villberg, J. and Kannas, L. (2016), "The desired learning outcomes of school-based nutrition/physical activity health education", *Health Education*, Vol. 116 No. 4, pp. 372-394.

Padrão, S.M., Aguiar, O.B. and Barão, G.D.O.D. (2017), "Food and nutrition education: the defense of a counter-hegemonic and historical-critical perspective for education", *Demetra: Food, Nutrition and Health*, Vol. 12 No. 3, pp. 665-682.

Peralta, L.R., Dudley, D.A. and Cotton, W.G. (2016), "Teaching healthy eating to elementary school students: a scoping review of nutrition education resources", *The Journal of School Health*, Vol. 86 No. 5, pp. 334-345.

Ribeiro-Silva, R.D.C., Fiaccone, R.L., Conceição-Machado, M.E.P., Ruiz, A.S., Barreto, M.L. and Santana, M.L.P. (2018), "Body image dissatisfaction and dietary patterns according to nutritional status in adolescents", *Jornal De Pediatria*, Vol. 94 No. 2, pp. 155-161.

Smetana, S.M., Bornkessel, S. and Heinz, V. (2019), "A path from sustainable nutrition to nutritional sustainability of complex food systems", *Frontiers in Nutrition*, Vol. 6, p. 39.

Sutter, C., Metcalfe, J.J., Tucker, L., Lohrmann, D.K., Koch, P.A., Allegrante, J.P. and Desorbo-Quinn, A. (2019), "Defining food education standards through consensus: the pilot light food education summit", *The Journal of School Health*, Vol. 89 No. 12, pp. 994-1003.

Talvia, S. and Anglé, S. (2018), "Towards more effective guidance – the food relationship framework as an approach to nutrition education", [in Finnish], *Sosiaalilääketieteen Aikakauslehti*, Vol. 55 No. 3, pp. 260-265.

The Basic Education Act (628/1998), *Laws of Finland*.

Truman, E., Lane, D. and Elliott, C. (2017), "Defining food literacy: a scoping review", *Appetite*, Vol. 116, pp. 365-371.

Tylka, T.L. and Wood-Barcalow, N. (2015), "What is and what is not positive body image? Conceptual foundations and construct definition", *Body Image*, Vol. 14, pp. 118-129.

United Nations (2015), *Transforming Our World: the 2030 Agenda for Sustainable Development*, United Nations, A/RES/70/1.

Vidgen, H.A. and Gallegos, D. (2014), "Defining food literacy and its components", *Appetite*, Vol. 76, pp. 50-59.

Waling, M. and Olsson, C. (2017), "School lunch as a break or an educational activity: a quantitative study of Swedish teacher perspectives", *Health Education*, Vol. 117 No. 6, pp. 540-550.

Warren, J.M., Smith, N. and Ashwell, M. (2017), "A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviours: effectiveness and associated potential mechanisms", *Nutrition Research Reviews*, Vol. 30 No. 2, pp. 272-283.

Appendix

The supplementary files are available online for this article.

Corresponding author

Aija Liisa Laitinen can be contacted at: aija.laitinen@uef.fi