Project report no. 9 - 2010

Gun Roos and Minna Mikkola

Education about organic food and sustainability in Denmark, Finland, Italy and Norway

Findings from the iPOPY project

SIFO

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NATIONAL INSTITUTE FOR CONSUMER RESEARCH
Sandakerveien 24 C, Building B
P.O. Box 4682 Nydalen
N-0405 Oslo
www.sifo.no

SIFO Statens institutt for forbruksforskning
National Institute for Consumer Research

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Summary

This report presents results from "Work Package 4: Consumer perceptions, practices and learning" of the "innovative Public Organic food Procurement for Youth – iPOPY" project. The report gives an overview of organic food and sustainable development within national core curriculum and examples of education about organic food and sustainability in the participating European countries: Denmark, Finland, Italy and Norway.

Keywords

iPOPY, organic food, sustainability, education, Denmark, Finland, Italy, Norway

Education about organic food and sustainability in Denmark, Finland, Italy and Norway

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av

Gun Roos and Minna Mikkola

2010

STATENS INSTITUTT FOR FORBRUKSFORSKNING
postboks 4682 Nydalen, 0405 Oslo

Foreword

This report is part of a work package "WP4 Consumer perceptions, practices and learning" of the "innovative Public Organic food Procurement for Youth – iPOPY" project (http://www.ipopy.coreportal.org/ and publications from the project are available at http://www.orgprints.org (keyword iPOPY)). iPOPY is one of eight projects that were funded through the joint call of ERA and CORE Organic in November, 2006 (more at http://www.core-organic.org).

The main aim of the iPOPY project is to study how increased consumption of organic food may be achieved by implementation of relevant strategies and instruments linked to public food serving outlets for young people in the participating European countries: Denmark, Finland, Italy and Norway. German researchers also participate, funded by the Research Council of Norway.

The work has been carried out through collaboration between researchers in the iPOPY project.
Project manager: Anne-Kristin Løes, Bioforsk Organic Food and Farming Division, Norway.
Project contributors:
Norway: Bioforsk Organic Food and Farming Division and SIFO.
Germany: University of Applied Sciences, Münster and Center for Technology and Society, Technical University Berlin
Denmark: Aalborg University
Finland: University of Helsinki, Ruralia Institute
Italy: State University of Milan, Department of Crop Science and PROBER (Association of organic and biodynamic producers of the administrative region Emilia Romagna)

This report has been written by Senior Researcher Gun Roos at SIFO and Project Researcher Minna Mikkola at Ruralia Institute, University of Helsinki. Gun Roos has been responsible for editing the report and is main author of Chapters 2, 4 and 5. Minna Mikkola is the main author of Chapter 3. Professor Roberto Spigarolo from State University of Milan and Dr. Laura Terragni from Akershus University College have collected and provided information and material from Italy. Professor Niels Heine Kristensen and Associated Professor Thorkild Nielsen at Aalborg University have participated in providing information and material from Denmark.

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We would like to thank all projects partners and others who have contributed with information, comments and suggestions for improvement. However, the authors take full responsibility for the contents of this report.

Oslo, August 2010

NATIONAL INSTITUTE FOR CONSUMER RESEARCH

Contents

Summary

This report on education about organic food and sustainability in Denmark, Finland, Italy and Norway is part of a work package “WP4 Consumer perceptions, practices and learning” of the “innovative Public Organic food Procurement for Youth – iPOPY” project.

The aim of the report is to give an overview of education about organic food and sustainability in Denmark, Finland, Italy and Norway. The more specific objectives are: a) to introduce some of the structures and learning objectives from the national curricula that may give room to integrating organic food and sustainability, and b) to describe some selected cases of educational approaches, activities and material from the four European countries studied in the iPOPY project.

The report is mainly based on literature, written material, documents, and public websites. The selection of cases and examples for each country is pragmatic, including mainly those that have been suggested and selected by participating researchers to exhibit progressive educational features.

Chapters 2 through 5, one on each country (Denmark, Finland, Italy and Norway) include description of the role of organic agriculture and food and sustainability in the national core curriculum in primary, lower and upper secondary education and a selection of qualitative case studies and examples illustrating educational approaches and activities used in schools.

The national curriculum is the main structure in planning education in schools, and thus also a central factor to be considered in planning education about organic food and sustainability. Organic food was not explicitly mentioned and included in learning objectives in any of the four countries (Denmark, Finland, Italy and Norway). However, sustainable development was in some of the countries included in general aims of education, cross-curricular themes or learning objectives for some specific subjects, including natural science, geography, home economics and food and health education. For example, in Denmark the grade specific learning goals in science, biology, geography and home economics were explicitly linked to sustainable development. In Finland, responsibility for environment, well-being and sustainable future is a cross-curricular theme in basic education, and sustainable development is a cross-curricular theme in upper secondary education. In Norway, sustainable development was included in the learning objectives of natural science, social studies and food and health. In Italy, where the national curriculum is being reformulated and also regional policies and planning has an important role, sustainable development is included in learning objectives in science and geography. Therefore, linking organic food with sustainable development and emphasizing the role of organic food as part of sustainable development could be recommended. Sustainability is a theme that is suitable for integrating several subjects such as science, health, history, social sciences and math and for a whole school approach and for tying school lessons to real world. For teachers the perceptions of educational benefits and fit with the curriculum and learning objectives are important when they choose to adopt and integrate topics and activities.

Various educational material and activities are available in the four countries in text books, leaflets and on the Internet. Farm-to-school programs and school gardens include or focus on experiential and educational activities, involvement, authentic learning experiences, and the use of different senses. Recommendations include that cultural factors need to be considered when planning food education, activities and learning. The countries where school meals are part of education (Finland and Italy) have one more arena where different issues related to food can be taught.

This report has been limited to iPOPY countries (Denmark, Finland, Italy and Norway). It would be useful in future studies about education for sustainability and organic food to include also other European countries.

1 Introduction

1.1 Background

Education about sustainability, organic food and agriculture is today increasingly being addressed in many countries. This development can be linked to many factors, including a general concern about the environment and climate change, a rising interest in organic food, and a worry about young peoples' health and diet. Organic food, local food, and sustainable food have received growing attention in recent years among various stakeholders in the food system, including food producers and market actors, politicians and regulators, experts and researchers, and consumers. At the same time there is a growing concern with student health and academic performance among politicians, educators, food service personnel, advocates and parents, and an interest in developing school meal programs and education.

This report on education about organic food and sustainability in Denmark, Finland, Italy and Norway is part of a work package "WP4 Consumer perceptions, practices and learning" of the "innovative Public Organic food Procurement for Youth – iPOPY" project[1]. The main aim of the iPOPY project is to study how increased consumption of organic food may be achieved by implementation of relevant strategies and instruments linked to public food serving outlets for young people in the participating European countries: Denmark, Finland, Italy and Norway. Supply chain management, procedures for certification of serving outlets, stakeholders' perceptions and participation as well as the potential of organic food in relation to health are analysed as part of the project. Because schools are central arenas for public food procurement for children and adolescents the project focuses mainly on organic food served in schools. One of the objectives of the iPOPY project is to explore the perceptions, practices and learning linked to procurement and consumption of organic food among young people. This aim is addressed in WP4 which focuses on the consumers of public food serving outlets (other publications from WP4 include: Marley, 2008; Mikkola, 2009a; Mikkola, 2009b; Mikkola, 2010; Mikkola and Roos, 2010; Mikkola et al., 2009; Roos, 2009; Roos and Mikkola, 2009).

Young people's perceptions, practices and learning are dynamic and shaped by a wide variety of individual, social and cultural factors, including schools and formal education. Schools as educational institutions have an important role to play in equipping children and adolescents with knowledge, attitudes and skills. However, schools can't teach everything, and thus decisions and choices have to be made about what is most important to teach in a particular culture. The result of those choices is the national curriculum, which defines what is taught in the schools. Organic food and sustainability are interdisciplinary themes that do not fit neatly into any specific academic discipline or topic, but they are often introduced within and across contexts of established disciplines. They tend to be included in natural science (environmental education) and home economics (nutrition education), but may also be integrated into other topics such as the humanities and social science.

[1] http://www.ipopy.coreportal.org/

The aim of this report is to give an overview of education about organic food and sustainability in Denmark, Finland, Italy and Norway. The more specific objectives are: a) to introduce some of the structures and learning objectives from the national curricula that may give room to integrating organic food and sustainability, and b) to describe some selected cases of educational approaches, activities and material from the four European countries studied in the iPOPY project. The report focuses on giving an overview and introducing examples of progressive cases. It does not attempt to give comprehensive information about education system and the education about organic food and sustainability. Information and analyses of education systems and policies in Europe is, for example, provided by the Eurydice network[2], which is coordinated and managed by the EU Education, Audiovisual and Culture Executive Agency.

The understandings and definitions of organic agriculture and food are more established and known, whereas sustainable development and sustainable food are more recent and comprehensive concepts. For example, the International Federation of Organic Agriculture Movements has defined organic agriculture as "a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved"[3]. Sustainable development has been defined in many ways; a frequently quoted definition is from the Brundtland Commission of the United Nations (1987): "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[4]. Sustainable development definitions often include three aspects: economic development, social development, and environmental protection.

There are various international documents, initiatives and projects that are relevant for education about organic food and sustainability in Europe. The United Nations Decade of Education for Sustainable Development (2005-2014), for which UNESCO is the lead agency "seeks to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental problems we face in the 21st century"[5]. The United Nations has described Education for Sustainable Development (ESD) with three interconnected key areas: social environment, natural environment and economy. The following goals have been described:

- Education for sustainable development should permeate all curriculum plans and not constitute a separate subject
- The education should help establish the values and principles underpinning sustainable development
- The education should stimulate critical thinking and problem solving
- The education should be based on methodological diversity to promote the learning process
- Students and pupils should themselves participate actively in decisions about the methods to be used
- The education should address local as well as global topics[6].

Agenda 21, the document produced by the 1992 United Nations Conference on the Environment and Development in Rio, states that education is "critical for promoting sustainable development"[7]. A common Baltic-Nordic strategy for Education for Sustainable Development, Baltic 21E, has been ratified. The strategy has the following goals for schools: "The individ-

[2] http://eacea.ec.europa.eu/education/eurydice/index_en.php
[3] http://www.ifoam.org
[4] http://www.un-documents.net/wced-ocf.htm
[5] http://www.unesco.org/en/esd/
[6] http://sustain.no/about/UDIR_Sustainable_development_jan07.pdf
[7] http://www.un.org/esa/sustdev/documents/agenda21/index.htm

ual learners should have the knowledge, values and skills to be active, democratic and responsible citizens and participate in decisions at the individual as well as at different levels within the society, locally and globally, to create a sustainable society. Learners in vocational education should also have skills and competencies relevant to their future professions"[8].

Many politicians and policy makers think that school education can be an important way to tackle both health and environmental problems and, therefore, support projects and programs on Health Education (HE), Environmental Education (EE) and Education for Sustainable Development (ESD)[9]. This has resulted in different national and international initiatives such as 'Green Flag schools', 'Eco Schools', 'Health Promoting Schools' etc. Green Flag or Eco-Schools is a programme for environmental management and certification, designed to implement sustainable development education in schools by encouraging children and youth to take an active role in how their school can be run for the benefit of the environment. Eco-Schools is one of the programmes of the FEE - Foundation for Environmental Education and currently, the Programme is being implemented in 47 countries involving 32 156 schools[10].

The European Network of Health Promoting Schools, which started in 1992, today has more than 40 countries as members. The network aims at integrating health promotion in the educational agenda (Clift and Jensen, 2005). A health promoting school is defined as one that constantly strengthens its capacity as a healthy setting for living, learning and working[11]. The two most important theoretical fundaments for this project are the concept of Action Competence (Jensen, 2000) and Antonovsky´s theories on coping and coherence (Antonovsky, 1979; Antonovsky, 1987). The key elements of Action Competence are knowledge/insight, commitment, vision, experience and social skills (Jensen, 2000). One of the significant challenges to traditional models, which are focused on behaviour modification, is characterised by the distinction between 'moralistic' and 'democratic' health education and promotion conceptualized within the Danish Network of Health Promoting Schools. The main aim of democratic health promoting schools is construed as development of students' action competence, that is, the ability to act and bring about positive change with regard to health (Jensen, 1997; Jensen, 2000).

Learning by experience and holism are currently emphasized in education theories. As with environmental education, studies of nutrition education and school meals suggest consistency and integrating nutrition and health into the whole school environment, using a so called "whole school approach" (Marley, 2008; Morgan and Sonnino, 2007; Morgan and Sonnino, 2008). Some of the cases described in this report illustrate this approach.

In this report we will focus on giving an overview of education about organic food and sustainability in the four countries included in iPOPY: Denmark, Finland, Italy and Norway.

1.2 Methods

The report is mainly based on literature, written material, documents and public websites. Researchers in the iPOPY project have collected relevant material in their countries based on instructions and forwarded this to the authors of this report. Attempts were made to collect corresponding information from the four countries (Denmark, Finland, Italy and Norway), but because of variations in material and different people providing the information from the different countries we decided to allow diverse presentations of the four countries instead of limiting the presentations to only comparable data. Also, the aim was not to make a compari-

[8] http://sustain.no/about/UDIR_Sustainable_development_jan07.pdf
[9] http://www.gdrc.org/uem/ee/index.html
[10] http://www.fee-international.org
[11] http://www.who.int/school_youth_health/gshi/hps/en/

son but to give an overview of how education about organic food and sustainability is structured in the national core curriculum in primary, lower and upper secondary education and to describe a variety of examples of educational approaches and activities.

The selection of cases and examples for each country reflects positive educational cases, but is not all-inclusive and more could be added. The selection is pragmatic, including mainly those that have been suggested and selected by participating researchers to exhibit progressive educational features. The cases represent member schools of the Green Flag scheme or are otherwise dedicated to Environmental Education (EE) or its counterpart Education for Sustainable Development (ESD). The terms EE and ESD are often used interchangeably, and share to some extent the common frame of United Nations' Decade of Education for Sustainable Development[12].

1.3 Structure of report

The report has the following structure.

Chapters 2 through 5, one on each country (Denmark, Finland, Italy and Norway) include description of the role of organic agriculture and food and sustainability in the national core curriculum in primary, lower and upper secondary education and a selection of qualitative case studies and examples illustrating educational approaches and activities used in schools. The structure of each chapter varies because of variation in available material and national context.

The last chapter, Chapter 6, summarises and brings up some concluding remarks.

Relevant parts from national curriculum have been copied from Internet websites and included in Appendices 1-4 (in national languages if not available in English).

[12] http://www.unesco.org/en/esd/

2 Education about organic food and sustainability in Denmark

2.1 Introduction

Denmark has a relatively long history of organic food production compared with other Northern European countries. In 2008, the share of organic of total agricultural land was 5.6% and the share of the sales was 7% (FiBL, 2010). Danish consumption of organic food has been described as "normalised" because a very small share of the population claim that they never buy organic food products (Jacobsen et al., 2005).

In the school setting Danish pupils learn about organic food mainly through what is taught in the lessons because few schools provide food to the pupils. Most pupils bring a packed lunch from home and eat it in the class room, but publicly organised food provisioning is increasing (Hansen et al., 2008). There are some municipalities (for examples, Copenhagen, Roskilde and Gladsaxe) that have school lunch projects and programs that also include some information and education (He and Mikkelsen, 2009). Examples of these initiatives are included in this chapter.

2.2 Organic food and sustainable development within national core curriculum

The Danish national curriculum from 2009 defines what is taught in the schools and gives learning objectives for the different subjects to be taught in grades 1-9[13] (Appendix 1). The subjects that are especially relevant for organic food and sustainability are: science, biology, geography, and home economics. The learning objectives for these subjects are the following:

> **Science:**
> § 13 The purpose of the teaching of general science is that pupils gain insight into important phenomena and contexts and develop thinking, language and concepts of nature and technology, which has value in daily life.
>
> 2nd Paragraph. Education shall be based broadly on the pupils' own experiences, observations, studies and experiments and help them to develop practical skills, creativity and ability to cooperate. Education shall maintain and promote pupils' pleasure in dealing with nature, technology, living conditions and living conditions and their desire to ask questions and do research both indoors and outside.

[13] https://www.retsinformation.dk/Forms/R0710.aspx?id=125973

3rd Paragraph. Education shall assist pupils in developing understanding of the interaction between humans and nature in their own and foreign societies, and accountability to the environment as a basis for commitment and action. Education shall provide a basis and interest among pupils for further work on the subjects biology, physics/chemistry and geography.

Biology:
§ 15 The purpose of the teaching of biology is that pupils acquire knowledge about the organisms, nature, environment and health with emphasis on understanding the fundamental biological concepts, biological relationships and on important applications of biology. Education shall provide pupils familiarity with scientific work and consideration of ways and understand how biology - and biological research - in interaction with other science contributes to our understanding of the world.

2nd Paragraph. Education shall use varied forms of work and largely based on pupils' own observations and studies, including laboratory and field work. Education shall develop pupils' interest and curiosity for nature, biology, science and technology and give them the desire to learn more.

3rd Paragraph. Teaching should help pupils recognize that science and technology is a part of our culture and worldview. Pupils' responsibility towards nature, environment and health must be developed so that they have confidence in their attitudes and action in relation to issues of human interaction with nature - locally and globally.

Geography:
§ 14 The purpose of the teaching of geography is that pupils acquire knowledge of important natural and culturally created conditions for living in Denmark and elsewhere. Pupils must acquire basic geographical knowledge as background for understanding of geographical concepts and relationships and knowledge of communities' use of nature and natural resources. Education shall provide pupils familiarity with natural and cultural geographic work and give them insight into how geography - and geographical research - in interaction with other science contributes to our understanding of the world.

2nd Paragraph. Education shall use varied forms of work and largely based on pupils' own observations and investigations through fieldwork and use of geographic sources. Education shall develop pupils' interest and curiosity in the natural and cultural geography, natural sciences and engineering and give them the desire to learn more.

3rd Paragraph. Education shall contribute to pupils' understanding of foreign cultures and to recognize the contributions of natural and cultural geography to our world. Pupils' accountability to the nature and use of natural resources and techniques must be developed so that they have confidence in their attitudes and action in relation to issues of human interaction with nature - locally and globally.

Home economics:
§ 11 The aim of teaching home economics is that the pupils through varied learning pathways acquire knowledge and skills that enable them to act and be active in their own lives. Students should gain practical skills, aesthetic experience and understanding of own and others' food culture, of food, household consumption and interaction with community factors and the area's importance for resources and environmental problems and health and quality of life for the individual and others.

2nd Paragraph. Through aesthetic, practical, experimental and theoretical tasks, pupils have the opportunity to develop self-esteem, imagination, joy and recognition, so that they

in community with others and individually are able to take a critical position and act in their private lives and society.

3rd Paragraph. Education shall prepare pupils to take part in and responsibility for issues related to food, household consumption in terms of culture, health, well-being and sustainability. Education shall give pupils opportunities to experience the value of community and cooperation based on equality and democracy.

The learning goals have a general focus on pupils' participation and learning through experiences and cooperation. Organic food is not mentioned explicitly in these general learning objectives and the word sustainability is only used as part of the objectives of home economics. However, in the specific goals for different grades we found the following learning goals that are more explicitly linked to sustainability:

Science – learning goals after grade 6:
-Know the concept of sustainability and be able to explain examples of human consumption of resources and use of technology affects the circuit in the wild and to assess the implications for plants, animals and humans
-Evaluate examples of environmental problems locally and globally based on personal insight.

Biology – learning goals by grade 9:
-Describe human uses of natural base and involve prospects for sustainable development
-Relate to current environmental problems and their impact on human health and the surrounding countryside.

Geography – learning goals by grade 9:
-Provide examples of regional and global patterns in the economy, production, resource consumption, sustainability, environment and pollution.
-Provide examples of human exploitation of natural bases in the context of sustainability.

Home economics – learning goals grades 4, 5, 6 and 7:
-Analyze various food groups in quality in relation to taste and food technological characteristics, health, environment, ethics and price
-Know about consumer rights and obligations in relation to procurement and use of goods
-Explain the food, consumption and hygiene/household's impact on environment and health and quality of life
-Apply the principles for sustainable households in shopping, cooking, dishwashing, cleaning, washing and waste management
-Take a critical position as a consumer and the conditions for living sustainably and with both health and well-being.

These specific learning goals open up for including in Denmark issues related to organic food and sustainability in several subjects, including science, biology, geography and home economics.

2.3 Cases – educational approaches and activities

Organic food has an established role in Denmark and various educational materials are also available. A search on "organic food" on the Danish platform for educational material[14] resulted in 36 hits, and a search on "sustainability" gave 23 hits. We have selected to present two of these hits as cases to illustrate the types of material available: "Hvad er økologi?" (What is organic?) and "Fugl og fisk – økologi på bordet" (Poultry and fish – organic on the table). We will also present examples of what some municipalities do on the field of organic food in school.

2.3.1 "Hvad er økologi?" (What is organic?)

"Hvad er økologi?" (What is organic?) is a set of educational material published by "Økologisk landsforening" (Organic Denmark)[15] as part of a project funded by the Ministry of Food, Agriculture and Fisheries in 2009-2010.

The Danish national organic organisation, Organic Denmark, supports development of organic farming and production of organic food, and is aimed at consumers, farmers and producers. Organic Denmark provides information on organic food and farming to consumers (for example, members receive the magazine "Økologisk" four times a year and leaflets such as "10 gode grunner til å velge Ø" (10 good reasons to choose organic) can be downloaded for free). Children and youth are one of the special target groups and Organic Denmark has developed special educational material for schools. On the special part of their webpage aimed at schools[16] they give the following introduction about their activities:

> "Put more ecology at the table - get more out of action for health, welfare and professional benefit in the school.
>
> Knowledge of ecology and ecological production form the foundation for sustainable development - both in school, at home and at work. Therefore it is important to maintain and update children's and adults' understanding of basic facts about health, environment and well-being. Setting ecology on the school's agenda can boost - or maintain – holistically oriented development.
>
> Organic Denmark offers in 2010 an organic package 'økopakke' with several components: Free educational materials and guidance on how to use it. Material is made for education and training in cooperation with the Research Program of Environmental and Health Education at DPU.
>
> Furthermore, we offer advice on how the food that is eaten at school can be more organic - both lunches, tuck shops as well as kitchens. In order to get a good process we recommend to start with a workshop in the school to get an overview of the initiatives that have already started while developing ideas for moving forward. We give a written set on your workshop - the next steps we shall organize together and adjust to your needs."

The webpage includes material that can be downloaded and links to material for school meals, education and farm visits.

[14] www.EMU.dk
[15] www.okologi.dk
[16] http://okologiiskolen.dk

"Hvad er økologi?"(What is organic?) is a toolbox set of educational material, including texts and tasks, adapted for pupils in elementary, intermediate and secondary school (grades 1-3, 4-6, 7-9, 10) and a teacher's handbook, all available for free downloading[17]. There are also links to other material and a film that can be ordered for free where children from organic farms tell about the animals on their farm.

"Hvad er økologi" is based on combining educational material with making a visit to an organic farm. The education material is build up with modules before, during and after the farm visit. For example, grades 4-7: before the farm visit pupils get information and tasks related to farms and agriculture, organic, food chains, farm animals, and animal welfare. After the farm visit the topics include organic and healthy food and organic and ground water.

The material has been developed to fulfil some of the goals of national core curricula (science, biology, mathematics, home economics, health education, Danish).

According to the project manager the project material has been popular, for example, the website had 12 000 visitors from February to August 2008 (Ruge, 2009).

2.3.2 "Fugl og fisk – økologi på bordet" (Poultry and fish – organic on the table)

The aim of the project "Fugl og fisk – økologi på bordet" (Poultry and fish – organic on the table)[18] was to implement a range of activities to pass on knowledge about ecology and organic food in relation to human health, animal welfare, nature and environment. The project funded by the Ministry of Food and Danish Society for the Protection of Animals was implemented by the producer association Poultry and Fish - Organic Quality in collaboration with Aqua Freshwater Aquarium, FDB (Danish coop), Organic Denmark and the Danish Aquaculture.

As part of the project "Fugl og fisk – økologi på bordet" (Poultry and fish – organic on the table) educational material was developed. The educational material and a complimentary newsletter can be downloaded for free for use in schools. On the webpage the educational material is introduced: "The purpose of it all is to provide information on ecological poultry and fish in a both serious and exciting way. We want to make consumers smarter about what it really is that they buy when putting organic produce in the shopping basket[19]"

The material consists of 10 modules (1. What is organic?; 2. Organic and conventional poultry – what is the difference?; 3. Visiting organic poultry at Drudgården; 4. Fishing salmon; 5. Fish as farm animals; 6. Organic fish; 7. Visiting an organic fish farm; 8: Organic fish do better; 9. Poultry and fisk as food; 10. Organic is good for the bees and flowers) with short texts aimed at grades 6-7. The material talks about birds and fish in the wild and domestic animals in agriculture and aquaculture. It also informs about the differences between organic and conventional production.

The material was planned to be used before and after visits to an exhibition 'Poultry and Fish - Organic at the table' which was organised in 2009-2010, but according to the producers the materials may also be used without visiting the exhibition or in conjunction with a trip to an organic farm or fish farm.

[17] http://okologiiskolen.dk/Undervisning.asp
[18] http://www.fuglogfisk.dk/
[19] http://www.fuglogfisk.dk/

2.3.3 Municipalities and organic food in schools

A few Danish municipalities (including Copenhagen, Roskilde, Gladsaxe, and Ishøj) and schools (for example, Værebro school in Gladsaxe) have introduced organic school meal projects and programs that also include some information and educational components. We will briefly describe as examples activities in Copenhagen, Gladsaxe and Ishøj.

Examples of municipal activities:

Copenhagen

The healthy and organic school food project in Copenhagen (KØSS) aims at serving meals that follow nutritional guidelines and that are based on organic food. KØSS started in 2002 as "Copenhagen Healthy School Meals" and was part of the Dogme2000 project (He and Mikkelsen, 2009).

The project emphasises the educational value of involving the students in preparation and sale of the food at school. Before the students start they are taught about economy, hygiene and nutrition. In addition, the KØSS secretariat has also produced teaching resources about cooking and organic food and agriculture. The intention was that these materials would have been used in education but many schools have not integrated the organic message successfully into the curriculum (Hansen et al., 2008).

KØSS has recently been succeeded by a project called EAT[20]. The goal of EAT is to support a happy and healthy food culture in schools. EAT equals school meals that taste delicious (appetizing, healthy and made from fresh seasonal ingredients); support food enjoyment and a framework for mealtimes, adapt to the cultural diversity in schools, and meet the official recommendations for healthy school meals. EAT aims at providing minimum 75% organic food.

The manifest signed by the group responsible for EAT:
1. The food must be fresh, plain and consist of minimum 75 percent organic ingredients.
2. Meat, fish and poultry must have high animal welfare and well-being, may well be organic.
3. Copenhagen school meals should reflect Denmark's changing seasons
4. Gastronomically the food should be tasty, educational, varied, and modern and take account of Copenhagen's various cultures
5. The food must reconcile the need for good taste with modern knowledge about health and well-being
6. The food must be of high nutritional quality
7. It is essential that staff in the production kitchen that produce the food go through a process that enhances the understanding of good food quality and how such is produced
8. The design of the concept expressed in lunches, meals, bentobox, leaflet and booklets must be timely and with an overall impression, just as it is known from leading brands
9. School booths must have a lift and complemented with a dining environment. Students themselves must make the space their own, a place where they can feel at home and happy to take a meal
10. A points system, giving students a financial incentive and desire to sell school meals for their comrades, should be developed.[21]

[20] http://www.kk.dk/sitecore/content/Subsites/EAT/SubsiteFrontpage.aspx
[21] http://www.kk.dk/sitecore/content/Subsites/EAT/SubsiteFrontpage/OmEAT/Faddergruppen/Faddermanifest.aspx

Gladsaxe

In 2004 Gladsaxe Municipality (a municipality in the Capital Region of Denmark, population approx. 60 000) introduced a school food program that included construction of decentralised school canteens serving food as an alternative to bringing lunch packs. The goal is that 25% of the food budget should be spent on organic food should be reached in the time period 2009-2012. Based on the experiences education of school management, canteen personnel and other school employees is crucial for success and in addition to serving healthy and organic food also eating environment has to be considered (Dominicussen, 2009).

Schools in Gladsaxe may also have their own activities. For example, one school in Gladsaxe Municipality, Værebro school, has developed and implemented for 6 years an approach to nutrition and healthy living which combines instruction with experience (learning through heart, body and mind). The main subjects that are included are science, Danish and physical education. Pupils in grade 2 have a course in nutrition which includes field trips, food preparation, and giving lessons to pupils in other grades. For example, the pupils visit an organic hen farm where they witness slaughter of hens, participate in cleaning and plucking the hens, next day at school they cook the hen and prepare food that they serve. Grades 3-8 participate one week each school year in the school cafeteria project and pupils participate in planning, preparing, arranging and selling the daily hot dish, salad bar and bread. The manager of the school cafeteria (who is a trained chef and teacher) handles the teaching in the school cafeteria (Danielsen, 2009).

Ishøj

Ishøj (a municipality in the Capital Region of Denmark, population approx. 20 000) issued a nutrition policy in 2003 and started a project in kindergartens, day-care providers, day-care centres, institutions for children, afternoon clubs, and school canteens.

Goal of project:

- to have organic food in all institutions for children and school canteens,
- increase skills in nutritional and environmentally friendly cooking among those who are food responsible (canteen personnel)
- increase knowledge about nutritious food and the meaning of organic food among leaders and teachers

A report including recipes from the participating institutions was published as part of the evaluation of the project. The evaluation showed that the institutions had arranged several activities: newsletter, theme day (which was compulsory for all leaders and the food responsible), courses for employees, topic at parental meetings, debates in the kindergarten, and visits to organic farm. The project results showed that some kindergartens and afternoon clubs changed from no organic food to 100% organic food. Some had included children in the kitchen and they concluded that through the participation children do not just learn about food but it also supports language development and stimulates senses. Some started gardens and one school started a canteen. Teachers, pupils and administration were invited to meeting with the canteen personnel to taste the food and schools more organic and healthy food was sold (Ishøj Kommune, 2005).

3 Education about organic food and sustainability in Finland

3.1 Introduction

Organic agriculture has increased in Finland, but consumption is still relatively low; in 2008, the share of organic area of total agricultural area was 6.6% and the share of the sales was 1% (FiBL, 2010). The active users of organic food comprise about 4 % of households and they buy nearly half of the organic produce on the market; regular users comprise 17 % and their purchases reach about 35 % of organic sales. The contingent users, nearly half of consumers, cover the remaining 20 % of organic sales while about one third of consumers do not buy organic food (Rahtola, 2010).

In Finland, catering is a large industry with nearly 22 000 professional kitchens and a third of Finns consums a catered meal on a daily basis (AC Nielsen, 2008). School catering is a remarkable part of this industry, 3 800 public school kitchens serve daily a free warm meal (AC Nielsen, 2008) to close to 800 000 young people from 7 to 19 years of age. The use of organic food by public catering seems to be moderate. In a survey covering 29% of Finnish municipalities and their use of organic food, five to nine per cent of caterers used organic food from 25 to 100 % of their food offer (Risku-Norja et al., 2010). However, about three quarters of respondents did not use organic food at all. Isoniemi et al. (2006) found similar levels of consumption of organic food in a survey of 444 municipalities' public caterers. Only 1-8% of respondents used more than 75% of particular food as organic, while about one third of respondents used less than 10 % and roughly half of respondents used no organic food in public catering. Of all professional kitchens, about 1 500 are estimated to use organic food according to EkoCentria (Rahtola, 2010). Some schools certified by various environmental management schemes use organic food (Mikkola, 2010) but others focus on other areas of sustainable development such as waste management and saving of energy and water (Mikkola, 2009a; Mikkola, 2010; Risku-Norja et al., 2010). The school meal recommendations (Valtion ravitsemustoimikunta, 2008) focus on healthy meals in order to secure the daily intake of major nutrients. The focus on health may at least partly explain the 'rational' and 'moderate' relation to organic food. However, organic food is seen as part of the sustainability complex in Finnish public catering at large (Mikkola, 2009a).

The prevalence of organic food in school contexts may be understood as an example of education for sustainable development (ESD), which is emphasised by the Finnish national strategy for sustainable development (Suomen kestävän kehityksen toimikunta, 2006). Furthermore, the Ministry of Environment (2009) recommends that sustainable public procurement and thus public catering would offer sustainable meals such as vegetable-based, seasonal and organic ones once a week in 2010 and at least twice a week by 2015 in governmental kitchens. Previously, Finland's national programme to promote sustainable consumption and production "Getting more from less" from 2005 proposed that the use of local and organic food

should be increased by 15% by 2015 and 25% by 2025 by catering industry[22]. Although not directly addressing school catering, these recommendations bear relevance in the educational context as well.

In Finland, young people encounter organic food on basic and upper secondary education levels in terms of teaching and learning and school meals. School meals are seen to be part of education, and they as well as class-room or outdoor education are regulated by National Core Curriculum and educational laws.

3.2 Organic food and sustainable development within national core curriculum

The Finnish National Board of Education, under the auspices of Ministry of Education, issued the current National Core Curriculum for Basic Education in 2004[23] and for General Upper Secondary Education in 2003[24]; the new Proposal for Core Curriculum for Basic Education (2010) is under development for 2020[25]. The basic education regards classes 1-9 and pupils of the ages 7-16 years. The general upper secondary school is planned for educational period of three years for pupils aged 16-19 years. The respective Core Curriculum includes the minimum of 75 courses to be passed before matriculation examination. The curriculum also includes cross-curricular themes as well as compulsory, advanced and applied courses (Eurydice, 2010; Opetushallitus, 2003; Opetushallitus, 2004; Uitto, 2009). In addition to the foundation of national curricula, there are school-specific implementations of the curricula and these may include locally chosen emphasis on cross-curricular themes and also include particular outdoor education activities. In order to enhance the quality of education, schools may also co-operate with particular external stakeholders and partners active in fields such as education, administration or economic life (Opetushallitus, 2003; Opetushallitus, 2004).

The education about sustainability as a generic topic and organic food as a particular topic are thus channelled through four educational routes; first, cross-curricular themes, second, the school subjects (basic education) and their courses (upper secondary education) and third, as a separate part, the pupil wellbeing, including among other things free school meals and the guidelines issued for these. As a fourth route there is the option for schools to emphasise particular cross-curricular themes and furthermore, to co-operate with external stakeholders to learn about respective societal developments.

Cross-curricular themes are considered central foci of current pedagogic and didactic work, the aims and content of which are dealt with by several school subjects. These themes integrate teaching and learning and respond to educational challenges of this era. The themes also express current societal stand regarding these challenges. The common aim for all cross-curricular themes is to enable the students to observe and analyse today's phenomena, to suggest grounded views for desirable future developments, to evaluate one's own way of life and current trends from the point of view of the future and to make choices for the future one prefers. Cross-curricular themes are dealt with and through all school subjects. (Opetushallitus, 2003)

In basic education, there are seven cross-curricular themes
1.Growth as a person

[22] http://www.ymparisto.fi/default.asp?contentid=149254&lan=en
[23] http://www02.oph.fi/ops/perusopetus/pops_web.pdf
[24] http://www.oph.fi/instancedata/prime_product_julkaisu/oph/embeds/47345_lukion_opetussuunnitelman_perusteet_2003.pdf
[25] http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2010/liitteet/okmtr01.pdf?lang=fi

2.Cultural identity and internationalism
3.Media skills and communication
4.Participatory citizenship and entrepreneurship
5.Responsibility for environment, well-being, and sustainable future
6.Safety and traffic
7.Technology and the individual

Furthermore, as a basic educational value and cross-curricular theme, Education for Sustainable Development (ESD) is to be considered in all school subjects such as mother tongue, foreign languages, mathematics, environmental and natural sciences, biology, geography, physics, chemistry, health education, religion, ethics, history, social studies, music, visual arts, crafts, physical education, home economics, and optional subjects. (Uitto, 2009)

Particularly the cross-curricular theme *Responsibility for environment, well-being, and sustainable future* has educational aims such as ***understanding*** the prerequisites for human well-being, the necessity of environmental protection, and the relationship between the two. L***earning to observe*** changes in the environment and in human well-being, ***to clarify*** the causes and consequences and ***to act*** for the living environment and the enhancement of well-being is intended. Furthermore, ***learning to evaluate*** the impacts of the consumption and daily practices, and ***adoption of*** the actions required for Sustainable Development (SD) are expected to be developed in the pupil. Also ***learning to promote*** well-being in one's own communities, ***understanding*** the threats and potentials of well-being at global level is looked for through education. U***nderstanding*** that through choices, individuals construct both their own futures and our common future means that ***the pupils will learn to act*** constructively for a sustainable future. (Opetushallitus, 2004; Uitto, 2009).

Within the cross-curricular theme *Responsibility for environment, well-being, and sustainable future* the core contents for primary schools are the ecologically, economically, culturally, and socially SD in one's own school and living environment as well as individual and community responsibility for the well-being of people and the condition of the living environment. Furthermore, core contents include environmental values and sustainable way of life and eco-efficiency in production, society, and everyday ways of acting. Product life-cycles, consumer behaviour, management of one's own household, and the consumer's means of influence build up toward the hoped-for future and the choices and actions this calls for (Opetushallitus, 2004; Uitto, 2009).

In the general upper secondary education, the cross-curricular themes follow similar lines of thought, only modified for students aiming at matriculation examination. The themes are as follows:

1.Active citizenship and entrepreneurship
2.Safety and well-being
3.Sustainable development
4.Cultural identity and knowledge of cultures
5.Technology and society
6.Communication and media competence

The educational aims for students state that students need to ***be familiar with the key factors*** of the ecological, economic, social and cultural dimensions of SD and ***understand*** that only simultaneous implementation all dimensions induces SD. The students ***know how to measure, assess and analyse*** changes occurring in the natural, cultural and social environments. They ***reflect*** the meaning of sustainable lifestyle, an environmentally friendly and eco-efficient production and society, a community and society reinforcing its social and cultural capital and a culture looking after its ecological basis over generations. Moreover, the students are ***able and willing to act*** for SD in their own everyday life and as students, consumers

and active citizens and ***to co-operate*** for a better future on local, national and international level.

Students also should ***learn to examine the challenges to SD from several points of view, such as exploring*** the effects of human activity on the environment and changes that have occurred in the way human beings adapt their environments during cultural evolution. A***nalysing*** global environmental hazards, their causes and means to correct the course of development belong to students' competences as well as ***examining*** problems related to population growth, poverty and hunger. ***Assessing*** the cycles of substances and energy in the environment and production systems and ***learning*** how to save energy and raw materials belong to students' capacities. ***Pondering*** on the characteristics of economic growth, not based on increasing consumption of energy and raw materials, and how the economic stability bears on environmental protection and people's well-being, are within student competencies. ***Studying*** business enterprises and technologies that fulfil the principles of SD and learning how to exercise the means of influence available to consumers are known to students. ***Determining*** the ways in which human activities can be adjusted to their environments with respect for cultural heritage and without endangering natural diversity is within students' capabilities as well as ***rehearsing*** the practices of sustainable lifestyles and ***examining*** their structural prerequisites. Finally, examples of successful practices will be incorporated into instruction and the general upper secondary school's everyday life. (Opetushallitus, 2003; Uitto, 2009). The student needs experiences about the effects and meaningfulness of h/er/is ethical, practical, societal and professional choices. To promote SD, the 'big picture' needs to be created about the extent of changes and co-operation necessary for developments to take place. The upper secondary may also run its own environmental or sustainability program as well as exhibit teaching and learning culture labelled by environmental awareness, which all support sustainable life styles (Opetushallitus, 2003).

While Education for Sustainable Development (ESD) is an extremely rich educational field with subject specific applications, food in general is dealt with by several schools subjects in basic education. In *mother tongue, foreign languages* everyday communication is needed and taught for eating meals. In *Environmental and natural sciences,* grades 1-4 pupils are taught about the origin of food stuffs and where food is produced. The pupils are instructed about day-to-day practices and habits that promote health, such as good nutrition and regular meals. *Health education,* grades 7-9, deals with healthy choices in daily living such as nutritional needs and problems in different situations, exemplified by the most common allergies and special diets. *Home economics,* grades 7-9, has objectives such as learning to perform basic tasks related e.g. to household in compatible ways with SD. In terms of Core Contents of Home Economics, nutrition and the food culture include nutritional recommendations and healthy food based on food quality and safety, basic methods of preparing food and meal planning. Furthermore, the curriculum mentions various eating situations in the Finnish food culture and current changes in food cultures. (Opetushallitus, 2004; Uitto, 2009).

In similar vein, in general upper secondary school the *mother tongue and foreign languages* include communication in everyday situations such as discussing dishes and food cultures while eating meals. Furthermore, nature and SD are topics for which vocabulary and conversation are taught in several foreign languages such as English, German, French and Spanish. *Biology education* consists of courses, one of which is Environmental ecology (BI3-course) dealing with sustainable future and ecologically sustainable primary production. Human biology (BI4-course) presents students structures, functions and significance of organ systems such as digestion and nutrition. Biotechnology (BI5-course) introduces plant and animal breeding and their ethics and relevant legislation. *Geography education* includes The common world (GE2-course), working out primary production and the environment; food production and supply, sustainable agriculture and fishery, as well as different forms of agriculture. The world of risks (GE-3 course) deals with issues such as regional risks, their intertwined causes and efforts to prevent them. *Health education* consists of Foundations of health (TE1-

course), presenting factors influencing working, functional abilities and food safety. Young people, health and everyday life (TE2-course) is a health-related course, discussing of cultural and social meanings of nutrition and topics such as weight control, health-related exercise and eating disorders. (Opetushallitus, 2003; Uitto, 2009).

3.3 School meals

Pupils' well-being is a topic in the laws pertaining to education and these also include implementation of the school meal: "The pupil who participates in instruction must be served every work day an appropriately organised and supervised, well-balanced free meal" (Law of Basic Education 628/1998, 31§[26]). "Full-time students have the right to have a free meal on those work days, during which the curriculum supposes students' presence in the place of instruction offered by the organizer of the education. A decree regulates full-time studies (Law of general upper secondary school 629/1998, 28§[27]). "Full-time students have the right to have a free meal on those work days, during which the curriculum supposes students' presence in the place of instruction offered by the organizer of the education. A decree regulates full-time studies" (Law of vocational education, 630/1998, 37§[28]). (Lintukangas et al., 2007)

School meal is an elementary pedagogic part of the school day and therefore considered equal with lessons. The concept of well-balanced meal sets requirements for the nutritional quality and diversity of the meal. The plate model presents a meal including one fourth of the plate area filled with potatoes, rice or pasta, one fourth with meat, poultry, fish or eggs and half with vegetables. Furthermore, the meal includes glass of low-fat or non-fat milk, and piece of bread with low-fat spread. These guidelines aim at securing one third of daily energy and nutrition intake by young people (Valtion ravitsemusneuvottelukunta, 2005; Valtion ravitsemusneuvottelukunta, 2008). The national guidelines of school meals cover the food culture, nutrition, daily social engagement in peaceful and aesthetically pleasing environment as well as education about table manners (Lintukangas et al., 2007; Manninen, 2009). Furthermore, particular criteria such as low fat and low salt and information criteria offer guidelines about school meals. The information criteria support the customers' orientation of meal compilation according to the guidelines. These 'model meals' are displayed from once to three times a week in the dining hall (Lintukangas et al., 2007).

The Handbook of School Meals (Lintukangas et al., 2007) deals with 'contact points' of professional kitchen work and sustainable development. The Handbook defines sustainable development and its goals as implemented through municipal environmental policies which direct the municipal administrational sectors' activities. The environmental scheme of professional kitchens includes food stuffs, cleaning and other chemicals as well as consumption of water and energy and finally waste disposal. Local food is suggested to be preferred, and packaging waste to be avoided. The environmental aspects of professional kitchens are seen to be of interest for young people, and to work as bridge to environmental education. (Lintukangas et al., 2007)

Environmental and sustainability schemes such as the Nordic Swan, Green Flag, OKKA-foundation and Environmental Diploma of the Church represent multicriteria certification systems, in which the use of organic food is more or less emphasised (Mikkola, 2010). They are based on points to be earned by implementing practical environmental activities, defined by the certifying body and include certification costs to be paid. Step-by-Step to Organic (Portaat Luomuun) established by EkoCentria[29] and supported by educational and administra-

[26] http://www.finlex.fi/fi/laki/ajantasa/1998/19980628
[27] http://www.finlex.fi/fi/laki/ajantasa/1998/19980629
[28] http://www.finlex.fi/fi/laki/ajantasa/1998/19980630
[29] http://www.ekocentria.fi

tional bodies, focuses on the use of organic food and is free for users, as based on in-house control system familiar from hygiene controls. Particularly the schemes of Green Flag and OKKA-foundation are developed for educational purposes for young people, but other schemes may be applied similarly according to educational interests. The number of schools associated with these programs draws probably near to 500, but not all of them necessarily use organic food; on the other hand, organic food is used without any information to customers. Furthermore, there are schools 'dedicated' to the use of organic food and thematic days and weeks of organic food in Finnish schools. (Mikkola, 2010)

3.4 Cases – educational approaches and activities

3.4.1 Textbooks, materials and websites

In Finland, teachers are able to choose the textbooks they prefer, and in addition there is material published by associations such as Finnish Association for Environmental Education and Finfood Luomu (The organic division of Finfood, a food information agency), to be used at schools. MTT Agrifood Research Centre Finland has established a science park for agriculture and the 4H Association organizes outdoor education on educational gardens and farms. Furthermore, teachers use project based education and use internet in search for relevant knowledge. The situation allows for a variety of educational materials and methods to be used, but text books represent a 'backbone' of content corresponding the educational aims and content of Core Curricula as interpreted by textbook authors.

As an illustration of basic education textbooks, the Book of Nature Biology and Geography (Honkanen-Rihu et al., 2004) for classes 5-6 contains an extensive review of primary production, human being, biota and forest as habitat and continents and cultures of the globe on its 393 pages. Primary production is dealt with production plants and the sugar, oil, protein and vitamins produced by plants. Wheat, barley, rye, oat, maize, rice, durra, potatoe, soy, cocoa palm and other globally important production plants are presented with their English names. Farming is explained as an interplay of habitat factors such as water, light and fertilizers which are controlled to some extent to support the growth of plants. Fertilizers are specified as manure, composted organic material and industrial ones, and green manure is explained as utilization of nitrogen fixing bacteria to enrich soil by nitrogen for plants' usage. Basic agricultural machinery is depicted and the food system from field to table is exemplified by potatoe chain – ending with (frozen) french fries, mashed potatoe and potatoe chips. The importance of imports of coffee, cacao and tee is referred to while Fair Trade as a support for farmers in developing countries is clarified. Furthermore, important production animals such as (Ayshire) cattle, sheep, goat and reindeer are described as well as species of poultry and fish. The concept of feed as food for production animals and the meaning of silage is dealt with as part of modern agriculture. Even game species are depicted and a controversial discussion excercise about hunting is suggested to be held among pupils. Wild mushrooms are grouped according to their usability as food and poisonous mushrooms are depicted. Wild berries such as blueberries and lingonberries are reminded of with the notice, that they are not made enough use of because pickers/gatherers are lacking. Finally, the book presents several species of weeds and their mechanisms of spreading, and continues with pests and plant diseases such as potato plague and grain fungus. The pest control is divided into the chemical one with herbicides and pesticides and into biological one with crop rotation and predators eating pests. Even though herbicides and pesticides are developed to kill weeds and pests, the book suggests that they are carried into crop plants to some extent as well. Furthermore, these chemicals are hazardous for health, and therefore their usage is controlled and limited. The increased biodegradability is claimed to decrease the possibility of their being carried into crop plants. The spoilage of food is explained as the result of

microbial activity, and preservatives, additives and vacuum packaging are listed as ways to increase keeping of the food. Moreover, organic food, local food and domestic food are dealt with as concepts and their labels are presented on the double-page spread. Organic food with ’Sun’ label and ’Ladybird’ label is accounted by controlled production, and approval of fertilizers and pesticides as well as only a few additives. The use of synthetic additives for organic food is prohibited, and in general, the book explains, organic food is a little more expensive than industrially produced food because the farmer’s crops are smaller. Finally, healthy nutrition is rather thoroughly accounted for by basic nutrients such as carbohydrates, fats, proteins, vitamines, minerals and fibres. The nutrition content of nearly 20 staples and the food circle is presented as guidelines for healthy eating. The book includes learning methods such as self-evaluation of one’s explanation of new concepts and practical experiments with various materials and discussions. The book also includes plenty of representative picture material.

The textbook ”Geography for school Finland” (Leinonen et al., 1996) for classes 7-9 offers an extensive outline of Finnish agriculture. The book deals with natural conditions, average farm sizes and yield levels in EU countries and their total agricultural area, production plants and animals as well as production lines and additional livelyhoods of farms. The relation of agriculture and environment has been touched upon by introducing the concept of sustainable development in agriculture, and organic farming as part of it. Particularly organic production is claimed to have given up of synthetic fertilizers and pesticides, and due to this, yields may decrease to some extent while prices increase respectively. The book suggests that consumers are willing to pay more for clean food products. The book deals shortly with the Baltic and explains it as an enclosed sea area, which is heavily polluted by organic waste, toxins, oil and nutrients as well as fertilizers. These factors cause eutrophication and increased levels of DDT and PCB in fish. Furthermore, the book focuses on industrial sectors, aspects of environmental protection such as waste materials and recycling, life cycle of products, and energy sources including hydropower, bioenergy, nuclear power, fossil fuels, wind and solar power. Finally the book discusses about ways to save energy.

The booklet ”Sustainable everyday tips for kitchen” by Finfood Luomu and SFS-Ympäristösertifikaatti presents the concept of sustainable every-day life in the kitchen by focusing on practical tips such as purchasing Swan labelled products, organic food labelled by ’Sun’ with some recipies, source separation and recycling, saving of energy and money. The booklet comments on prices of Swan labelled products by claiming that these are not more expensive than other ones and furthermore emphasises, that price of organic food becomes cheaper due to increased demand. Additionally, the selection and number of private label products increases. The basis for eventually higher prices is explained as season and lower crop levels, larger space for production animals and small scale production.

Finfood Luomu’s booklet ”Starting point organic” presents detailed information about organic agriculture and animal husbandry. The rules of animal husbandry, including natural proliferation and artificial insemination, minimum age for slaughtering, minimum space to allow species specific behaviour, organic feed and use of medicines under veterinarian’s control. The booklet explains the origin of organic wild berries mushrooms as gathered from a defined area not treated with fertilizers or pesticides during past three years. Furthermore, the booklet clarifies the allowed and prohibited use of additives and prohibition on radiation and GMO, which needs to be informed on the package. Finally, market shares of organic produce ranging from 0,3 in meat to 7,6 in eggs during 2005, 2006 and 2007 are presented for the reader.

In general upper secondary education the textbooks of the courses deal with sustainability and organic food in rather generic and theoretical level.

The compulsory course ”Biota” (BI 1) by Lahti et al. (2007) presents a broad overview of basic biological concepts such as theories of evolution, biotic divisions, ecosystems and their structure, food chains, webs and pyramids, flow of energy and materia as well as basic population ecology. The generalisation is presented that in natural ecosystems it is usual that about 10% of energy of each nutritional level becomes used by the next one.

The advanced course of Environmental Ecology (B 13) deals with sustainable production

The compulsory courses ”Blue Planet” (GE 1) and ”Common World” (GE 2) present by their textbook (Ervasti et al., 2005) of 323 pages extensive overview on natural resources, sustainable future and assist the reader with conceptual index including English terms. The natural resources are listed as renewable ones such as crop plants, production animals, fish and game, water, air and solar energy. Non-renewable resources are given as disposable ones such as fossil fuels and ore, and recyclable ones as metals and minerals. The book deals with a wide range of factors affecting the efficiency of agriculture, including natural conditions, cultural, political, jurisdictional, technological, infrastructure and capital aspects of production. The commercial agriculture and self-sufficient production are presented on the continuum between extensive and intensive agricultural production. The book accounts for negative environmental consequenses of intensive agriculture as ecotoxicolocal aspects, animal suffering, increase of pests due to monocultures and eutrophication as well as groundwater pollution by fertilizers. However, the particular form of extensive agriculture, the organic farming, is not explicitly named, whereas local food is mentioned as solution for more sustainable production. The chapter about sustanable future concludes the message of the book by presenting Millennium declaration goals, subgoals and their assessment by indicators. Think globally, act locally is printed on the last page.

The advanced course ”World of Risks” (GE 3) deals with global and country specific population growth curves. The global population’s nutrition needs and food production are dealt with by comparing threats and possibilities of agricultural production in terms of soils, cilamate, state conditions, world economy and other factors. The book compares efficiency of plant and animal based production in terms of food products such as bread, and presents concerns of growing global meat production per person while on the one hand, malnutrition prevails among nearly one billion people and obesity related diseases create costs in industria countries. Green Revolution is presented as succesfull but concern by governments for the food system is suggested to warrant nutrition and prevent conflicts.

Health education course “Foundations of health” (TE1) by Kannas et al. (2007) discusses at length about food and nutrition, with detailed and quantified information about nutrients, energy consumption and exercise by contrasting exercise with amount of particular foods, obesity, energy density of food and balancing one’s weight. The textbook also deals with various convictional diets but pays no attention to organic food.

The compulsory language course 6 in German (Mäkinen et al., 2005) ”Chansen und Risiken in unserer Umgebung” is meant for students learning the most advanced level of German; they may also choose additional three advanced courses. The textbook offers chapter titles such as ”not complaning but trading” and ”how about fair coffee”. Vocabulary includes terms such as sustainable development, environmental friendliness, climatic catastrophy, fair trade, local food, organic food and the familiar slogan ’think globally, act locally’! The textbook for advanced course 8 in German (Stude et al., 2006) ”From today to next morning” deals with the chapter titled ’nutrition for billions’ the vocabulary of malnutrition, global population growth and conditions of native producers, who mainly are women under enormous work load. The chapter call for support by international community.

On the home pages of National Board of Education there is web-based educational service for teachers[30] including additional educational materials for ESD about environmental awareness, climate change, biodiversity, energy consumption and use utilization of waste. The service also present case schools which have implemented ESD by particular activites, possibly using environmental schemes or self-developed approaches to promote ESD. Among 18 basic and 13 general upper secondary education case schools, the most common embodiment of EE or ESD was waste mangement and energy saving, and these activities were also linked with food. The schools implemented surveillance of food waste, organised ways to decrease the amount of biowaste and introduced biowaste collection points within premises. Food sale of extra food was developed to decrease the amount of food waste. Meals containing fish created more biowaste, and were advertised for their healthynes to counteract the trend. Composts were established and run by pupils. Learning about foreign food cultures took place in language education. There was particularly one school where food system was approached by learning of origin, transport, processing and disposing of food and organic food was used to some extent regularly at school. School gardens were established in order to learn agricultural work and to produce food for school kitchens.

3.4.2 iPOPY cases – educational approaches and activities

iPOPY research shows that the official views about EE and ESD are implemented by teachers in their every-day educational efforts. It seems that as teachers have degrees of freedom in their work, the teachers most committed to ESD are willing to deliver the extra effort this endeavour takes. Teachers may also emphasise other interests in ESD than food and focus heavily on energy, social sustainability or conflict resolution. However, there are also teachers who focus on other interests than ESD and teachers who experience their basic educational task so demanding that extra foci are left beyond their efforts. (Mikkola, 2009b)

In iPOPY research about ESD and organic food two of the three research case schools were certified by Green Flag. In one urban school, the headmaster wanted to include organic food as one aspect of ESD in school meals. After lengthy negotiations with local education administration, Agency of Rural Affairs responsible of the EU milk support and the catering company contracted for the service, the headmaster achieved the practice of serving Finnish and Swedish varieties of organic crisp bread and organic milk to pupils as part of the ‘well-balanced’ meal. This practice was informed about to both pupils and their parents. The educational practice was also visible in pupils’ drawings on the school walls depicting organic milk cartoons (Mikkola, 2009b).

As one more organisation-independent and less visible form of ESD, the school gardens have been used as horticultural educational platforms by several schools near the Helsinki region. The youth organization ‘4H’ (Head, Hands, Heart and Health for development towards responsible and enterprising adulthood) has been active in search for funding and organising the horticultural educational activities with teachers. In the school garden project, school gardens growing vegetables and flowers were established on the school premises by first building the beds, filling them with soil, sowing the seeds and later, looking properly after the beds. The vegetables were consumed by the school kitchen in meal preparation (Salo, 2010). Similar efforts have been in use in several schools in Finland (Laaksoharju, 2007).

An even deeper dive into practice has been enabled by pedagogic projects whereby farms have been used as educational stages. The School Goes to Farm (notion by Yli-Viikari, with MTT Agrifood Research Finland) project organised a farm-school network, allowing the pupils to participate in farm activities as ecological, economic, and socio-cultural in three production orientations; animal husbandry, grain production and forestry. The planning of edu-

[30] http://www.edu.fi/etusivu

cation was conducted by teachers and farmers together, and the site visits organised during the natural growth and working cycle on the farm. Even rather rare occupations such as beekeeping and traditional woodwork were demonstrated for the pupils. This kind of experiential education was able to offer a particularly strong connection with sustainable agriculture (Risku-Norja and Aaltonen, 2007).

3.4.3 Some conclusions

The education for sustainable development (ESD) offers a platform for teaching and learning about organic food in school; as a detailed topic, it seems to be inherently included in higher level educational areas and not to 'stand on its own'. However, the background information supports in positive ways the evaluation of organic food and presents concepts that enable the identification of its characteristics as clean quality food production. On the other hand, the background information also seems to set questions to organic farming, which takes place in the world of malnutrition, even famine, under pressure of developmental needs.

In the textbooks of basic and general upper secondary education, organic food is presented as a clear entity, identifiable by its labelling and explication of its production methods in relation to conventional, commercial and intensive agriculture. Furthermore, organic food is dealt with by textbooks of several disciplines, implementing the cross-curricular theme of sustainable development.

There are schools active in EE and ESD approaching organic food broadly both in teaching and learning as well as school catering and even gardens and farms. Often these schools run environmental schemes. However, these efforts present voluntary orientation chosen by teachers and young people. The educators emphasise generally learning by exploring, experiencing, testing and sharing the topic with others and in the context of external bodies such as businesses, research centres and associations. Therefore, the generic aims and content of ESD allow plenty of space for organic food as a transformative object of education. Transformative orientation is here understood as learning of concepts, application of critical analysis about societal developments and adoption of change agency in terms of food system.

There are several factors that complicate the work with organic food at school. First, the field of application of ESD is rather extensive allowing teachers to focus on a number of other topics and not so much on organic food. Even in the schools dedicated for environmental education (EE) and ESD, the topics of education may vary from energy saving and waste management to biodiversity of tropical biota. The co-operation with caterers in a situation of occupational 'overload' is demanding and not very many teachers engage with networking efforts to organize optional and outdoor education (Mikkola, 2009b). Furthermore, the organic food seems not be an issue within Finnish educational system, unlike the energy or waste issues. The system emphasises particularly scientific and humanistic as well as artistic achievements of students and focuses on good results in matriculation examination as a channel to further education. Rural areas or provincial towns with closer contacts with primary producers and smaller volumes of procured food seem to find themselves more enabled to use organic food in catering with small and medium sized suppliers (Mikkola, 2009b).

4 Education about organic food and sustainability in Italy

4.1 Introduction

Organic farming has been growing in Italy and consumption has increased especially in the Northern parts. The share of organic of total agricultural land was 7.9% and the share of the sales was 3% in 2008 (FiBL, 2010).

In Italy school meals are an important part of both education and health, and the educational purposes of school meals are recognized. School meals also have a function in protecting the local. Italy has been recognised as the country where public procurement strategies establish a clear priority for local and organic food. In 1999 the Italian government issued Finance Law 488, which had an important role in the development of organic and local food in Italian schools (Morgan and Sonnino, 2007). Most schools offer meal services that provide a warm lunch. Since year 2000 use of (some) organic food is compulsory in Italian schools. However, mayors infringing the law will not be prosecuted, so only a minority of municipalities serves regularly organic food[31]. Approximately 40 % of the school food (by weight) is organic. Italian regions have implemented ambitious laws and guidelines supporting the use of organic produce. More than 1 million Italian school meals including organic foods are served daily in Italian schools. Starting in the 1990s the Italian organic movement has worked for promoting organic school catering and organic farming to be included in the topic food education (Bocchi et al., 2008).

4.2 Organic food and sustainable development within national core curriculum

In Italy, overall responsibility for education lies within the Ministry of Education, University and Research (Ministero dell'Istruzione, dell'Università e della Ricerca)[32], which works at central level, while regional and provincial education offices work at local level. The reform of the Italian education system started with Law no. 53/2003. Since then, two governments, belonging to two opposite political coalitions, have been in power, with the consequence that the education system has been subjected to various reforms.[33]

[31] http://www.organicconsumers.org/organic/italy062804.cfm
[32] http://www.istruzione.it
[33] http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/national_summary_sheets/047_IT_EN.pdf

The education levels in Italy are: scuola primaria (primary school, six to ten years old); scuola media (lower secondary school, eleven to fourteen years old); and scuola superiore, liceo (upper secondary school, from age fourteen onwards).

Primary schools and lower secondary schools adopt National Guidelines (Indicazioni nazionali per i piani personalizzati delle attività educative) of 2004 together with Guidelines for the Curriculum (Indicazioni per il curricolo per la scuola dell'infanzia e per il primo ciclo di istruzione), issued in 2007 and introduced on an experimental basis in school year 2007/08 and school year 2008/09. In the next three school years (until 2011/12) the activities carried out by the schools will be monitored. The Guidelines of 2007 give greater importance to curricula instead of to personalised study programmes; education to active citizenship is considered as a goal for all subjects and not as a separate subject; definition of general learning objectives instead of analytically described learning objectives, in order to give more importance to school autonomy and to the professionalism of teachers in the planning of the curriculum. The guidelines are nationally determined and adapted to local needs by each school according to school autonomy. Teachers are free to choose textbooks and teaching methods.[34]

Upper secondary school is not compulsory in Italy. Central government determines basic curricula for each branch of general, vocational and technical upper secondary education and gives guidance on teaching methods. At present, the organisation of *licei* and of both technical and vocational institutes is under reform, according to law 133/2008. Core subjects common to all institutions are Italian, history, a modern foreign language, mathematics and physical education. Specialised courses (indirizzi) begin in the third year of upper secondary school.[35]

The general objectives of the educational process at primary school level are: to exploit of the child's experience; corporeity as a value; to express ideas and values of the experience; from empiric to formal categories; from ideas to life: the international comparison; the difference of people and cultures as a richness; to practise personal commitment and social solidarity. Specific learning objectives at primary school level have been defined for the following subjects in the National Guidelines of 2004: Italian, English language, history, geography, mathematics, science, technical education and ICT, music, art and drawing, sport and motory sciences, and catholic religion.[36]

Organic food and sustainable development are not explicitly included in the learning objectives for primary school (see Appendix 3). However, some of the learning objectives in geography and science are maybe relevant. Relevant learning objectives for geography include: "recognize changes humans have made to the environment", "recognize the main changes have had on regions and the nation, using photographs and maps" "identify issues related to human-environment over time"; and for science include: "understanding the necessity for complementarity and synergy for survival of humans and the environment" and "recognize local ecosystems and factors and conditions related to equilibrium".

As for the lower secondary school, general objectives of the educational process are: a school for integral education of the individual; a school that places young people in the world, a school for guidance; a school for identity, motivation and significance; a school to prevent

[34] http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/national_summary_sheets/047_IT_EN.pdf

[35] http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/national_summary_sheets/047_IT_EN.pdf

[36] http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_full_reports/IT_EN.pdf

uneasiness and make up for disadvantages; and a school for educational relationships. Specific learning objectives have been defined for the following subjects:, Italian, English language, a second foreign language, history, geography, mathematics, science, technical education, information and communication technology, music, art and drawing, sport and motory sciences, and catholic religion.[37]

In addition, teachers in primary and lower secondary schools are required to organize education to civil coexistence (citizenship education, traffic education, food education, health and affectivity education).

The reform of 2008 (law n. 169 of 30.10.2008) has introduced a new subject in all the schools, named "cittadinanza e costituzione" (citizenship and constitution) which includes environmental education and teaching democracy.[38]

Food education is an interdisciplinary voluntary topic, aiming at knowledge of traditional dishes, their tastes and agricultural crops, agro-food technologies, organic farming, nutrition and furthermore, sustainable consumption and production with ethical considerations such as fairly traded food. Commercial actors and local authorities supply some educational material and arrange lessons and voluntary projects in school. There is usually a focus on the quality of food, nutritional issues and traditional food. Education about sustainable consumption has not been provided in Italian schools, but today some Consumers' Associations have started with educational activities (Morgan and Sonnino, 2008; Spigarolo and Donegani, 2009; Vittadini, 2009).

The ongoing reform of curriculum for the mandatory schools (primary and lower secondary) has plans for food education. Following the European Council guidelines for developing health education in schools, the main objective of food education is wellbeing and health, and specifically: encourage awareness of the food-health relationship in order to develop a "food consciousness"; foster the implementation of healthy food-behaviours, mainly through knowledge and consumption of quality products, issued by sustainable practices and bond to tradition and local culture; promote the understanding of the agri-food system through the knowledge of relationships between production systems, food consumption, environment and society; and promote food education programs embracing different subjects such as history, culture and anthropology of food-man relationships

In Italy, organic food and sustainable development do not have important places in the curriculum. However, learning objectives for geography and science include environment and human-environment relationships. Ongoing reforms include changes in subjects like citizenship and constitution and food education, which may give room for integrating more organic food and sustainability in education.

4.3 Cases – educational approaches and activities

Educational activities on food in Italy include different levels of involvement: international campaigns (financed or co financed by EU or by International bodies); national campaigns (financed or co financed by IT Ministries or by National bodies); regional/local activities (financed or dominance by Regional/local bodies); and activities organized directly by the schools. For example, some schools have started with school gardens (Vittadini 2009) and Slow Food Italia arranges "Educazione del Gusto".

[37] http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_full_reports/IT_EN.pdf
[38] http://iostudio.pubblica.istruzione.it/web/28201/cittadinanza_e_costituzione

Examples of international campaigns (”Educare alla sicurezza alimentra” and “BioBenessere”) and regional activities (Piacenza) are described here as examples of educational activities in Italy.

4.3.1 ”Educare alla sicurezza alimentare” (Educate to food safety)

This campaign was carried out at the same time in 15 EU countries in 2001-2002. It was financed by DG 24 EU Commission and carried out in every country by Consumers’ Associations. In Italy ACU was the leader, and Codacons, ConfConsumatori, Lega Consumatori, Movimento Consumatori and VZS/CTCU were the supporters.

The main educational objectives were to promote the knowledge of the young consumers (6-18) about food safety and sustainable consumption. The slogan of the Italian campaign was: “Mangio sano, informato e soddisfatto” (I eat safe, informed and satisfied)[39].

As part of the campaign educational materials were produced. The most important ones were: didactical cards for the primary school (age 6-10 years); didactical cards for the lower secondary school (age 11-13 years); didactical cards for the upper secondary schools (age 14-19 years); posters; CD-ROM which contains an hyper textual version of all the materials and a website (www.mangiosano.org).

Over 250 local meetings were organized, involving groups of 20-50 teachers for each meeting, in all Italian regions. At the meetings the campaign was explained and materials were distributed directly to the teachers. This was seen as important for motivating the teachers to avoid waste. It was assumed that if the educational material would just be sent to the schools, it would not always reach the relevant teachers. An initial press conference was arranged to launch the campaign and a final convention to discuss the results was organized in Milan in July 2002. During and after the campaign there were discussions about food safety and an informal network between Municipalities, school canteens and Consumers’ Association was created. In the following years this network has undertaken the task to promote sustainable consumption.

4.3.2 “BioBenessere” (Bio-wellness)

The BioBenessere project was developed by Pro.B.E.R. (The Association of Biological and Biodynamic Producers of Emilia Romagna) in the context of EC Regulation 94/2002 (18 January 2002) “Actions to inform and promote agricultural products in the internal market” aims at underlining the intrinsic characteristics of biological agricultural products in terms of:
- quality
- food safety
- production methods
- nutrition and health
- labelling
- animal welfare
- environmental protection.[40]

As part of the BioBenessere project education of sustainable consumption and organic food was arranged to young consumers. The development of education of sustainable consumption was seen as a crucial theme in forming critical citizens. The project produced didactic cards (about 50 cards for each level) adapted for three school levels: primary school, secondary

[39] http://www.mangiosano.org
[40] http://www.bio-benessere.it

school, and high school. The cards covered some of the following themes: Organic farming, cereals, fruit and vegetables, milk, animal welfare, bread, pasta, pizza, oil, cheese yogurt, biodiversity.

4.3.3 Piacenza

In Piacenza, a municipality in Emilia Romagna, organic and local food is served at school meals. Food education starts with taste and peer education in first class in primary school (ages 6-11 years). The older classes (10-11 years) visit organic farms and learn to recognize organic foods.

BioPiace, a consortium of organic producers established in 2002, arrange educational programs to children about local food and organic food. They contact schools with information and then arrange lessons/presentations about local/organic food, farm visits, arrange competition. Participation is free for school. In 2008 approx. 2000 children aged 3-14 years participated.

5 Education about organic food and sustainability in Norway

5.1 Introduction

The organic food market has developed slowly in Norway compared to other European countries and organic food has had a marginal position outside the conventional food market, but during the last 10 years organic food has become more included in the conventional food system (Terragni et al., 2009). The share of organic of total agricultural land was 5% in 2008 and the share of the sales was 1% (FiBL, 2010). The share of sales is low, but sales have grown in the last few years[41].

In the school setting Norwegian pupils learn about organic food mainly through what is taught in the lessons because few schools provide food to the pupils. Most pupils bring a packed lunch from home and some subscribe to milk and fruit served at the school (Bugge, 2007; Løes et al., 2008). The proportions of organic milk and fruit are limited in the subscription schemes. Organic milk is only offered in one area and organic fruit is very limited and only delivered in a few municipalities. In addition, some municipalities have as part of different projects served children organic food (Løes, 2010).

5.2 Organic food and sustainable development within national core curriculum

The Norwegian Directorate for Education and Training, the executive agency for the Ministry of Education and Research, is responsible for the development of primary and secondary education. The Directorate for Education and Training is responsible for ensuring that sustainable development is integrated in curriculum guidelines and promoting development of appropriate learning resources in this field. The national curriculum gives the general guidelines for subjects to be covered in Norwegian schools.[42]

The Knowledge Promotion (Kunnskapsløftet) is the latest reform in the Norwegian school system introduced in 2006.[43] The reform covers primary, lower secondary and upper secondary education and training (grades 1-9 in 10-year compulsory school and for pupils in their first year of upper secondary education and training i.e. 11th grade). The goal of the Knowledge Promotion is to help all pupils to develop fundamental skills that will enable them to participate actively in the Norwegian society of knowledge. The Knowledge Promo-

[41] http://www.oikos.no/newsread/news.asp?n=5427&wce=
[42] http://www.utdanningsdirektoratet.no/Tema/In-English/Curriculum-in-English/
[43] http://www.regjeringen.no/en/dep/kd/Selected-topics/compulsory-education/Knowledge-Promotion/what-is-the-knowledge-promotion.html?id=86769

tion, with its special emphasis on outcome-based learning, is meant to help ensure that all pupils receive a differentiated education.

The Norwegian Directorate for Education and Training, the executive agency for the Ministry of Education and Research, is responsible for the development of primary and secondary education. The national curriculum gives the general guidelines for topics to be covered in Norwegian schools.[44] Organic food and sustainability may come under various topics, including the topics of food and health, natural science and social studies, which are the ones that explicitly include sustainability.

In the general part of the curriculum guideline for primary and lower secondary school, secondary school and adult education the following is said about the environmentally aware human being: "The interplay between economy, ecology and technology must make unique demands, scientific and ethical, on our age, if we are to ensure sustainable development. Education must therefore provide a broad awareness of the interconnection in nature and the interplay between humans and their habitat." The plan states the principles for education for sustainable development:

- working methods that activate pupils and challenge the pupil's fantasy and creativity
- interdisciplinary co-operation and holistic knowledge
- the local community is to be used as a learning arena
- ethical issues are to be emphasized
- student evaluation methods are to take into account a broad concept of knowledge.[45]

Organic food and sustainability may come under various subjects, including food and health, natural science and social studies, which are the subjects that explicitly include sustainability in the objectives (objectives and aims in Appendix 4).

Food and Health subject curriculum

Food and health is a compulsory subject in Norwegian primary (grades 1-7) and lower secondary (grades 8-10) schools.

The aim of the subject is the following: "food and health shall contribute to giving pupils insight into and the ability to choose and reflect critically on food and meals, thus giving them knowledge to deal with life in a practical sense, and on a social and personal basis. As a creative subject, food and health shall allow experimentation and development of critical judgment in connection with food and meals. Thus it may inspire pupils to use their competence outside school and in later life. As a practical subject the teaching in food and health shall stimulate pupils to prepare food and experience the joy of working, to acquire good working habits and to become critical consumers so they can take responsibility for food and meals at home, in recreation situations and in working life and social life. The teaching in the subject shall contribute to a lifestyle with awareness of what promotes good health." The subject is structured into three main subject areas: food and lifestyle, food and culture, and food and consumption. The competence aims after grade 7 for the subject area "food and consumption" include: Pupils shall be able to assess, choose and shop with environmental awareness. The competence aims after grade 10 for the subject area "food and consumption" include: Pupils shall be able to assess and choose foodstuffs based on ethical and sustainable criteria.[46]

[44] http://www.utdanningsdirektoratet.no/Tema/In-English/Curriculum-in-English/
[45] http://sustain.no/about/UDIR_Sustainable_development_jan07.pdf
[46] http://www.utdanningsdirektoratet.no/upload/larerplaner/Fastsatte_lareplaner_for_Kunnskapsloeftet/english/Food_and_health_subject_curriculum.rtf

The focus on organic food and sustainability varies from school to school depending on involvement in these themes in the municipality and among teachers. Some schools incorporate organic food into their curriculum and school environment more than the national teaching plan requires (Marley, 2008). Textbooks include themes related to organic food and sustainability (ethical and sustainable food consumption, food safety, and organic labelling) (Ask et al., 2006).

Natural science subject curriculum

Natural science is a compulsory topic in Norwegian primary education (grades 1-7), lower secondary education (grades 8-10) and programmes for general studies (Vg1). Sustainable development is included in the objectives of the subject: “Knowledge on, understanding of and experiences in nature can strengthen the will to protect natural resources, preserve biological diversity and contribute to sustainable development.”

Sustainable development is a main subject area in natural science in Vg1 (the first year) in programmes for general studies and lower secondary education programmes in upper secondary school.

Sustainable development
The aims for the education are that the pupil shall be able to

- describe succession processes in an ecosystem
- examine an ecosystem and assess where it is in the succession process
- elaborate on factors that influence the size of a population
- explain what is meant by the "look-before-you-leap" principle, uncertain knowledge and the concept of sustainable development, and give examples of these
- assess environmental principles for consumer choices and energy use
- select and describe some global conflicts of interest and assess the consequences these might have for the local population and the global community
- elaborate on how the international community is working on global environmental challenges
- provide examples of nature management and changes of natural environments that may have consequences for indigenous peoples in Norway and other countries.[47]

Social studies subject curriculum

The objectives of social studies include: “The purpose of the social studies subject is to help create understanding and belief in fundamental human rights, democratic values and equality, and to encourage the idea of active citizenship and democratic participation. The subject shall stimulate the development of knowledge on cultural diversity in the world in the past and the present, and an understanding of the relation between nature and man-made environments. The subject shall also help pupils to develop awareness that mankind is part of a historical context, and that a long chain of historical events has led us to become what we are today. This shall give the individual insight into on how society in general influences attitudes, knowledge and actions and how the individual can influence society and his or her own life situation.”

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http://www.utdanningsdirektoratet.no/upload/larerplaner/Fastsatte_lareplaner_for_Kunnskapsloeftet/english/Natural_science_subject_curriculum.rtf

Social studies have been structured into main subject areas: history, geography, sociology, individual and society, working and business life, politics and democracy, culture and international relations. International relations (which include globalisation, distribution of resources and sustainable development) are a main subject area in Vg1/Vg2 in upper secondary education.

International affairs
The aims for the education are that the pupil shall be able to

- define the concept of power and provide examples of how power is practised in the world
- explain the concept of globalisation and assess various consequences of globalisation
- provide examples of international cooperation and describe Norway's international involvement
- elaborate on the UN's activities for peace and human rights and explain the UN's role in the international activities for indigenous peoples
- elaborate on the EU's aims and governing bodies and discuss Norway's relationship to the EU
- use digital tools to find examples of different types of conflict in the world and present an international conflict and proposals for solving this conflict
- elaborate on why some countries are poor and some rich, and discuss measures to reduce poverty in the world
- elaborate on what characterises international terrorism and reflect on the causes of terrorism
- discuss relations between economic growth, the environment and sustainable development.[48]

Sustainability and environment – strategies and policies

Norwegian environmental policy recognises the role of education. In the Report to the Storting no. 21 (2004-2005) the importance of education is pointed out. The report states that: "Educational institutions are responsible for a significant proportion of knowledge development. The whole school system, including institutions that provide vocational training and higher education institutions, gives new generations knowledge, attitudes and skills that can be instrumental in bringing about sustainable development".[49]

The Ministry of Education developed a strategy for environment and development in the education system already for the period 1995-1999. Norway has participated in an OECD project called "Environment and School Initiatives" (ENSI) since 1986. School researchers and school administrators from many countries have participated in this project. The goal has been to find out whether environmental education is an appropriate instrument for school development at the pupil-, teacher- and school level.

In 2006, a document "Education for sustainable development" presenting the work of the Norwegian Directorate for Education and Training in the field of education for sustainable development in primary, lower secondary and upper secondary education was issued.[50] The purpose of this document was to clarify goals, priorities and activities for the time period

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http://www.utdanningsdirektoratet.no/upload/larerplaner/Fastsatte_lareplaner_for_Kunnskapsloeftet/english/Social_studies_subject_curriculum.rtf
49 http://sustain.no/about/UDIR_Sustainable_development_jan07.pdf
50 http://sustain.no/about/UDIR_Sustainable_development_jan07.pdf

2006-2010. The document is a contribution to Norway's implementation of the United Nation's Decade for Education for Sustainable Development (2005-2014), the European strategy for education for sustainable development developed under the auspices of UNECE (United Nations Economic Commission for Europe), and the Baltic-Nordic strategy Baltic 21E. The document links education in sustainable development with the strategy for strengthening math, science and technology, the strategy to improve children's environment for learning and development, the strategy for entrepreneurship and the strategy for information- and communication technology (ICT) in schools. A number of academic themes are pointed out to be central to education for sustainable development, but climate, environmental toxins, biological diversity and patterns of consumption are key issues. The following possible topics are described: refuse and recycling; biological diversity; participation and democracy; energy; consumption, resources and global distribution; outdoor recreation and experiences in nature; health; Conflicts of interest; climate and air quality; cultural heritage sites; nature areas; and water resources.

5.3 Cases – educational approaches and activities

In Norway children mainly bring a packed lunch from home (Bugge, 2007), and lunch is not defined as an educational activity. Therefore, the cases selected from Norway are restricted to educational material and activities that are available for use in teaching relevant subjects.

The Norwegian School Network (Skolenettet)[51] is a web based service for finding links relevant for subjects provided by the Norwegian Directorate for Education and Training. The consumer learning pages[52] aim at contributing to the actualization of consumer issues for schools. The pages are meant to be a meeting place where teachers and others interested can get ideas, examples and see opportunities to work with consumer issues in education as the curriculum requires. The site also aims at contributing to promoting the use of information and communications technology for teachers and students. One of the topics on the consumer learning pages is sustainable consumption, environment and ethics. Sources for education and links are included. One of the links is to Norwegian Environmental Education Network[53], an educational tool for sustainable development.

The Environmental Education Network[54] was established in order to support schools and to facilitate cooperation between schools, environmental authorities, research institutions and NGOs. The network encourages school curriculum, education plans and projects that include collaboration with the local community, action-oriented approaches, first-hand experiences and interdisciplinary strategies (Marley, 2008). The activities are related to the national curriculum. Using the website, pupils can find information about themes related to sustainable development and enter the results of their own work. The intention of the programme is, among other things, to promote co-operation and action-oriented learning in the local environment, and to integrate global perspectives. The school has the opportunity to present its work to the public and to exchange ideas and co-operate with other schools. Up-to-date environmental information is ensured by linking www.miljolare.no with www.miljostatus.no, the Ministry of Environment's website providing information on the Norwegian state of the environment. The Directorate for Education and Training co-operates with ministries including the Ministry of the Environment, Ministry of Children and Equality, and the Ministry of Agriculture and Food. Co-operation has also been initiated with organs such as the Norwegian Consumer Council, The Ideas Bank, Grønn Hverdag and Sabima.

[51] http://skolenettet.no/Default.aspx?epslanguage=EN
[52] http://skolenettet.no/moduler/Module_FrontPage.aspx?id=13289&epslanguage=NO
[53] http://sustain.no
[54] http://sustain.no and http://www.miljolare.no

Over 700 schools and kindergartens participate in the Green Flag program in Norway[55]. Green Flag co-operates with the Ministry of Education, Environmental Education Network and Ministry of Environment.

The brochure "YouthXchange – guidelines for a sustainable lifestyle" in Norwegian is patterned after the main English version produced by the United Nations Environmental Programme (UNEP) and UNESCO. YouthXchange is integrated into the United Nations Decade for Education for Sustainable Development 2005-2014. The brochure has been sent to all schools and is also available on the Environmental Education Network.

5.3.1 "Den Naturlige Skolesekken" (The Natural Rucksack)

The Natural Rucksack[56] (Den Naturlige Skolesekken) is a project focusing on nature, environment and sustainable development in basic education developed by the National Centre for Science in Education[57] in collaboration with the Ministry of Environment, Ministry of Education and an expert group. The Natural Rucksack is a resource bank for teachers, and invites to using environments outside the school as a learning arena. The natural Rucksack aims to develop curiosity and knowledge about nature, awareness of sustainable development and increased environmental commitment among all pupils and teachers in basic education.

In the spring of 2009 a trial with 11 schools was performed and 78 schools were awarded funds in the autumn of 2009 to participate.

The Natural Rucksack is anchored in the curriculum for basic education. The Natural Rucksack can be linked to the subject food and health. Harvesting from the forest, farm and garden will give students insight through active participation into how the food gets from land or sea to table. Students should be able to put together a nutrition-wise safe and good food in accordance with the recommendations.

By cultivating the food, collecting it from the nature, preparing it on fire and then comparing the home-made food with pre-bought food, the goal is that students (and teachers) together:
• reflect on the relationship between food, lifestyle and health.
• become familiar with different foods, branding and production
• have shown that it is possible to choose a lifestyle that takes into account the human and the environment.

5.3.2 School gardens

School gardens have been recognised to be good arenas for learning by doing in many subjects, including natural science, writing, mathematics, arts and crafts, ICT. Teachers can find information on websites on the Internet[58].

Bioforsk Organic Food and Farming Division has their own school garden and they also administer the website "www.bioforsk.no/skolehagen". The website has tips and support for starting school gardens. This is done in accordance with the learning goals of the national curriculum. The site shows how school gardens can be linked to several subjects and goals:

[55] http://www.fee.no/frame.asp?page=green&page_id=1020
[56] http://www.natursekken.no/
[57] http://www.naturfagsenteret.no/
[58] http://www.bioforsk.no/skolehagen and http://www.skolehage.no/.

Science
- Processes in nature
- Circulation of nutrients, nutrient household (e.g. rhizobiumbakterier)
- Interaction, such as roots / micro-organisms
- Diversity, one of the pillars of stable ecosystem
- Development and growth - from seed to seed, experience the "natural time"

Food and Health
- Make food and drink of own products, decorative food
- Knowledge about the legend of plants

Gym
- Good working technique
- Physical endurance

Norwegian, English and other foreign languages
- Log writing, oral and written presentations

Arts & Crafts
- Sewing work clothes, craft birdhouses, building tepees, design garden (aesthetics), create flower decorations
- Drawing and painting

Mathematics
-Area, quantity, kg, price, convenient bill, construction (geometry) and map understanding.

Social Studies
-Old traditions, agricultural development, food distribution, sustainable food production.

Music
-Poetry, songs to their own texts, dramatization, creating instruments, and songs related to nature, earth, animals, and plants.

Other
Teaching in the school garden is environmentally creative, encourages collaboration and allows for using many pedagogical angles. In addition, the school garden, an excellent venue for adapted teaching.

Teaching tips include cooking lessons, research, and contact with the community, and pizza garden.

The website ”www.skolehage.no” is administered by the Norwegian Society for the Conservation of Nature with support from the Norwegian Directorate for Education and Training. The website includes information, ideas, support, courses, news, recipes, external links (education, food, environment and health, etc)[59] and teaching material, among these Økoskole[60]. Økoskole, which is based on the Swedish Ekoskolan material and administered by KRAV[61], is adapted to Norwegian context. In Norway, the Økoskole website and material are financed by the Norwegian Agricultural Authority (SLF), aimed at pupils in grades 5 to 10, provides teaching material including booklets for pupils, teachers guide and fact sheets:

[59] http://www.skolehage.no/index.php?option=com_weblinks&catid=18&Itemid=23
[60] http://www.skolehage.no/matskole/
[61] http://www.krav.se/System/Spraklankar/In-English/KRAV-/

To 5-11-year-olds:
A leaflet with stories about organic food. Fact sheets in PDF with pictures from the leaflet.

Education on organic food, grades 7-10:
A leaflet for pupils, teachers' guide with assignments and topics for further study. The material is aimed at being used in science, social science, Norwegian, food and health, and cross curricular projects.

Fact sheets (for age 12 years and older):
Fact sheets on organic agriculture (topics: food safety, energy consumption, climate, biological diversity, pesticides, egg and chicken, cereals, milk, apples, carrots) developed by Bioforsk Organic Food and Farming Division. Free downloading

Økoskole (grades 6-9)
Interactive education material. Pupils learn about how food becomes organic through being a farmer for one day. The material is aimed at being used in ICT, science, Norwegian, food and health etc.

Eat S.M.A.R.T (for age 12 years and older)
Information and education material that shows how you can eat food that is good both for the body and the environment. The material can be used for teaching food, environment and health and can be used as introduction for cross curricular educational activities. Consists of 21 slides and texts.

Living learning
Information on practical education where pupils can experience and learn about how food is produced. Education can happen at farm visits[62] or in school gardens.

[62] more about the farm as a pedagogiocal resource, for example at http://livinglearning.org/InEnglish.htm

6 Concluding remarks

The national curriculum defines what is taught in the schools and is the main structure in planning education in schools, and thus also a central factor to be considered in planning education about organic food and sustainability. When dealing with sustainability and organic food in education, it is important to negotiate between several subjects how to mutually adapt and organise education of these issues; they are both extensive like sustainable development and more detailed like organic food.

Organic food was not explicitly mentioned and included in learning objectives in any of the four countries (Denmark, Finland, Italy and Norway). However, sustainable development was in some of the countries included in general aims of education, cross-curricular themes or learning objectives for some specific subjects, including natural science, geography, home economics and food and health education. For example, in Denmark the grade specific learning goals in science, biology, geography and home economics were explicitly linked to sustainable development. In Finland, responsibility for environment, well-being and sustainable future is a cross-curricular theme in basic education, and sustainable development is a cross-curricular theme in upper secondary education. In Norway, sustainable development was included in the learning objectives of natural science, social studies and food and health. In Italy, where the national curriculum is being reformulated and also regional policies and planning has an important role, sustainable development is included in learning objectives in science and geography. Therefore, linking organic food with sustainable development and emphasizing the role of organic food as part of sustainable development could be recommended. Sustainability is a theme that is suitable for integrating several subjects such as science, health, history, social sciences and math and for a whole school approach and for tying school lessons to real world.

Certification (e.g. Green Flag or Eco Schools) and international programs may also be important in initiating education in specific topics. For example, sustainable development has been tied to education by the United Nations, and many countries have included it in their education policies. UNESCO leads the United Nations Decade of Education for Sustainable Development (2005-2014). The following goals have been issued for Education for Sustainable Development (ESD):

- Education for sustainable development should permeate all curriculum plans and not constitute a separate subject
- The education should help establish the values and principles underpinning sustainable development
- The education should stimulate critical thinking and problem solving
- The education should be based on methodological diversity to promote the learning process
- Students and pupils should themselves participate actively in decisions about the methods to be used
- The education should address local as well as global topics[63].

[63] http://sustain.no/about/UDIR_Sustainable_development_jan07.pdf

These goals seem to build on educational theories and developments that emphasize education that support critical thinking and active participation. Similar types of goals were found in the national curricula in the countries included in the report.

Various educational activities are available in the four countries both in text books, leaflets and on the Internet. The countries where school meals are part of education (Finland and Italy) have one more arena where different issues related to food can be taught. School meals as everyday practices can be used as platforms for learning by doing. Plate models similar to those used in Finland used in teaching eating behaviour for children (Valtion ravitsemusneuvottelukunta, 2008) could moreover function as basis of co-operation between food educators and caterers.

Other recommendations include that cultural factors need to be considered when planning food education, activities and learning processes (Roos, 2009). For example, Italian food culture is closely related to local identity and there is a link between organic and local food (Morgan and Sonnino, 2007). In Finland, local food has been extensively used by public catering organizations (Isoniemi et al., 2006; Risku-Norja et al., 2010) and the organic food particularly as locally produced food items has a recognised position within Finnish catering for sustainability (Mikkola, 2009a).

For teachers the perceptions of educational benefits and fit with the curriculum and learning objectives are important when they choose to adopt and integrate topics and activities. Education for sustainable development will profit from a more hands on and experiential approach. Farm-to-school programs and school gardens include or focus on experiential and educational activities, involvement, authentic learning experiences, and the use different senses. A study of US youth community gardens suggest that garden programs positively impact food choice, social skills, nutrition knowledge and cooking skills. Participants appreciated other individuals and cultures (Lautenschlager and Smith, 2007). Furthermore, building up something like a school garden by concerted efforts seems to decrease disorderly conduct among young people (Salo, 2010).

It has been pointed out that there are risks of educational environments becoming marketized. Many education policies and activities, such as farm-to-school programs are employing the rhetoric of neoliberal governmentality, including personal responsibility and individual success, consumerism, and choice (Allen and Guthman, 2006). However, there are also environments whereby responsibility and enterprising examples are welcome in education, such as the 4H youth organization's principles in Finland. The school needs to remain the environment for developing critical thinking, particularly to marketizing (Bridges, 2008).

This report has been limited to iPOPY countries (Denmark, Finland, Italy and Norway). There is also activity in organic school food and education about organic food and sustainable development in other European countries, for example, UK and the Netherlands (Morgan and Sonnino, 2007; Morgan and Sonnino, 2008; Sargant and van der Burg, 2006). Moreover, the biggest European national markets for organic food exist in Germany, France and UK (FiBL, 2010) where education about sustainable development and organic food may raise further interest. Therefore, it would be useful in future studies about education for sustainability and organic food to include also some of these countries.

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Appendix 1 National curriculum - Denmark

Source: National curriculum: Common goals 2009 (BEK nr 748 af 13/07/2009): https://www.retsinformation.dk/Forms/R0710.aspx?id=125973

Natur/teknik

§ 13. Formålet med undervisningen i natur/teknik er, at eleverne opnår indsigt i vigtige fænomener og sammenhænge samt udvikler tanker, sprog og begreber om natur og teknik, som har værdi i det daglige liv.

Stk. 2. Undervisningen skal i vidt omfang bygge på elevernes egne oplevelser, erfaringer, iagttagelser, undersøgelser og eksperimenter og medvirke til, at de udvikler praktiske færdigheder, kreativitet og evne til samarbejde. Undervisningen skal vedligeholde og fremme elevernes glæde ved at beskæftige sig med natur, teknik, livsbetingelser og levevilkår samt deres lyst til at stille spørgsmål og lave undersøgelser både inde og ude.

Stk. 3. Undervisningen skal medvirke til, at eleverne udvikler forståelse for samspillet mellem menneske og natur i deres eget og fremmede samfund samt ansvarlighed over for miljøet som baggrund for engagement og handling. Undervisningen skal skabe grundlag og interesse hos eleverne for det videre arbejde med fagene biologi, fysik/kemi og geografi.

Bilag 18

Natur/teknik

Slutmål efter 6. klassetrin

Den nære omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive, sortere og anvende viden om materialer og stoffer og deres forskellige egenskaber samt det levende og det ikke levende
– beskrive planter og dyr samt forklare deres funktioner, livsbetingelser og samspil med omgivelserne
– beskrive vigtige kropsfunktioner og væsentlige faktorer, der påvirker disse, samt anvende viden om forhold, der har betydning for menneskets sundhed
– gøre rede for fænomener, der knytter sig til vejret og årstiderne
– kende og beskrive lokalområdet, bl.a. ved brug af kort og kunne anvende viden herom i andre sammenhænge.

Den fjerne omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– finde ligheder og forskelle mellem levevilkår og livsbetingelser for planter, dyr og mennesker i det nære og det fjerne

– forholde sig kritisk til informationer om naturfaglige forhold fra medierne
– redegøre for dyr, planter og menneskers levevilkår og indbyrdes samspil forskellige steder på Jorden
– anskue fordelingen af land og hav, landskaber, klimazoner og plantebælter som regionale og globale mønstre
– beskrive og sammenligne vigtige regioner og lande i vores egen og andre verdensdele
– sammenholde indsigt i solsystemets opbygning og Jordens bevægelser med fænomener, de selv har oplevet
– anvende hovedtræk af Jordens og livets udvikling til belysning af naturens mangfoldighed.

Menneskets samspil med naturen

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– færdes i naturen på en hensigtsmæssig og hensynsfuldt måde
– kende til forskellige natursyn og beskrive eksempler på naturanvendelse og naturbevarelse samt interessemodsætninger knyttet hertil
– kende begrebet bæredygtighed og kunne redegøre for eksempler på, at menneskets forbrug af ressourcer og anvendelse af teknologi påvirker kredsløb i naturen og vurdere, hvilke konsekvenser det har for planter, dyr og mennesker
– kende træk af teknologiens historie og anvendelse samt følgevirkninger for planter, dyr og mennesker
– vurdere eksempler på miljøproblemer lokalt og globalt på baggrund af egen indsigt.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– formulere relevante spørgsmål, opstille hypoteser og modeller som grundlag for både praktiske og teoretiske undersøgelser
– planlægge, designe og gennemføre iagttagelser, undersøgelser og eksperimenter
– vælge og anvende udstyr, redskaber og hjælpemidler, der passer til opgaven samt organisere forløbet, når det foregår individuelt eller i grupper
– ordne og vurdere data
– konkludere ud fra iagttagelser, undersøgelser, datasøgning, dataopsamling, faglig læsning og interview både på skolens område og uden for dette
– formidle resultater af egne og andres data på flere forskellige måder
– formidle fagligt stof, modeller og teorier med relevant fagsprog
- forholde sig kritisk til informationer på nettet.

Trinmål efter 2. klassetrin

Den nære omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– sortere og navngive materialer og stoffer fra dagligdagen efter egne kriterier og enkle givne kriterier, herunder form, farve, funktion og anvendelse
– undersøge ændringer af stoffer og materialer fra dagligdagen, herunder is der smelter, vand der fryser, vand der fordamper og sukker der opløses
– undersøge hverdagsfænomener, herunder farver, lys og lyd
– beskrive udvalgte dyr og planter fra nærområdet, kende deres navne og kunne henføre dem til grupper
– kende udvalgte planters og dyrs livscyklus gennem året
– kunne beskrive en plante ved rod, stængel, blad og blomst
– kende naturområder, hvor navngivne planter og dyr lever
– kende menneskets sanser og enkle regler for sundhed
– kunne forbinde de forskellige årstider med vigtige begivenheder i naturen
– undersøge enkle forhold vedrørende vejret, herunder temperatur og nedbør

– beskrive vigtige funktioner og steder i lokalområdet: hvor vi bor, hvor vi handler, hvordan vi kommer rundt, hvor vi arbejder, og hvor der er natur
– kende enkle kort, enkle signaturer og verdenshjørnerne.

Den fjerne omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– kende til kategorier af dyr, herunder vilde dyr, husdyr, kæledyr, fortidsdyr og fantasidyr
– fortælle om, hvordan dyr præsenteres i medier og reklamer
– kende udvalgte dyr og planter fra andre verdensdele
– kende udvalgte dyr og planter fra forskellige naturområder
– kende udvalgte eksempler på menneskers levevilkår i andre dele af verden
– kende signaturer for land, sø, hav og bjerg ved brug af atlas og kort
– fortælle om årstider, sol og måne samt ændringer i længde på dag og nat.

Menneskets samspil med naturen

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdig-

– heder, der sætter dem i stand til at
– tage hensyn til planter, dyr og natur og vise det gennem egen adfærd ved ikke at kaste affald i naturen, og når der holdes smådyr i fangenskab
– give eksempler på ressourcer, der indgår i dagligdagen, herunder vand, fødevarer, elektricitet og affald.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– formulere enkle spørgsmål og udføre enkle undersøgelser, herunder: hvad er ting lavet af, hvilken temperatur har vandet fra hanen, hvor kan vi finde regnorme, hvorfor regner det?
opleve og gøre iagttagelser som grundlag for at gennemføre enkle undersøgelser og eksperimenter

– anvende udstyr, redskaber og hjælpemidler, herunder simple fælder til dyr, lup, termometer og kort
– ordne resultater og erfaringer på forskellige måder
  – formidle resultater og erfaringer med relevant fagsprog på forskellige måder, ved fortælling, tegning, udstilling eller fremvisning.

Trinmål efter 4. klassetrin

Den nære omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– sortere og beskrive materialer som metal, plast, sten og affald efter faglige kriterier
– undersøge og skelne om ændringer i stoffer er endelig, eller om de kan gendannes, herunder omdannelse af vand mellem de tre tilstandsformer, opløsning af salt og forbrænding af stearinlys
– kende forskellige materialer og stoffers oprindelse, brug, genbrug og bortskaffelse og kende til nedbrydning, herunder formuldning og rustdannelse
– kende flere navne på dyr og planter samt de vigtigste kendetegn, der henfører dem til systematiske grupper
– kende dyrs og planters forskellige levesteder og livsbetingelser, herunder behov for føde, luft, lys, vand og temperatur
– stille spørgsmål til planters og dyrs bygning og levevis ved brug af begreberne fødekæde, tilpasning, livsbetingelser

– fortælle om menneskets kropsfunktioner, fx åndedræt og fordøjelsessystem
– kende oxygen, kuldioxid samt næringsstofferne protein, fedt og kulhydrat
– beskrive enkle og vigtige regler for sund levevis
– bruge enkle fagudtryk i beskrivelsen af vejriagttagelser, herunder temperatur, vindstyrke, nedbør og sigtbarhed
– redegøre for karakteristiske træk ved lokalområdet, herunder opdeling i land, by og trafikårer
– kunne anvende enkle kort, faglige signaturer og verdenshjørnerne.

Den fjerne omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive og give eksempler på dyr og planter fra forskellige verdensdele, herunder hvordan dyr og planter får opfyldt deres livsbetingelser som vand, lys, næring og temperatur på forskellige levesteder
– beskrive og give eksempler på menneskers levevilkår i andre kulturer på forskellige udviklingstrin i forhold til egne levevilkår
– kende forskellige klimazoner og plantebælter på tematiske kort, herunder hvad der kendetegner de fire klimazoner og deres plantebælter, herunder typiske husdyr
– kende eksempler på menneskers levevilkår i forskellige klimazoner
– give eksempler på, hvordan medier formidler viden om naturen, herunder hvordan der formidles viden om vejr, sundhed og naturkatastrofer
– kende de syv verdensdele og kunne udpege dem på et verdenskort
– kende udvalgte stednavne på regioner og lande i vores egen del af verden, herunder Norden og Europa
– kende geografiske forhold, der er karakteristiske for udvalgte regioner og lande i vores egen verdensdel, herunder kunne aflæse vigtige oplysninger om landets natur
– kende månens bevægelse omkring Jorden og Jordens bevægelse omkring solen og forbinde dette med oplevede dagligdags fænomener, herunder årets og døgnets længde og årstider, månens faser
-kende hovedtræk af Jordens og livets udvikling.

Menneskets samspil med naturen

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– give eksempler på naturanvendelse og naturbevarelse lokalt og globalt, herunder skovdrift, landbrug og fredning
– give eksempler på samfundets anvendelse af ressourcer og teknik, herunder hvordan vi producerer elektricitet, varme og papir
– kunne sortere affald i forskellige fraktioner som organisk affald, glas, papir, metal og kemikalieaffald
– beskrive forskelle og ligheder på redskaber og apparaters udformning og anvendelse til forskellige tider.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– formulere spørgsmål og fremsætte hypoteser på baggrund af iagttagelser, oplevelser og mindre undersøgelser
– gennemføre og beskrive undersøgelser og eksperimenter
– arbejde hensigtsmæssigt med forskellige undersøgelsesmetoder og udstyr indendørs og udendørs samt anvende faglig læsning
– sammenligne resultater og data af både praktiske og mere teoretiske undersøgelser gennem tegninger, diagrammer, tabeller, digitale billeder eller lydoptagelser
-formidle - mundtligt og skriftligt - data fra egne undersøgelser og eksperimenter med relevant fagsprog på forskellige måder og med forskellige medier.

Trinmål efter 6. klassetrin

Den nære omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– sortere, udvælge og anvende materialer og stoffer, både syntetiske og naturskabte
– undersøge og vurdere stoffernes forskellige egenskaber, herunder styrke, isolerings- og ledningsevne samt muligheder for genbrug
– kende forskel på det levende og det ikke-levende ud fra enkle kriterier
– undersøge, hvordan nye egenskaber fremkommer, når forskellige materialer og stoffer bruges sammen, blandes sammen eller brænder
– kende til, at alt stof i verden består af et begrænset antal grundstoffer og kende få grundstoffers navne, herunder kulstof, oxygen, hydrogen og jern
– kende til vigtige stoffers og materialers anvendelse, genbrug og kredsløb
– undersøge og beskrive hverdagsfænomener, herunder elektricitet og magnetisme
– sammenholde forskellige danske planters og dyrs levesteder og deres tilpasning hertil
– forbinde en plantes dele med deres hovedfunktioner, herunder blomst og frøsætning
– kunne forklare hovedtræk af dyrs og planters samspil ved fotosyntese og ånding med vægt på udveksling af kuldioxid og oxygen
– sammenligne en dansk biotop med en tilsvarende et andet sted i verden
– beskrive vigtige menneskelige organsystemer, herunder kredsløb og væsentlige faktorer, der fremmer en sund livsstil
– kunne sammensætte et sundt måltid og vælge gode motionsformer
– kunne læse og i store træk vurdere varedeklarationer på almindelige levnedsmidler og slik
– begrunde valg, der fremmer egen sundhed og trivsel
– sammenligne egne data og observationer med en vejrudsigt
– anvende kort, både ældre og nye til informationssøgning om områdets udvikling, herunder gøre sig tanker om, hvordan lokalområdet kunne ændre sig.

Den fjerne omverden

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive og give eksempler på forhold, der har betydning for dyr og planters tilpasning til forskellige livsbetingelser, herunder vand, lys, næring, næringssalte og temperatur
– sammenligne og beskrive de forskelle i levevilkår, mennesker har forskellige steder på Jorden
– sammenligne oplysninger fra tematiske kort og den virkelighed, de repræsenterer
– sammenligne geografiske forhold og globale mønstre, der er karakteristiske for udvalgte regioner og andre verdensdele
– redegøre for, hvorledes naturkatastrofer opstår og påvirker planter, dyr og menneskers levevilkår
– forholde sig til mediernes fremstilling af naturfaglige forhold og vurdere informationerne på baggrund af egen og andres viden
– kende udvalgte stednavne på regioner og lande i verden, herunder stednavne for verdens brændpunkter, kæmpebyer og verdenshavene
– sammenholde viden om regionale og globale mønstre med viden om levevilkår for mennesker, dyr og planter
– gøre rede for hovedtræk af solsystemets opbygning
– redegøre for hovedtræk af Jordens og livets udvikling
– beskrive forhold, der har betydning for livets udvikling, herunder variation, ændring af levesteder og naturlig udvælgelse
– kende til pladetektonik og fænomener, der har sammenhæng hermed.

Menneskets samspil med naturen

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– kende til skrevne og uskrevne regler om at færdes sikkert og hensynsfuldt i naturen

– kende til forskellige natursyn og kunne redegøre for naturanvendelse og naturbevarelse lokalt og globalt og interessemodsætninger, der knytter sig hertil
– give eksempler på bevarelse af naturområder og byudvikling
– redegøre for eksempler på ressourcer og anvendelse af teknik, der har betydning for menneskers levevilkår, herunder vand, energi og transport
– give eksempler på, hvordan samfundets brug af teknologi på et område kan skabe problemer på andre områder som vand/spildevand og energiforsyning/forurening
– anvende begrebet bæredygtighed og give eksempler på bæredygtig udvikling
– give eksempler på, hvordan ændringer i anvendelse af teknologi har indvirket på planter, dyr og mennesker
– kende til miljøproblemer lokalt og globalt samt give eksempler på, hvordan disse problemer kan løses, herunder forslag til spareråd i forbindelse med brug af vand og el og i forhold til anvendelse af vedvarende energi.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– formulere spørgsmål, fremsætte hypoteser og lave modeller som grundlag for undersøgelser
– planlægge, designe og gennemføre undersøgelser og eksperimenter med udgangspunkt i åbne og lukkede opgaver
– designe og bygge apparater og modeller efter egne ideer og redegøre for form, funktion og hensigt
– kategorisere undersøgelsesresultater og sammenfatte enkle regler, herunder at alt levende indeholder vand, og at metaller er gode ledere for strøm og varme
– formidle - mundtligt og skriftligt - egne og andres data fra undersøgelser, eksperimenter og faglig læsning med relevant fagsprog og brug af forskellige medier
– forstå og anvende grafisk information i form af enkle diagrammer og kurver.

Biologi

§ 15. Formålet med undervisningen i biologi er, at eleverne tilegner sig viden om organismer, natur, miljø og sundhed med vægt på forståelsen af grundlæggende biologiske begreber, biologiske sammenhænge og på vigtige anvendelser af biologi. Undervisningen skal give eleverne fortrolighed med naturvidenskabelige arbejdsformer og betragtningsmåder og indblik i, hvordan biologi - og biologisk forskning - i samspil med de andre naturfag bidrager til vores forståelse af verden.

Stk. 2. Undervisningen skal anvende varierede arbejdsformer og i vidt omfang bygge på elevernes egne iagttagelser og undersøgelser, bl.a. ved laboratorie- og feltarbejde. Undervisningen skal udvikle elevernes interesse og nysgerrighed over for natur, biologi, naturvidenskab og teknik og give dem lyst til at lære mere.

Stk. 3. Undervisningen skal bidrage til, at eleverne erkender, at naturvidenskab og teknologi er en del af vores kultur og verdensbillede. Elevernes ansvarlighed over for natur, miljø og sundhed skal videreudvikles, så de får tillid til egne muligheder for stillingtagen og handlen i forhold til spørgsmål om menneskets samspil med naturen – lokalt og globalt.

Bilag 20

Biologi

Slutmål efter 9. klassetrin

De levende organismer og deres omgivende natur

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– kende og beskrive udvalgte organismer, deres systematiske tilhørsforhold, livsytringer og tilpasninger til forskellige livsbetingelser
– kende til opbygning og omsætning af organisk stof, stofkredsløb og energistrømme
– kende karakteristiske danske og udenlandske økosystemer
– redegøre for grundlæggende forhold i arvelighed, evolution og artsdannelse.

Miljø og sundhed

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive og forklare væsentlige kropsfunktioner
– kende forskellige faktorer, der påvirker menneskets sundhed
– beskrive menneskers anvendelse af naturgrundlaget samt inddrage perspektiver for bæredygtig udvikling
– forholde sig til aktuelle miljøproblemer og deres betydning for menneskets sundhed og den omgivende natur.

Biologiens anvendelse

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– undersøge og forklare almene biologiske processer i fødevareproduktionen
– vurdere forskellige interesser knyttet til syn på og anvendelse af dyr
– forklare vigtige principper for naturpleje og naturgenopretning
– forholde sig til bioteknologiers anvendelse og betydning for den enkelte, samfundet og naturen.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– identificere og formulere relevante problemstillinger samt opstille hypoteser
– planlægge, gennemføre og vurdere undersøgelser og eksperimenter i naturen og laboratoriet
– læse, forstå og vurdere informationer i faglige tekster
– anvende informationsteknologi i forbindelse med informationssøgning, dataopsamling, bearbejdning og formidling
– kende eksempler på biologisk forskning, der har udvidet menneskets erkendelse
– anvende et hensigtsmæssigt fagsprog
– formidle resultatet af arbejdet med biologiske problemstillinger
– skelne mellem baggrund for og hensigt med forskellige digitale informationer.

Trinmål efter 8. klassetrin

De levende organismer og deres omgivende natur

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– kende udvalgte organismer og deres placering i fødekæder samt anvende begreber om deres livsytringer, herunder fødeoptagelse, respiration, vækst, formering og bevægelse

– beskrive udvalgte danske organismer og deres systematiske tilhørsforhold, bl.a. i kategorier af leddyr, bløddyr og hvirveldyr samt frøplanter og sporeplanter
– beskrive Jordens inddeling i klimazoner og plantebælter og give eksempler på arters tilpasning til forskellige typer af levesteder og livsbetingelser *(fælles med geografi)*
– give eksempler på og sammenligne forskellige arters tilpasninger i bygning, funktion og adfærd i forhold til føde, næringsstoffer, vand, oxygen og temperatur
– kende levende cellers bygning og funktion
– forklare forskellen mellem dyre- og planteceller, såvel i flercellede som encellede organismer
– gøre rede for hovedtræk ved fotosyntese og respiration, herunder disse processers betydning i økosystemer *(fælles med fysik/kemi)*
– beskrive hovedtræk af vand og kulstofs kredsløb i naturen *(fælles med fysik/kemi og geografi)*
– give eksempler på naturlige og menneskeskabte ændringer i økosystemer og deres betydning for den biologiske mangfoldighed
– sammenligne væsentlige forhold i udvalgte danske og udenlandske økosystemer
– give eksempler på gener som bærere af biologisk information og deres betydning for arvelighed
– kende funktionen af ukønnet og kønnet formering på celle- og organismeniveau, herunder menneskets forplantning
– kende hovedtræk af evolutionen, herunder vigtige begreber som fødselsoverskud, konkurrence, tilpasning, mutation, variation, isolation og selektion.

Miljø og sundhed

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive funktionen af og sammenhængen mellem skelet, muskler, sanser og nervesystem
– redegøre for vigtige funktioner af indre organer og deres indbyrdes samspil, herunder optagelse af næringsstoffer og energi samt bortskaffelse af affaldsstoffer
– kende nerve- og hormonsystemet samt deres funktion
– give eksempler på, hvordan livsstil og levevilkår påvirker menneskets sundhed
– give eksempler på, hvordan kroppen forsvarer sig mod bakterier og vira
– redegøre for, hvordan forskellige erhverv, herunder landbrug, er afhængige af naturgrundlaget

– give eksempler og forklaringer på, at forskellige dyrkningsmønstre er afhængige af og har indflydelse på naturforholdene *(fælles med geografi)*
– give eksempler på de økologiske udfordringer, der er forbundet med at producere bæredygtigt på grundlag af naturressourcer
– give eksempler på aktuelle lokale og globale miljø- og sundhedsproblemer.

Biologiens anvendelse

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– forklare fødevareproduktion i relation til biologiske processer og principper
– forklare vigtige biologiske processer knyttet til fødevareforarbejdning, herunder gæring, fremstilling af mejeriprodukter og konservering
– redegøre for menneskets syn på og brug af produktionsdyr, kæledyr og dyr i fangenskab
– give eksempler på naturpleje og naturgenopretning
– give eksempler på, hvordan bæredygtig udvikling indgår som led i naturforvaltningen
– kende til grundvandsdannelse i Danmark og forhold, der har indflydelse på vores muligheder for at indvinde rent drikkevand *(fælles med fysik/kemi og geografi)*
– kende forskellige typer af bioteknologi
– kende vigtige metoder inden for genteknologi, herunder gensplejsning og kloning samt vurdere metoderne i forhold til naturlige processer.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– skelne mellem holdningsmæssige og faktuelle udsagn
– formulere relevante spørgsmål og hypoteser
– læse og forstå informationer i faglige tekster
– planlægge, gennemføre og evaluere enkle undersøgelser og eksperimenter i forskellige biotoper og i laboratoriet
– anvende enkelt udstyr til undersøgelser og eksperimenter i naturen og i laboratoriet, herunder mikroskop, stereolup samt udstyr til analyse af fysiske og kemiske forhold
– anvende it-teknologi til informationssøgning, dataopsamling, kommunikation og formidling *(fælles med fysik/kemi og geografi)*
– give eksempler på, hvordan biologisk viden bliver til gennem eksperimenter, systematiske undersøgelser og tolkning af data
– kende eksempler på naturhistoriske fortællinger, som har udvidet menneskets erkendelse
– præcisere biologiske erkendelser og sammenhænge ved brug af relevant fagsprog
– forklare om biologisk viden og indsigt erhvervet gennem forskellige former for vidensøgning, herunder egne undersøgelser.

Trinmål efter 9. klassetrin

De levende organismer og deres omgivende natur

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– anvende viden om udvalgte organismer og deres livsytringer i forhold til deres placering i fødenet og tilpasning til levesteder

– klassificere hvirveldyr og deres gruppering inden for fisk, padder, krybdyr, fugle og pattedyr samt udvalgte leddyr, herunder hovedgrupper af insekter
– redegøre for udvalgte gruppers livscyklus, herunder insekter og deres udvikling fra æg til voksen
– forklare sammenhængen mellem forskellige arters tilpasning i bygning, funktion og adfærd i forhold til forskellige typer af levesteder og livsbetingelser samt forholdet til andre organismer
– kende forskellige celletyper og deres funktion, herunder nerve- og muskelceller samt kønsceller

– gøre rede for udvalgte græsnings- og nedbryderfødekæder
– beskrive den biologiske betydning af energistrømme samt udvalgte kredsløb i forskellige økosystemer
– beskrive hovedtræk af nitrogens kredsløb i naturen og problemer, der knytter sig til brug af nitrogenholdig gødning i moderne landbrugsformer *(fælles med fysik/kemi)*
– forklare årsager og virkninger for naturlige og menneskeskabte ændringer i økosystemer og deres betydning for den biologiske mangfoldighed
– kende nogle økologiske forskelle på udvalgte danske og udenlandske økosystemer, herunder betydningen af klimaforhold, jordbundsforhold, økosystemets alder og årstider
– redegøre for grundlæggende forhold i arvelighed, herunder betydningen af dna
– kende sammenhængen mellem dna, gener og proteiner
– redegøre for hovedtræk af Jordens tilblivelse, de grundlæggende betingelser for liv og naturvidenskabelige forestillinger om Jordens og livets udvikling *(fælles med fysik/kemi og geografi)*
– redegøre for livets opståen og evolution i en naturvidenskabelig sammenhæng, herunder artsdannelse
– give eksempler på, hvordan biologisk mangfoldighed kan påvirkes af geografiske og fysik-kemiske forhold.

Miljø og sundhed

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– forklare sammenhænge mellem muskler, lunger og blodkredsløb under fysisk aktivitet samt væsentlige træk ved kroppens energiomsætning
– forklare fødens sammensætning, dens energiindhold og sundhedsmæssige betydning, herunder proteiner, kulhydrater og fedtstoffer *(fælles med fysik/kemi)*
– forklare vigtige reguleringer af det indre miljø gennem hormonsystemet, herunder reguleringen af blodsukker og væskebalance
– forklare den biologiske baggrund for sundhedsproblemer knyttet til livsstil og levevilkår
– kende til biologiske virkninger og anvendelser af ioniserende stråling *(fælles med fysik/kemi)*
– give eksempler på den biologiske baggrund for udvalgte forebyggelses- og helbredsmetoder
– kende virkningen af vaccination og behandling med antibiotika, herunder udvikling af resistens
– vurdere anvendelse af naturgrundlaget i perspektivet for bæredygtig udvikling og de interessemodsætninger, der knytter sig hertil *(fælles med fysik/kemi og geografi)*
– forklare årsager, betydning og foranstaltninger i forbindelse med miljø- og sundhedsproblemer såvel lokalt som globalt
– vurdere aktuelle løsnings- og handlingsforslag vedrørende miljø- og sundhedsproblemer samt analysere tilhørende interessemodsætninger.

Biologiens anvendelse

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– vurdere konsekvenser for dyr, planter og natur ved udvalgte produktionsformer, herunder konventionelle og økologiske
– give eksempler på anvendelse af mikroorganismer
– give eksempler på, hvordan anvendelse af dyr både kan påvirkes af biologisk viden og af følelser
– forklare den biologiske baggrund for udvalgte naturplejeindgreb og naturgenopretninger, herunder hensynet til biologisk mangfoldighed
– give eksempler på og vurdere fordele og risici ved anvendelse af moderne bioteknologi, herunder anvendelsen af genmodificerede organismer
– forklare vigtige typer af genteknologi anvendt på forskellige organismer, herunder mennesket
– debattere mulige konsekvenser ved at ændre på menneskers arveanlæg i såvel krops- som kønsceller.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– formulere og genkende relevante biologiske problemstillinger
– opstille og afprøve naturfaglige hypoteser på baggrund af egne undersøgelser

– læse, forstå og vurdere informationer i både trykte og digitale faglige tekster
– give forslag til biologiske eksperimenter og systematiske undersøgelser i forbindelse med spørgsmål om natur, miljø og sundhed
– designe og gennemføre relevante undersøgelser og vælge udstyr, der passer hertil
– formulere konklusioner på grundlag af egne og andres resultater
– videreudvikle og eksperimentere med anvendelsen af it-baserede hjælpemidler i arbejdet med og formidlingen af biologiske emner og problemstillinger i naturen og i laboratoriet
– anvende it til søgning af data og informationer om relevante biologiske problemstillinger
– give eksempler på resultater af nyere biologisk forskning, som har betydning for menneskets erkendelse og livsvilkår
– anvende biologiske begreber og viden om biologiske processer i forskellige sammenhænge
– formidle resultater og konklusioner af arbejdet med biologiske emner og problemstillinger gennem brug af alsidige metoder

Geografi

§ 14. Formålet med undervisningen i geografi er, at eleverne tilegner sig viden om vigtige naturgivne og kulturskabte forudsætninger for levevilkår i Danmark og den øvrige verden. Eleverne skal tilegne sig grundlæggende geografisk viden som baggrund for forståelse af geografiske begreber og sammenhænge og viden om samfundenes udnyttelse af naturgrundlag og ressourcer. Undervisningen skal give eleverne fortrolighed med natur- og kulturgeografiske arbejdsformer og betragtningsmåder og give dem indblik i, hvordan geografi - og geografisk forskning - i samspil med de øvrige naturfag bidrager til vores forståelse af verden.

Stk. 2. Undervisningen skal anvende varierede arbejdsformer og i vidt omfang bygge på elevernes egne iagttagelser og undersøgelser bl.a. ved feltarbejde og brug af geografiske kilder. Undervisningen skal udvikle elevernes interesse og nysgerrighed over for natur- og kulturgeografi, naturvidenskab og teknik og give dem lyst til at lære mere.

Stk. 3. Undervisningen skal bidrage til elevernes forståelse af fremmede kulturer, og til at de erkender natur- og kulturgeografiens bidrag til vores verdensbillede. Elevernes ansvarlighed over for naturen og brugen af naturressourcer og teknik skal videreudvikles, så de får tillid til egne muligheder for stillingtagen og handlen i forhold til spørgsmål om menneskets samspil med naturen – lokalt og globalt.

Bilag 19

Geografi

Slutmål efter 9. klassetrin

Regionale og globale Mønstre

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– give eksempler på naturgeografiske mønstre, kredsløb og sammenhænge på regionalt og globalt plan
– beskrive den globale befolknings- og storbyfordeling
– give eksempler på regionale og globale mønstre i forbindelse med økonomi, produktion, ressourceforbrug, bæredygtighed, miljø og forurening.

Naturgrundlaget og dets udnyttelse

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive det indre og ydre geologiske kredsløb
– beskrive vigtige forhold ved vejr, klima og klimaforandringer på Jorden
– beskrive, hvordan is, vand og vind kan forme landskaber
– beskrive og forklare sammenhængen mellem landskab, klima, jordbund og vand som grundlag for levevilkår i verdens forskellige egne
– give eksempler på menneskets udnyttelse af naturgrundlaget set i sammenhæng med bæredygtighed.

Kultur og levevilkår

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– kende vigtige navne som holdepunkt for et nationalt og globalt overblik
– beskrive og forklare vigtige forhold, der påvirker befolknings- og byudvikling med udgangspunkt i danske forhold
– beskrive og forholde sig til menneskers levevilkår i eget og andre samfund
– kende til de interkulturelle og mellemmenneskelige relationer
– vurdere de miljømæssige konsekvenser af samfundenes udnyttelse af naturgrundlaget
– give eksempler på globalisering, årsager hertil og konsekvenser heraf
– give eksempler på årsager til internationale konflikter begrundet i geografiske forhold.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– undersøge regioner, globale mønstre og problemstillinger samt samspillet mellem disse ved hjælp af geografiske kilder og hjælpemidler
– anvende globus, kort - herunder digitale kort og satellitbilleder - samt elektroniske data som et arbejdsredskab til at skabe overblik og sammenhæng
– foretage undersøgelser, målinger og registreringer på grundlag af egne iagttagelser og oplevelser i natur- og kulturlandskabet
– læse, forstå og vurdere informationer i faglige tekster
– anvende informationsteknologi i forbindelse med informationssøgning, undersøgelser, registrering, bearbejdning og fremlæggelse
– anvende et hensigtsmæssigt geografisk fagsprog
– skelne mellem baggrund for og hensigt med forskellige digitale informationer.

Trinmål efter 8. klasse

Regionale og globale mønstre

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– placere de væsentligste elementer i det globale vindsystem, herunder polarfronte, passatvinde og ITK (den intertropiske konvergenszone)
– beskrive det globale vandkredsløb
– beskrive og forklare Jordens inddeling i klimazoner og plantebælter og give eksempler på arters tilpasning til forskellige typer af levesteder og livsbetingelser *(fælles med biologi)*
– beskrive fordeling af bjerge, dybgrave, vulkaner og jordskælv på Jorden
– kende til den globale befolknings tilvækst og fordeling
– kende til fordelingen af verdens storbyer
– beskrive industrilokalisering i forhold til råstoffer, arbejdskraft, transport og markeder i både i- og ulande
– kende til fordeling af rige og fattige regioner i verden.

Naturgrundlaget og dets udnyttelse

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– give eksempler på årsager til og sammenhænge mellem pladetektonik, bjergkædedannelse, vulkanisme og jordskælv
– kende processerne i et geologisk kredsløb: forvitring, erosion, transport, aflejring og bjergartsdannelse
– anvende enkle fysiske begreber og sammenhænge i beskrivelsen af fænomener der knytter sig til vejr og klima, herunder vands tilstandsformer, temperatur, tryk, luftfugtighed, gnidningselektricitet og vindhastighed *(fælles med fysik/kemi)*
– kende til naturlige klimasvingninger og menneskets påvirkning af Jordens klima – herunder hvorledes CO_2 udledes og indgår i naturen
– beskrive hovedtræk af vands og kulstofs kredsløb i naturen *(fælles med fysik/kemi og biologi)*
– give eksempler på is, vands og vinds erosions-, transport- og aflejringsformer og deres betydning for landskabers udformning
– kende til dannelsen af det danske istidslandskab og anvende enkle begreber til at beskrive landskabsformer, herunder hævet havbund, smeltevandsslette, moræne- og dødislandskaber
– give eksempler og forklaringer på at forskellige dyrkningsmønstre er afhængige af og har indflydelse på naturforholdene *(fælles med biologi)*
– kende til grundvandsdannelse i Danmark og forhold, der har indflydelse på vores muligheder for at indvinde rent drikkevand *(fælles med biologi og fysik/kemi)*
– kende til forekomst og udnyttelsen af råstoffer i Danmark og andre regioner.

Kultur og levevilkår

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– kende navne på væsentlige danske og udenlandske lokaliteter og deres placering
– kende til urbanisering og byers opbygning og funktioner i Danmark og andre industrilande
– kende til befolkningsudvikling i lande med forskellige udviklingstrin - den demografiske transitionsmodel
– sammenligne egne levevilkår med levevilkår i fattige lande, kende til begrebet bruttonationalprodukt (BNP) samt en typisk erhvervsudvikling i henholdsvis rige og fattige lande
– sammenholde regioners erhvervsmæssige og økonomiske udvikling med levevilkårene
– kende til egen kultur set i forhold til fremmede kulturer
– kende til udnyttelse af naturlige råstoffer
– kende til fødevareproduktion
– kende til energiproduktion lokalt, regionalt og globalt, herunder fossilt brændsel, atomenergi og vedvarende energi
– kende til de miljømæssige konsekvenser af samfundenes forbrugsmønstre
– kende til regional og global handel, infrastrukturer og kommunikationsformer samt udveksling af
– tjenesteydelser og arbejdskraft
– kende til konflikter om grænsedragninger forskellige steder i verden
– kende til politiske, militære og økonomiske samarbejder mellem lande samt deres rolle i forbindelse med konfliktløsning, herunder sammenslutninger som EU, NATO, Verdensbanken og FN.

Arbejdsmåder og tankegange

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– beskrive levevilkår i forskellige regioner ved hjælp af geografiske kilder og hjælpemidler som oplevelser, fortællinger, billeder, film, kort, tekster, elektroniske medier og statistikker

Hjemkundskab, herunder som valgfag

§ 11. Formålet med undervisningen i hjemkundskab er, at eleverne gennem alsidige læringsforløb tilegner sig kundskaber og færdigheder, der gør dem i stand til at handle og agere i deres eget liv.
Eleverne skal opnå praktiske færdigheder, æstetiske erfaringer og forståelse af egen og andres madkultur, af madens, husholdningens og forbrugets samspil med samfundsfaktorer samt af områdets betydning for ressource- og miljøproblemer og for sundhed og livskvalitet for den enkelte og andre.

Stk. 2. Gennem æstetiske, praktiske, eksperimenterende og teoretiske opgaver skal eleverne have mulighed for at udvikle selvværd, fantasi, livsglæde og erkendelse, så de i fællesskab med andre og hver for sig får lyst til og bliver i stand til at tage kritisk stilling og handle i det private liv og i samfundet.

Stk. 3. Undervisningen skal forberede eleverne til at tage del i og medansvar for problemstillinger vedrørende mad, husholdning og forbrug i relation til kultur, sundhed og livskvalitet samt bæredygtighed. Undervisningen skal lægge op til, at eleverne oplever værdien af et fællesskab og samarbejde, der bygger på ligeværd og demokrati.

Bilag 15

Hjemkundskab

Slutmål 4./5./6./7. klassetrin

Sundhed

Kost, ernæring, hygiejne

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– redegøre for energibehov og energigivende stoffers, fibres, vitaminers og mineralers ernæringsmæssige betydning
– vurdere, planlægge og tilberede dagskost, måltider og retter ud fra kostanbefalinger og digitale kostberegninger
– redegøre for mikroorganismers forekomst, betydning, vækstbetingelser og spredning samt have en forståelse af de almindeligste opbevarings- og konserveringsprincipper
– anvende almene hygiejneprincipper ved tilberedning, opbevaring og konservering af fødevarer.

Kultur- æstetik – livskvalitet

Madlavning og måltider

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– tilberede fødevarer efter grundlæggende madlavningsteknikker og -metoder
– sammensætte og tilberede enkle retter og måltider, der er kendetegnende for forskellige situationer, historiske perioder og kulturer
– planlægge indkøb og arbejdsproces
– få en forståelse af mad og måltider i et socialt, kulturelt og historisk perspektiv
– eksperimentere med fødevaresammensætninger og krydringer med henblik på at skabe æstetiske indtryk og udtryk
– reflektere over og sætte ord på sansemæssige oplevelsers samspil med følelser, individuelle erfaringer og kultur samt det æstetiske i forbindelse med fødevarer og måltider
– tage stilling til madens og måltidets betydning for sundhed og livskvalitet for én selv og for andre.

Samfund – ressourcer og miljø – etik

Fødevarer, forbrug, hygiejne

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– sætte navne på almindeligt anvendte råvarer/fødevarer og inddele dem i fødevaregrupperne
– eksperimentere med ingredienser og metoder med henblik på at få indsigt i fødevarers madtekniske egenskaber
– vurdere en vare ud fra en varedeklaration og have kendskab til mærkningsordninger
– få en forståelse af fødevarers vej fra jord til bord (oprindelse, sæson, produktion, distribution, indkøb, anvendelse og bortskaffelse)
– analysere forskellige fødevaregruppers kvalitet i forhold til smagsmæssige og madtekniske egenskaber, sundhed, miljø, etik og pris
– kende til forbrugerens rettigheder og pligter i forhold til indkøb og anvendelse af varer
– analysere faktorer, der styrer vores forbrug, kostvaner og husarbejde herunder udviklingen i vareudbud, teknologi og markedsføring, tid, kræfter og ressourcer i hverdagen samt kulturelle og æstetiske aspekter
– forklare madens, forbrugets og hygiejnens/husholdningens betydning for miljø og for sundhed og livskvalitet
– anvende principper for bæredygtig husholdning i forbindelse med indkøb, madlavning, opvask, rengøring, vask og affaldshåndtering
– tage kritisk stilling som forbruger og til vilkår for at leve bæredygtigt og med både sundhed og livskvalitet.

Fagets virksomhedsformer

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– opleve med alle sanser, fortolke egne oplevelser, udvikle fantasi og kreativitet og udtrykke sig æstetisk og skabende
– arbejde praktisk, eksperimenterende og håndværksmæssigt
– forklare, forstå, anvende, analysere og vurdere viden af fagteoretisk art
– kommunikere om og handle i forhold til fagets æstetiske, etiske, praktiske og teoretiske problemstillinger.

Bilag 16

Hjemkundskab som valgfag

Slutmål efter 8. og 9. klassetrin

Sundhed

Kost, ernæring, hygiejne

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– forklare energibehov og energigivende stoffers, fibres, vitaminers og mineralers og sekundære stoffers betydning for sygdom og sundhed
– anvende viden om ernæring til sammensætning og vurdering af måltider ud fra forskellige kostanbefalinger og digitale kostberegninger
– forholde sig til aktuelle problemstillinger om kost og ernæring

– forklare forskellige mikroorganismers forekomst, betydning, vækstbetingelser og spredning samt den mikrobiologiske baggrund for opbevarings- og konserveringsmetoder
– anvende almene hygiejneprincipper, herunder personlig hygiejne, ved tilberedning, opbevaring og konservering af fødevarer
– forholde sig til hygiejneproblematikker i fødevareproduktionen

Kultur- æstetik – livskvalitet

Madlavning og måltider

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– tilberede fødevarer efter grundlæggende madlavningsteknikker og -metoder
– sammensætte og tilberede retter og måltider, der er kendetegnende for forskellige situationer, historiske perioder og kulturer
– planlægge indkøb og arbejdsprocer
– analysere og vurdere mad og måltider i et socialt, kulturelt og historisk perspektiv
– eksperimentere med fødevaresammensætninger og krydringer med henblik på at skabe æstetiske indtryk og udtryk
– reflektere over og sætte ord på de sansemæssige oplevelsers samspil med følelser, individuelle erfaringer og kultur samt anvende æstetiske kriterier i forbindelse med fødevarer og måltider
– tage stilling til madens og måltidets betydning for sundhed og livskvalitet for én selv og for andre.

Samfund – ressourcer og miljø – etik

Fødevarer, forbrug, hygiejne

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– eksperimentere med ingredienser og metoder med henblik på at få indsigt i fødevarers madtekniske egenskaber
– vurdere en vare ud fra en varedeklaration og kunne gøre rede for udvalgte mærkningsordninger
– analysere forskellige veje for fødevarer fra jord til bord (oprindelse, sæsonproduktion, distribution, indkøb, anvendelse og bortskaffelse) i forhold til sundhed, miljø og etik
– vurdere forskellige fødevarers kvalitet i forhold til smagsmæssige og madtekniske egenskaber, sundhed, miljø, etik og pris
– kende til forbruger- og fødevarelovgivning og til institutioner på området
– tage stilling til egne behov og ønsker og til indflydelsen af faktorer, der styrer vores forbrug, kostvaner og husarbejde, herunder teknologi- og samfundsudvikling, vareproduktion, medier og markedsføring tid, kræfter og ressourcer i hverdagen samt kulturelle og æstetiske aspekter
– forklare madens, forbrugets og hygiejnens/husarbejdets betydning for miljø og for sundhed og livskvalitet.
– anvende principper for bæredygtig husholdning i forbindelse med indkøb, madlavning, opvask, rengøring og vask samt affaldshåndtering
– forholde sig til sammenhænge mellem miljø og sundhed
– tage kritisk stilling som forbruger og til vilkår for at leve bæredygtigt med både sundhed og livskvalitet.

Fagets virksomhedsformer

Undervisningen skal lede frem mod, at eleverne har tilegnet sig kundskaber og færdigheder, der sætter dem i stand til at

– opleve med alle sanser, fortolke egne oplevelser, udvikle fantasi og kreativitet og udtrykke sig æstetisk og skabende
– arbejde praktisk, eksperimenterende og håndværksmæssigt
– forklare, forstå, anvende, analysere og vurdere viden af fagteoretisk art
– kommunikere om og handle i forhold til fagets æstetiske, praktiske, teoretiske og etiske problemstillinger.

Appendix 2 National curriculum - Finland

Source:
Perusopetuksen opetussuunnitelma 2004

1. luku Opetussuunnitelma

1.1 Opetussuunnitelman laatiminen

Opetussuunnitelman perusteet on kansallinen kehys, jonka pohjalta paikallinen opetussuunnitelma laaditaan. Opetuksen järjestäjällä on vastuu opetussuunnitelman laadinnasta ja kehittämisestä. Opetussuunnitelmassa päätetään perusopetuksen kasvatus- ja opetustyöstä ja täsmennetään perusteissa määriteltyjä tavoitteita ja sisältöjä sekä muita opetuksen järjestämiseen liittyviä seikkoja. Perusopetuksen opetussuunnitelmaa laadittaessa tulee ottaa huomioon esiopetuksen opetussuunnitelma ja perusopetuksen yhtenäisyys sekä muut kunnassa tehdyt lapsia, nuoria ja koulutusta koskevat päätökset.

Valtakunnalliset ja paikalliset perusopetusta koskevat päätökset muodostavat perusopetusta ohjaavan kokonaisuuden. Nämä päätökset ovat

- perusopetuslaki ja -asetus
- valtioneuvoston asetus perusopetuslaissa tarkoitetun opetuksen valtakunnallisista tavoitteista ja perusopetuksen tuntijaosta
- esi- ja perusopetuksen opetussuunnitelman perusteet
- opetuksen järjestäjän hyväksymä opetussuunnitelma
- opetussuunnitelmaan perustuva perusopetusasetuksen 9. §:n mukainen vuosittainen suunnitelma.

Opettajan tulee opetuksessaan noudattaa opetuksen järjestäjän vahvistamaa opetussuunnitelmaa.

Opetussuunnitelma voidaan laatia siten, että siinä on kuntakohtainen osio, alueittaisia tai koulukohtaisia osioita sen mukaan kuin opetuksen järjestäjä päättää. Perusopetuksen opetussuunnitelman yhtenäisyys edellyttää eri opettajaryhmien yhteistyötä opetussuunnitelmaa laadittaessa. Oppilaan huoltajien on voitava vaikuttaa varsinkin opetussuunnitelman kasvatustavoitteiden määrittelyyn. Myös oppilaita voidaan ottaa mukaan opetussuunnitelmatyöhön.

Opetussuunnitelma tulee oppilashuoltoa sekä kodin ja koulun yhteistyötä koskevalta osalta laatia yhteistyössä kunnan sosiaali- ja terveydenhuollon toimenpanoon kuuluvia tehtäviä hoitavien viranomaisten kanssa.

1.2 Opetussuunnitelman sisältö

Perusopetuksen opetussuunnitelmasta tulee ilmetä seuraavat seikat sen mukaan kuin opetuksen järjestäminen edellyttää mm.:

- arvot ja toiminta-ajatus
- yleiset kasvatuksen ja opetuksen tavoitteet
- opetuksen mahdollinen eheyttäminen
- aihekokonaisuuksien toteuttaminen
- opetuksen tavoitteet ja sisällöt vuosiluokittain eri oppiaineissa tai opintokokonaisuuksittain vuosiluokkiin jakamattomassa opetuksessa
- kodin ja koulun yhteistyö
- yhteistyö muiden tahojen kanssa
- oppilashuollon suunnitelma ja siihen liittyvän yhteistyön järjestäminen

2. luku Opetuksen järjestämisen lähtökohdat

2.1 Perusopetuksen arvopohja

Perusopetuksen arvopohjana ovat ihmisoikeudet, tasa-arvo, demokratia, luonnon monimuotoisuuden ja ympäristön elinkelpoisuuden säilyttäminen sekä monikulttuurisuuden hyväksyminen. Perusopetus edistää yhteisöllisyyttä, vastuullisuutta sekä yksilön oikeuksien ja vapauksien kunnioittamista. Perusopetuksen avulla lisätään alueellista ja yksilöiden välistä tasa-arvoa. Opetuksessa otetaan huomioon erilaiset oppijat ja edistetään sukupuolten välistä tasa-arvoa antamalla tytöille ja pojille valmiudet toimia yhtäläisin oikeuksin ja velvollisuuksin yhteiskunnassa sekä työ- ja perhe-elämässä. Perusopetuksen paikallisessa opetussuunnitelmassa tulee tarkentaa opetuksen perustana olevia arvoja. Niiden tulee välittyä opetuksen tavoitteisiin ja sisältöihin sekä jokapäiväiseen toimintaan.

2.2 Perusopetuksen tehtävä

Perusopetus on osa koulutuksen perusturvaa. Sillä on sekä kasvatus- että opetustehtävä. Sen tehtävänä on toisaalta tarjota yksilölle mahdollisuus hankkia yleissivistystä ja suorittaa oppivelvollisuus ja toisaalta antaa yhteiskunnalle väline kehittää sivistyksellistä pääomaa sekä lisätä yhteisöllisyyttä ja tasa-arvoa. Sen tehtävänä on myös kehittää kykyä arvioida asioita kriittisesti, luoda uutta kulttuuria sekä uudistaa ajattelu- ja toimintatapoja.

3.2 Oppimisympäristö

Oppimisympäristöllä tarkoitetaan oppimiseen liittyvää fyysisen ympäristön, psyykkisten tekijöiden ja sosiaalisten suhteiden kokonaisuutta, jossa opiskelu ja oppiminen tapahtuvat.

Fyysiseen oppimisympäristöön kuuluvat erityisesti koulun rakennukset ja tilat sekä opetusvälineet ja oppimateriaalit. Siihen kuuluvat lisäksi muu rakennettu ympäristö ja ympäröivä luonto.

3.3 Toimintakulttuuri

Koulun toimintakulttuuri vaikuttaa merkittävästi koulun kasvatukseen ja opetukseen ja sitä kautta oppimiseen. Tavoitteena on, että koulun kaikki käytännöt rakennetaan johdonmukaisesti tukemaan kasvatus- ja opetustyölle asetettujen tavoitteiden saavuttamista.

Toimintakulttuuriin kuuluvat kaikki koulun viralliset ja epäviralliset säännöt, toiminta- ja käyttäytymismallit sekä arvot, periaatteet ja kriteerit, joihin koulutyön laatu perustuu. Toimintakulttuuriin kuuluu myös oppituntien ulkopuolinen koulun toiminta kuten juhlat, teemapäivät sekä erilaiset tapahtumat. Koulun kasvatustavoitteiden ja arvojen sekä aihekokonaisuuksien tulee konkretisoitua toimintakulttuurissa. Tavoitteena on toimintakulttuuri, joka on avoin ja vuorovaikutteinen sekä tukee yhteistyötä niin koulun sisällä kuin kotien ja muun yhteiskunnan kanssa.

Myös oppilaalla tulee olla mahdollisuus osallistua koulun toimintakulttuurin luomiseen ja sen kehittämiseen.

4.5 Oppilashuolto

Oppilashuoltoon kuuluu lapsen ja nuoren oppimisen perusedellytyksistä, fyysisestä, psyykkisestä ja sosiaalisesta hyvinvoinnista huolehtiminen. Oppilashuolto kuuluu kaikille kouluyhteisössä työskenteleville sekä oppilashuoltopalveluista vastaaville viranomaisille. Opetussuunnitelmaan tulee laatia suunnitelma, jossa kuvataan oppilashuollon tavoitteet ja keskeiset periaatteet: kouluruokailun järjestämisessä huomioon otettavien terveys- ja ravitsemuskasvatuksen ja tapakasvatuksen tavoitteet.

7. luku Oppimistavoitteet ja opetuksen keskeiset sisällöt

7.1 Eheyttäminen ja aihekokonaisuudet

Opetus voi olla ainejakoista tai eheytettyä. Opetuksen eheyttämisen tavoitteena on ohjata tarkastelemaan ilmiöitä eri tiedonalojen näkökulmista rakentaen kokonaisuuksia ja korostaen yleisiä kasvatuksellisia ja koulutuksellisia päämääriä.

Aihekokonaisuudet ovat sellaisia kasvatus- ja opetustyön keskeisiä painoalueita, joiden tavoitteet ja sisällöt sisältyvät useisiin oppiaineisiin. Ne ovat kasvatusta ja opetusta eheyttäviä teemoja. Niiden kautta vastataan myös ajan koulutushaasteisiin.

Aihekokonaisuudet kuvataan tässä kohdassa, mutta ne toteutuvat eri oppiaineissa niille luonteenomaisista näkökulmista oppilaan kehitysvaiheen edellyttämällä tavalla. Opetussuunnitelmaa laadittaessa aihekokonaisuudet tulee sisällyttää yhteisiin ja valinnaisiin oppiaineisiin sekä yhteisiin tapahtumiin, ja niiden tulee näkyä koulun toimintakulttuurissa.

4. OSALLISTUVA KANSALAISUUS JA YRITTÄJYYS

Osallistuva kansalaisuus ja yrittäjyys -aihekokonaisuuden päämääränä on auttaa oppilasta hahmottamaan yhteiskuntaa eri toimijoiden näkökulmista ja kehittää osallistumisessa tarvittavia valmiuksia sekä luoda pohjaa yrittäjämäisille toimintatavoille. Koulun oppimiskulttuurin ja toimintatapojen tulee tukea oppilaan kehittymistä omatoimiseksi, aloitteelliseksi, päämäärätietoiseksi, yhteistyökykyiseksi ja osallistuvaksi kansalaiseksi sekä tukea oppilasta muodostamaan realistinen kuva omista vaikutusmahdollisuuksistaan.

TAVOITTEET

Oppilas oppii

- ymmärtämään kouluyhteisön, julkisen sektorin, elinkeinoelämän ja järjestöjen merkitystä, toimintaa ja tarpeita yhteiskunnan toimivuuden näkökulmasta
- muodostamaan oman kriittisen mielipiteen erilaista asiantuntijuutta hyödyntäen
- osallistumaan tarkoituksenmukaisella tavalla ja ottamaan vastuuta yhteisten asioiden hoidosta omassa kouluyhteisössä ja paikallisyhteisössä
- kohtaamaan ja käsittelemään muutoksia, epävarmuutta ja ristiriitoja sekä toimimaan yritteliäästi ja aloitteellisesti
- toimimaan innovatiivisesti ja pitkäjänteisesti päämäärän saavuttamiseksi sekä arvioimaan omaa toimintaansa ja sen vaikutuksia
- tuntemaan työelämää ja yritystoimintaa sekä ymmärtämään näiden merkityksen yksilölle ja yhteiskunnalle.

KESKEISET SISÄLLÖT

- perustietoja kouluyhteisön, julkisen sektorin, elinkeinoelämän ja järjestöjen toiminnasta sekä työnjaosta
- demokratian merkitys yhteisössä ja yhteiskunnassa
- erilaisia osallistumis- ja vaikuttamiskeinoja kansalaisyhteiskunnassa
- verkostoituminen oman ja yhteisen hyvinvoinnin edistämiseksi
- osallistuminen ja vaikuttaminen omassa koulussa ja elinympäristössä sekä oman toiminnan vaikuttavuuden arviointi
- yrittäjyys ja sen merkitys yhteiskunnalle, perustietoja yrittäjyydestä ammattina sekä työelämään tutustuminen.

5. VASTUU YMPÄRISTÖSTÄ, HYVINVOINNISTA JA KESTÄVÄSTÄ TULEVAISUUDESTA

Vastuu ympäristöstä, hyvinvoinnista ja kestävästä tulevaisuudesta -aihekokonaisuuden päämääränä on lisätä oppilaan valmiuksia ja motivaatiota toimia ympäristön ja ihmisen hyvinvoinnin puolesta. Perusopetuksen tavoitteena on kasvattaa ympäristötietoisia, kestävään elämäntapaan sitoutuneita kansalaisia. Koulun tulee opettaa tulevaisuusajattelua ja tulevaisuuden rakentamista ekologisesti, taloudellisesti, sosiaalisesti ja kulttuurisesti kestäville ratkaisuille.

TAVOITTEET

Oppilas oppii

- ymmärtämään ympäristönsuojelun välttämättömyyden ja ihmisen hyvinvoinnin edellytykset ja niiden välisen yhteyden
- havaitsemaan ympäristössä ja ihmisten hyvinvoinnissa tapahtuvia muutoksia, selvittämään syitä ja seurauksia sekä toimimaan elinympäristön hyväksi ja hyvinvoinnin lisäämiseksi
- arvioimaan oman kulutuksensa ja arkikäytäntöjensä vaikutuksia ja omaksumaan kestävän kehityksen edellyttämiä toimintatapoja
- edistämään hyvinvointia omassa yhteisössä sekä ymmärtämään hyvinvoinnin uhkia ja mahdollisuuksia globaalilla tasolla
- ymmärtämään, että yksilö rakentaa valinnoillaan sekä omaa tulevaisuuttaan että yhteistä tulevaisuuttamme, ja toimimaan rakentavasti kestävän tulevaisuuden puolesta.

KESKEISET SISÄLLÖT

- ekologisesti, taloudellisesti, kulttuurisesti ja sosiaalisesti kestävä kehitys omassa koulussa ja elinympäristössä
- yksilön ja yhteisön vastuu elinympäristön tilasta ja ihmisten hyvinvoinnista
- ympäristöarvot ja kestävä elämäntapa
- ekotehokkuus tuotannossa ja yhteiskunnassa sekä arjen toimintavoissa, tuotteen elinkaari
- oman talouden hallinta ja kulutuskäyttäytyminen, kuluttajan vaikuttamiskeinot
- toivottava tulevaisuus ja sen edellyttämät valinnat ja toiminta.

7. IHMINEN JA TEKNOLOGIA

Ihminen ja teknologia -aihekokonaisuuden päämääränä on auttaa oppilasta ymmärtämään ihmisen
suhdetta teknologiaan ja auttaa näkemään teknologian merkitys arkielämässämme. Perusopetuksen tulee tarjota perustietoa teknologiasta, sen kehittämisestä ja vaikutuksista, opastaa järkeviin valintoihin ja johdattaa pohtimaan teknologiaan liittyviä

eettisiä, moraalisia ja tasa-arvokysymyksiä. Opetuksessa tulee kehittää välineiden, laitteiden ja koneiden toimintaperiaatteiden ymmärtämistä ja opettaa niiden käyttöä.

TAVOITTEET

Oppilas oppii

- ymmärtämään teknologiaa, sen kehittämistä ja vaikutuksia eri elämänalueilla, yhteiskunnan eri sektoreilla ja ympäristössä
- käyttämään teknologiaa vastuullisesti
- käyttämään tietoteknisiä laitteita ja ohjelmia sekä tietoverkkoja erilaisiin tarkoituksiin
- ottamaan kantaa teknologisiin valintoihin ja arvioimaan tämän päivän teknologiaan liittyvien päätösten vaikutuksia tulevaisuuteen.

KESKEISET SISÄLLÖT

- teknologia arkielämässä, yhteiskunnassa ja paikallisessa tuotantoelämässä
- teknologian kehitys ja kehitykseen vaikuttavia tekijöitä eri kulttuureissa, eri elämänalueilla eri aikakausina
- teknologisten ideoiden kehittäminen, mallintaminen, arviointi ja tuotteiden elinkaari
- tietotekniikan ja tietoverkkojen käyttö
- teknologiaan liittyvät eettiset, moraaliset, hyvinvointi- ja tasa-arvokysymykset
- tulevaisuuden yhteiskunta ja teknologia.

7.7 Ympäristö- ja luonnontieto

VUOSILUOKAT 1-4

Ympäristö- ja luonnontieto on biologian, maantiedon, fysiikan, kemian ja terveystiedon tiedonaloista koostuva integroitu aineryhmä, jonka opetukseen sisältyy kestävän kehityksen näkökulma. Opetuksen tavoitteena on, että oppilas oppii tuntemaan ja ymmärtämään luontoa ja rakennettua ympäristöä, itseään ja muita ihmisiä, ihmisten erilaisuutta sekä terveyttä ja sairautta.

Ympäristö- ja luonnontiedon opetus tukeutuu tutkivaan ja ongelmakeskeiseen lähestymistapaan, jossa lähtökohtana ovat oppilaan ympäristöön ja oppilaaseen itseensä liittyvät asiat, ilmiöt ja tapahtumat sekä oppilaan aikaisemmat tiedot, taidot ja kokemukset. Kokemuksellisen ja elämyksellisen opetuksen avulla oppilaalle kehittyy myönteinen ympäristö- ja luonnonsuhde.

Ympäristö- ja luonnontiedon lähestymistavat ja sisällöt valitaan oppilaiden edellytysten ja kehitystason perusteella sekä siten, että opiskelutilanteissa voidaan työskennellä myös maastossa. Ympäristö- ja luonnontietoon liittyvät käsitteet voidaan jäsentää kokonaisuuksiksi, joissa tarkastellaan oppilasta, ympäröivää maailmaa ja hänen toimintaansa yhteisön jäsenenä. Näiden kokonaisuuksien opiskelu auttaa häntä ymmärtämään omaa ympäristöään sekä ihmisen ja ympäristön välistä vuorovaikutusta.

TAVOITTEET

Oppilas oppii

- suojelemaan luontoa ja säästämään energiavaroja
- psyykkistä ja fyysistä itsetuntemusta, itsensä ja muiden arvostamista ja sosiaalista osaamista
- terveyteen ja sairauteen sekä terveyden edistämiseen, liittyviä käsitteitä, sanastoa ja toimintatapoja sekä tekemään terveyttä edistäviä valintoja.

KESKEISET SISÄLLÖT

Eliöt ja elinympäristöt

- elottoman ja elollisen luonnon peruspiirteet
- erilaisia elinympäristöjä ja eliöiden sopeutuminen niihin

- oman lähiympäristön tavallisimpia kasvi-, sieni- ja eläinlajeja
- luonto eri vuodenaikoina
- kasvien ja eläinten elämänvaiheita
- ruoan alkuperä ja tuottaminen

Ympäristön aineita

- arkielämään kuuluvia aineita ja materiaaleja sekä niiden säästävä käyttö ja kierrätys

Ihminen ja terveys

- ihmisen keho sekä kasvun ja kehityksen vaiheet pääpiirteissään

KUVAUS OPPILAAN HYVÄSTÄ OSAAMISESTA 4. LUOKAN PÄÄTTYESSÄ

Eliöt ja ympäristöt

Oppilas
- ymmärtää kuinka elollinen ja eloton luonto eroavat toisistaan ja osaa kuvata eri elinympäristöjen kuten pihan, puiston, metsän, niityn ja pellon piirteitä sekä tunnistaa niiden tavallisimpia eliölajeja; oppilas osaa antaa esimerkkejä selkärangattomista ja selkärankaisista eläimistä
- tietää mistä ruoka-aineet ovat peräisin ja missä ruoka tuotetaan
- osaa lajitella jätteitä, ei roskaa ympäristöä sekä osaa säästää vettä, sähköä ja lämpöä.

Ihminen ja terveys

Oppilas
- osaa kuvata kasvun ja kehityksen sekä elämänkulun eri vaiheita, osaa nimetä ihmisen tärkeimmät ruumiinosat ja keskeisiä elintoimintoja
- tuntee terveyttä edistäviä arkikäytäntöjä ja tottumuksia: vuorokausirytmi, riittävä uni ja lepo, ravinto, säännöllinen ruokaileminen, päivittäinen liikunta, oikeat työskentelyasennot koulussa ja kotona, ryhti, suun terveys, hygienia, pukeutuminen

7.8 Biologia ja maantieto

VUOSILUOKAT 5–6

Biologian opetuksessa tutkitaan elämää ja sen ilmiöitä. Opetus järjestetään siten, että oppilas oppii tunnistamaan eliölajeja, ymmärtämään eliöiden ja niiden elinympäristöjen välistä vuorovaikutusta sekä arvostamaan ja vaalimaan luonnon monimuotoisuutta. Biologian opetuksen tavoitteena on ohjata oppilasta tuntemaan myös itseään ihmisenä ja osana luontoa. Ulkona tapahtuvassa opetuksessa oppilaan tulee saada myönteisiä elämyksiä ja kokemuksia luonnosta sekä oppia havainnoimaan ympäristöä. Biologian opetuksen tulee perustua tutkivaan oppimiseen. Opetusta toteutetaan sekä maastossa että luokkahuoneessa.

Maantiedon opetuksessa tarkastellaan maapalloa ja sen erilaisia alueita. Opetuksen tulee auttaa oppilasta ymmärtämään luonnon ja ihmisen toimintaan liittyviä ilmiöitä ja niiden välistä vuorovaikutusta eri alueilla. Maantiedon opetuksen tavoitteena on laajentaa oppilaan maailmankuvaa kotimaasta Eurooppaan ja muualle maailmaan. Opetus järjestetään siten, että oppilas saa käsityksen luonnonympäristöjen ja kulttuuriympäristöjen rikkaudesta eri puolilla maapalloa ja oppii arvostamaan niitä. Maantiedon opetuksen tulee luoda pohjaa kansojen ja kulttuurien väliselle suvaitsevaisuudelle ja kansainvälisyydelle.

Vuosiluokilla 5–6 biologian ja maantiedon opetukseen integroidaan myös

terveystiedon opetusta. Terveystiedon opetuksen tavoitteena on, että oppilas oppii ymmärtämään omaa kasvuaan ja kehitystään fyysisenä, psyykkisenä ja sosiaalisena prosessina sekä ihmisen ja hänen ympäristönsä välisenä vuorovaikutuksena.

Biologian ja maantiedon opetuksen tulee painottaa vastuullisuutta, luonnon suojelua ja elinympäristöjen vaalimista sekä tukea oppilaan kasvua aktiiviseksi ja kestävään elämäntapaan sitoutuneeksi kansalaiseksi.

TAVOITTEET

Oppilas oppii

- ymmärtämään, että ihminen on ravinnontuotannossaan riippuvainen muusta luonnosta
- kehittämään ympäristölukutaitoaan, toimimaan ympäristöystävällisesti, huolehtimaan lähiympäristöstään ja suojelemaan luontoa

KESKEISET SISÄLLÖT

Eliöt ja elinympäristöt

- eliöiden elinympäristöjä, kuten metsä ja suo**,** ravintoketjut sekä metsien hyötykäyttö
- elintarvikkeiden alkuperä ja tuottaminen sekä puutarhan antimet

Ihmisen rakenne, elintoiminnot, kasvu, kehitys ja terveys

- ihmisen kehon rakenne ja keskeiset elintoiminnot, lisääntyminen sekä murrosiän fyysiset, psyykkiset ja sosiaaliset muutokset

Luonnon monimuotoisuus

- luonnon monimuotoisuuden merkitys sekä jokamiehen oikeudet ja velvollisuudet

Ihmisten elämän ja elinympäristöjen monimuotoisuus maapallolla

- luonnon ja ihmisen toiminnan vuorovaikutus maapallolla sekä ihmisen toiminnan aiheuttamat muutokset ympäristössä

KUVAUS OPPILAAN HYVÄSTÄ OSAAMISESTA 6. LUOKAN PÄÄTTYESSÄ

Eliöt ja elinympäristöt

Oppilas

- osaa selittää ravintoketjun pääperiaatteet jonkin esimerkin avulla
- ymmärtää ja osaa antaa esimerkkejä siitä, miksi ja miten ihminen on riippuvainen luonnosta ja osaa selvittää peruselintarvikkeiden alkuperän

Ihmisen rakenne, elintoiminnot, kasvu, kehitys ja terveys

Oppilas

- osaa kuvata perusasioita ihmisen rakenteesta ja elintoiminnoista

Ihmisten elämän ja elinympäristöjen monimuotoisuus maapallolla

Oppilas

- tietää, että maapallolla on erilaisia ilmasto- ja kasvillisuusvyöhykkeitä ja osaa kertoa esimerkkejä siitä, miten ilmasto-olot, kuten lämpötila ja sademäärä, vaikuttavat ihmisen toimintaan, erityisesti maatalouteen ja asumiseen eri vyöhykkeillä sekä osaa kuvata ihmisten elämää erilaisissa ympäristöissä
- osaa kertoa esimerkkejä eri alueilta siitä, miten ihmisen toiminta, kuten kaupunkien ja teollisuuden rakentaminen, liikalaiduntaminen ja polttopuun kerääminen ovat aiheuttaneet muutoksia ympäristössä

BIOLOGIA

VUOSILUOKAT 7–9

Biologian opetuksessa tutkitaan elämää, sen ilmiöitä ja edellytyksiä. Opetuksen tulee kehittää oppilaan luonnontuntemusta ja ohjata ymmärtämään luonnon perusilmiöitä. Tavoitteena on, että oppilaat tutustuvat myös evoluutioon, ekologian perusteisiin ja ihmisen rakenteeseen ja elintoimintoihin. Biologian opetuksessa oppilasta ohjataan kiinnittämään huomiota ihmisen ja muun luonnon välisiin vuorovaikutussuhteisiin sekä korostetaan ihmisen vastuuta luonnon monimuotoisuuden suojelussa.

Biologian opetuksen tulee perustua tutkivaan oppimiseen ja kehittää oppilaan luonnontieteellistä ajattelua. Opetuksen tavoitteena on antaa oppilaalle valmiudet havainnoida ja tutkia luontoa sekä hyödyntää biologisen tiedon haussa myös tietoteknisiä mahdollisuuksia. Opetus järjestetään siten, että oppilaat saavat myönteisiä elämyksiä ja kokemuksia luonnossa opiskelusta, oppilaiden ympäristötietoisuus kehittyy ja halu vaalia elinympäristöjä ja elämän eri muotoja kasvaa.

TAVOITTEET

Oppilas oppii

- hahmottamaan ekosysteemien rakennetta ja toimintaa
- tuntemaan kasvien kasvattamisen ja viljelyn periaatteita sekä kiinnostuu kasvien kasvattamisesta
- tuntemaan ihmisen perusrakenteen ja keskeiset elintoiminnot sekä ymmärtämään seksuaalisuuden biologisen perustan
- tunnistamaan kotiseudun ympäristömuutoksia, pohtimaan niiden syitä ja esittämään ongelmien ratkaisumahdollisuuksia
- ymmärtämään ympäristönsuojelun keskeiset tavoitteet ja luonnonvarojen kestävän käytön periaatteet.

KESKEISET SISÄLLÖT

Luonto ja ekosysteemit

- ekosysteemi, sen rakenne ja toiminta, metsä- ja vesiekosysteemin ominaispiirteet sekä yhden ekosysteemin omakohtainen tutkiminen
- metsänhoitoon ja kasvinviljelyyn tutustuminen
- luonnon monimuotoisuus

Elämä ja evoluutio

- biotekniikan mahdollisuudet ja niihin liittyvät eettiset kysymykset

Ihminen

- ihmisen rakenne ja keskeiset elintoiminnot

Yhteinen ympäristö

- ekologisesti kestävä kehitys sekä ympäristönsuojelun sisältö ja tavoitteet
- oman elinympäristön tilan ja ympäristömuutosten tutkiminen, oman lähiympäristön tilaa parantavien toimien tarkastelu sekä oman ympäristökäyttäytymisen pohtiminen

PÄÄTTÖARVIOINNIN KRITEERIT ARVOSANALLE 8

Luonto ja ekosysteemit

Oppilas osaa

- kuvata ekosysteemin perusrakenteen ja toiminnan
- selostaa perusasioita metsänhoidosta ja kasvinviljelystä
- kuvata esimerkein luonnon monimuotoisuutta, osaa perustella sen merkitystä ekologisen kestävyyden kannalta sekä tuntee metsien kestävän käytön periaatteet.

Elämä ja evoluutio

Oppilas osaa

- kuvata pääpiirteet kasvi- ja eläinsolun rakenteesta
- selostaa fotosynteesin ja kuvata sen merkityksen eliökunnan kannalta

Ihminen

Oppilas osaa

- kuvata ihmisen tärkeimpien kudosten, elinten ja elimistöjen rakenteen ja toiminnan pääpiirteet

Yhteinen ympäristö

Oppilas osaa

- kuvata ekologisesti kestävää kehitystä sekä luonnon monimuotoisuuden säilymisen ja ympäristösuojelun merkitystä
- tehdä pienimuotoisia tutkimuksia oman elinympäristönsä tilasta
- kertoa esimerkkejä kotiseutunsa luonnonympäristön muuttumisesta ja osaa antaa esimerkkejä siitä, millä tavalla voi itse toimia kestävän kehityksen tavoitteiden mukaisesti.

MAANTIETO

VUOSILUOKAT 7–9

Maantiedon opetuksessa tutkitaan maapalloa ja sen erilaisia alueita sekä alueellisia ilmiöitä. Opetuksen tulee kehittää oppilaiden maantieteellistä maailmankuvaa ja sen alueellista perustaa. Maantiedon opetuksen tavoitteena on kehittää oppilaan kykyä tarkastella luonnonympäristöä, rakennettua ympäristöä ja sosiaalista ympäristöä sekä ihmisen ja ympäristön välistä vuorovaikutusta paikallistasolta globaalille tasolle saakka. Opetuksen tulee ohjata oppilasta seuraamaan ajankohtaisia tapahtumia maailmassa ja arvioimaan niiden vaikutusta luontoon ja ihmisen toimintaan.

Maantiedon opetus järjestetään siten, että oppilaiden kulttuurien tuntemus lisääntyy ja kyky ymmärtää ihmisten elämän ja elinympäristöjen erilaisuutta eri puolilla maailmaa kehittyy. Maantiedon opetuksen tulee toimia siltana luonnontieteellisen ja yhteiskuntatieteellisen ajattelun välillä. Opetuksen tavoitteena on ohjata oppilaita pohtimaan maapallolla esiintyvien luonnontieteellisten, kulttuuristen, sosiaalisten ja taloudellisten ilmiöiden syy- ja seuraussuhteita. Maantiedon opetuksen tulee tukea oppilaiden kasvua aktiivisiksi ja kestävään elämäntapaan sitoutuneiksi kansalaisiksi.

TAVOITTEET

Oppilas oppii

- tietämään, miten Suomessa jokainen kansalainen voi vaikuttaa oman elinympäristönsä suunnitteluun ja kehittymiseen
- ymmärtämään ja kriittisesti arvioimaan uutistietoa esimerkiksi maailmanlaajuisista ympäristö- ja kehityskysymyksistä sekä oppii toimimaan itse kestävän kehityksen mukaisesti.

Yhteinen ympäristö

- ympäristö- ja kehityskysymykset paikallisesti ja maailmanlaajuisesti sekä ongelmien ratkaisumahdollisuuksien pohtiminen
- Itämeren alueen ympäristökysymykset
- ihminen luonnonvarojen kuluttajana

PÄÄTTÖARVIOINNIN KRITEERIT ARVOSANALLE 8

Yhteinen ympäristö

Oppilas osaa

- selostaa lyhyesti, mitä ovat keskeiset maailmanlaajuiset ympäristö- ja kehitysongelmat, kuten kasvihuoneilmiön voimistuminen, otsonikato, aavikoituminen, elinympäristöjen saastuminen, väestönkasvu sekä köyhyys- ja nälkäongelma
- kuvata Itämeren alueen ympäristöongelmia ja niiden syitä sekä osaa esittää keinoja parantaa Itämeren alueen ympäristön tilaa
- kuvata, mitkä ovat hänen omat vaikutusmahdollisuutensa ympäristön tilan parantamiseksi ja tietää keinoja, joiden avulla keskeisiä maailmanlaajuisia ympäristö- ja kehityskysymyksiä voidaan ratkaista.

KEMIA

VUOSILUOKAT 7–9

Kemian opetuksen tehtävänä vuosiluokilla 7–9 on laajentaa oppilaan tietämystä kemiasta ja kemiallisen tiedon luonteesta sekä ohjata luonnontieteille ominaiseen ajatteluun, tiedonhankintaan ja tietojen käyttämiseen elämän eri tilanteissa. Opetus antaa oppilaalle persoonallisuuden kehittymisen ja nykyaikaisen maailmankuvan muodostamisen kannalta välttämättömiä aineksia ja se auttaa ymmärtämään kemian ja teknologian merkityksen jokapäiväisessä elämässä, elinympäristössä ja yhteiskunnassa. Kemian opetuksen tulee antaa oppilaalle valmiuksia tehdä jokapäiväisiä valintoja ja keskustella erityisesti energian tuotantoon, ympäristöön ja teollisuuteen liittyvistä asioista ja ohjata oppilasta ottamaan vastuuta ympäristöstään.

Opetus tukeutuu kokeelliseen lähestymistapaan, jossa lähtökohtana on elinympäristöön liittyvien aineiden ja ilmiöiden havaitseminen ja tutkiminen.

TAVOITTEET

Oppilas oppii

Elollinen luonto ja yhteiskunta

- fotosynteesi ja palaminen, energialähteet
- orgaanisten yhdisteiden hapettumisreaktioita ja reaktiotuotteita, kuten alkoholit ja karboksyylihapot sekä niiden ominaisuudet ja käyttö
- hiilivedyt, öljynjalostusteollisuus ja sen tuotteita
- hiilihydraatit, valkuaisaineet, rasvat, niiden koostumus ja merkitys ravintoaineina sekä teollisuuden raaka-aineina
- pesu- ja kosmeettiset aineet ja tekstiilit

PÄÄTTÖARVIOINNIN KRITEERIT ARVOSANALLE 8

Oppilas

- tuntee aineiden kiertoprosesseja ja niiden aiheuttamia ilmiöitä luonnossa ja ympäristössä, esimerkiksi hiilen kiertokulku, kasvihuoneilmiö ja happamoituminen
- tuntee ympäristöön vaikuttavia aineita, niiden lähteitä, leviämistapoja ja vaikutuksia ihmisen ja luonnon hyvinvointiin, esimerkiksi fossiilisten polttoaineiden palamistuotteita ja raskasmetalleja
- osaa tulkita tavaraselosteita, selittää tuotteen elinkaaren ja osaa tehdä valintoja kuluttujana

7.10 Terveystieto

VUOSILUOKAT 7−9

Terveystiedon opetus perustuu monitieteiseen tietoperustaan. Terveystiedon opetuksen tarkoitus on edistää oppilaiden terveyttä, hyvinvointia ja turvallisuutta tukevaa osaamista. Opetuksen tehtävänä on kehittää oppilaiden tiedollisia, sosiaalisia, tunteiden säätelyä ohjaavia, toiminnallisia ja eettisiä valmiuksia.

Opetuksen lähtökohtana on terveyden ymmärtäminen fyysiseksi, psyykkiseksi ja sosiaaliseksi toimintakyvyksi. Opetuksessa kehitetään tietoja ja taitoja terveydestä, elämäntavasta, terveystottumuksista ja sairauksista sekä kehitetään valmiuksia ottaa vastuuta ja toimia oman sekä toisten terveyden edistämiseksi.

Terveystieto on oppiaineena oppilaslähtöinen, toiminnallisuutta ja osallistuvuutta tukeva. Opetuksen lähtökohtana tulee olla lapsen ja nuoren arki, kasvu ja kehitys sekä ihmisen elämänkulku. Opetuksessa otetaan huomioon myös yleiset ja koulu- ja paikkakuntakohtaiset ajankohtaiset terveyteen ja turvallisuuteen liittyvät kysymykset. Opetuksessa kehitetään tärkeitä tiedonhankintaan ja sen soveltamiseen liittyviä taitoja sekä edistetään terveyden ja hyvinvoinnin kriittistä arvopohdintaa.

Terveystietoa opetetaan vuosiluokilla 1–4 osana ympäristö- ja luonnontieto- oppiaineryhmää, vuosiluokilla 5–6 osana biologia/maantietoa ja fysiikka/kemiaa ja itsenäisenä oppiaineena vuosiluokilla 7–9. Terveystiedon opetus tulee suunnitella siten, että oppilaalle muodostuu kokonaisvaltainen kuva terveystiedosta koko perusopetuksen aikana. Terveystiedon sekä biologian, maantiedon, fysiikan, kemian, kotitalouden, liikunnan ja yhteiskuntaopin opetusta tulee suunnitella yhteistyössä. Opetuksen suunnittelussa tehdään yhteistyötä myös oppilashuollon henkilöstön kanssa.

TAVOITTEET

Oppilas oppii

- arvioimaan ympäristön, elämäntavan ja kulttuurin sekä median merkitystä turvallisuuden ja terveyden näkökulmasta

KESKEISET SISÄLLÖT

Kasvu ja kehitys

- ihmisen elämänkulku, eri ikäkaudet, syntymä, kuolema
- fyysinen kasvu ja kehitys: vuorokausirytmi, uni, lepo ja kuormitus, terveyttä edistävä liikunta, ravitsemus ja terveys

Terveys arkielämän valintatilanteissa

- ravitsemukselliset tarpeet ja ongelmat eri tilanteissa, yleisimmät allergiat ja erityisruokavaliot

PÄÄTTÖARVIOINNIN KRITEERIT ARVOSANALLE 8

Kasvu ja kehitys

Oppilas

- osaa selittää, miten uni ja lepo vaikuttavat vireyteen ja hyvinvointiin, antaa esimerkkejä terveyden kannalta tasapainoisesta ja monipuolisesta ravinnosta ja tietää liikunnan terveysvaikutuksia

Voimavarat ja selviytymisen taidot
Oppilas

- osaa pohtia elämäntapavalintojen merkitystä terveydelle ja perustella tai näyttää esimerkein arkielämän terveyttä edistäviä valintoja

7.14 Yhteiskuntaoppi

Yhteiskuntaopin opetuksen tehtävänä on ohjata oppilasta kasvamaan yhteiskunnan aktiiviseksi ja vastuulliseksi toimijaksi. Perusopetuksen vuosiluokkien 7–9 yhteiskuntaopin opetuksen tulee antaa perustiedot ja -taidot yhteiskunnan rakenteesta ja toiminnasta sekä kansalaisen vaikutusmahdollisuuksista. Opetuksen tarkoituksena on tukea oppilaan kasvua suvaitsevaiseksi ja demokraattiseksi kansalaiseksi ja antaa hänelle kokemuksia yhteiskunnallisesta
toimimisesta ja demokraattisesta vaikuttamisesta

VUOSILUOKAT 7–9

TAVOITTEET

Oppilas

- oppii tarkastelemaan ja kehittämään osaamistaan vastuullisena kuluttajana ja yhteiskunnallisena toimijana

KESKEISET SISÄLLÖT
Aihealueina ovat suomalainen yhteiskunta ja talouselämä sekä Euroopan unioni.

Taloudenpito

- yksityisen taloudenpidon periaatteet
- työnteko ja yrittäjyys

Kansantalous

- yksilö ja kotitaloudet kuluttajina ja talouden toimijoina
- ulkomaankaupan ja globaalitalouden merkitys

PÄÄTTÖARVIOINNIN KRITEERIT ARVOSANALLE 8

Yhteiskunnallisen tiedon hankkiminen ja käyttäminen

Oppilas

- osaa vertailla yhteiskunnallisen päätöksenteon ja taloudellisten ratkaisujen eri vaihtoehtoja ja niiden seurauksia.

Yhteiskunnallisen tiedon ymmärtäminen

Oppilas

- ymmärtää, että yhteiskunnallisessa päätöksenteossa ja taloudellisissa ratkaisuissa on olemassa useita vaihtoehtoja

- ymmärtää yhteiskunnallisen ja taloudellisen toiminnan eettisiä kysymyksiä.

7.19 Kotitalous

VUOSILUOKAT 7−9

Kotitalouden opetuksen tarkoituksena on kehittää arjen hallinnan edellyttämiä käytännön työtaitoja, yhteistyövalmiuksia ja tiedonhankintaa sekä niiden soveltamista arkielämän tilanteissa. Tehtävänä on ohjata oppilasta ottamaan vastuuta terveydestään, ihmissuhteistaan ja taloudestaan sekä lähiympäristön viihtyisyydestä ja turvallisuudesta.

Kotitalouden opetuksen tulee perustua käytännön toimintaan ja ryhmässä toimimiseen sekä oppilaan omien lähtökohtien huomioon ottamiseen ja kokonaisvaltaisen kasvun tukemiseen. Oppiaineessa perehdytään moniin ihmisen hyvinvoinnin ja hyvän elämän kannalta tärkeisiin kysymyksiin, jotka käsittelevät nuorta itseään, kotia ja perhettä sekä niiden yhteyksiä muuttuvaan yhteiskuntaan ja ympäristöön. Kotitalouden opetus tarjoaa mahdollisuuksia opetuksen eheyttämiseen ja yhteistyöhön muiden oppiaineiden kanssa ja soveltaa käytäntöön useiden eri alojen tietoa.

TAVOITTEET

Oppilas oppii

- pohtimaan kotitalouden arjen hallintaa ja sen yhteyksiä omiin valintoihinsa ja toimintaansa
- tekemään ruokatalouden, asunnon ja tekstiilien hoitoon liittyviä perustehtäviä ja käyttämään tarkoituksenmukaisia, turvallisia ja kestävän kehityksen mukaisia aineita, välineitä ja työtapoja
- toimimaan harkitsevana ja vastuunsa tuntevana kuluttajana sekä tiedostamaan kulutukseen liittyviä ongelmia

KESKEISET SISÄLLÖT

Ravitsemus ja ruokakulttuuri

- ravitsemussuositukset ja terveellinen ruoka
- ruoan laatu ja turvallisuus
- perusruoanvalmistusmenetelmät
- aterioiden suunnittelu ja erilaisia ruokailutilanteita suomalaisessa ruokakulttuurissa
- ruokakulttuurien muuttuminen

Kuluttaja ja muuttuva yhteiskunta

- oman rahankäytön suunnittelua
- kuluttajan vastuu ja vaikutusmahdollisuudet
- tuotteiden ja palvelujen hankinta ja käyttö
- kulutuksen ympäristövaikutukset
-

Koti ja ympäristö

- asunnon ja tekstiilien hoito
- kotitalouden jätehuolto
- kotitalouskoneiden ja kodin laitteiden käyttöä

PÄÄTTÖARVIOINNIN KRITEERIT ARVOSANALLE 8

Käytännön työtaidot

Oppilas

- tuntee ruoka-aineiden ominaisuuksia, tavallisimpia ruoanvalmistuksen menetelmiä ja osaa käyttää näitä hyväkseen ruoanvalmistuksessa
- osaa valmistaa ohjatusti suomalaisia perusruokia ja leivonnaisia ja koostaa ateriansa ravitsemussuositukset huomioon ottaen

osaa käyttää tarkoituksenmukaisia työtapoja ja tavallisimpia kodinkoneita ja -välineitä turvallisesti

- osaa toimia ympäristöä säästäen, valita tarkoituksenmukaisia pesu- ja puhdistusaineita sekä huolehtia kodin jätteiden peruslajittelusta.

Tiedonhankinta- ja käsittelytaidot

Oppilas

- osaa etsiä ja hyödyntää kotitalouden tietoja eri lähteistä, tulkita yleisimpiä tuote- ja pakkausmerkintöjä ja symboleja sekä pohtia erilaisen tiedon luotettavuutta
- osaa pääpiirteittäin kertoa mistä kotitalouksien menot koostuvat ja tehdä oman rahankäyttösuunnitelmansa
- tuntee tärkeimmät kuluttajan vastuu ja vaikutusmahdollisuudet.

Opetushallitus 2003

LUKION OPETUSSUUNNITELMAN PERUSTEET 2003

Nuorille tarkoitetun lukiokoulutuksen opetussuunnitelman perusteet

1 OPETUSSUUNNITELMA

1.1 Opetussuunnitelman laatiminen

Opetussuunnitelma laaditaan tähän asiakirjaan sisältyvien lukion opetussuunnitelman perusteiden mukaan. Opetussuunnitelmassa päätetään lukion opetus- ja kasvatustyöstä. Opetussuunnitelman pohjalta lukio laatii lukuvuosittaisen suunnitelman opetuksen käytännön järjestämisestä. Opiskelija laatii henkilökohtaisen opiskelusuunnitelmansa lukion opetussuunnitelman sekä lukuvuosittaisen suunnitelman pohjalta.

Opetussuunnitelmaa laadittaessa tulee ottaa huomioon lukion toimintaympäristö, paikalliset arvovalinnat ja osaamisvahvuudet sekä erityisresurssit. Lukiopaikkakunnan tai -alueen luonto ja ympäristö, kieliolosuhteet, historia sekä elinkeino- ja kulttuurielämä tuovat opetussuunnitelmaan paikallisuutta. Käytännön yhteistyö eri alojen asiantuntijoiden kanssa lisää opiskelun elämänläheisyyttä ja syvällisyyttä. Opetussuunnitelmaa laadittaessa myös ajankohtaistetaan opetussuunnitelman perusteissa mainittuja asioita.

Koulutuksen järjestäjä päättää, miten opetussuunnitelma laaditaan perusteiden pohjalta. Lukion opetussuunnitelma laaditaan sidosryhmäyhteistyössä. Tällä pyritään varmistamaan lukiokoulutuksen korkeatasoisuus, yhteiskunnallinen merkittävyys sekä koko yhteisön sitoutuminen yhdessä määriteltyihin tavoitteisiin ja toimintatapoihin. Opetussuunnitelmaa laadittaessa tulee pyrkiä ratkaisuihin, jotka kehittävät lukion toimintakulttuuria, rohkaisevat resurssien joustavaan ja tehokkaaseen käyttöön sekä monipuolistavat vuorovaikutteisuutta sekä lukion sisällä että suhteessa ympäröivään yhteiskuntaan.

Kaikilla kouluyhteisön jäsenillä ja huoltajilla tulee olla mahdollisuus tutustua opetussuunnitelmaan.

1.2 Opetussuunnitelman sisältö

Lukion opetussuunnitelma sisältää seuraavat osat:

- toiminta-ajatus ja arvopainotukset
- toimintakulttuurin pääpiirteet, opiskeluympäristö ja työtavat
- ohjaustyön suunnitelma
- eheyttäminen ja aihekokonaisuudet
- opiskelijahuolto

2.2 Arvoperusta

Lukio-opetuksen arvoperusta rakentuu suomalaiseen sivistyshistoriaan, joka on osa pohjoismaista ja eurooppalaista kulttuuriperintöä. Lukiossa

kulttuuriperintöä tulee oppia vaalimaan, arvioimaan ja uudistamaan. Opiskelijoita kasvatetaan suvaitsevaisuuteen ja kansainväliseen yhteistyöhön.

Lukio-opetuksen lähtökohtana on elämän ja ihmisoikeuksien kunnioitus. Lukion sivistysihanteena on pyrkimys totuuteen, inhimillisyyteen ja oikeudenmukaisuuteen. Lukiokoulutuksen tulee edistää avointa demokratiaa, tasa-arvoa ja hyvinvointia. Opiskelija ymmärretään oman oppimisensa, osaamisensa ja maailmankuvansa rakentajaksi. Opetuksessa tulee ottaa huomioon, että ihminen havainnoi ja jäsentää todellisuutta kaikkien aistiensa kautta.
Kasvatustyössä korostetaan yhteistyötä, kannustavaa vuorovaikutusta ja rehellisyyttä. Tavoitteena on, että opiskelija oppii tuntemaan oikeutensa ja velvollisuutensa sekä kasvaa aikuisen vastuuseen omista valinnoistaan ja teoistaan. Opiskelijan tulee saada lukioaikanaan kokemuksia siitä, miten tulevaisuutta rakennetaan yhteisillä päätöksillä ja työllä.

Lukio-opetuksen tulee kannustaa tunnistamaan julkilausuttujen arvojen ja todellisuuden välisiä ristiriitoja sekä pohtimaan kriittisesti suomalaisen yhteiskunnan ja kansainvälisen kehityksen epäkohtia ja mahdollisuuksia. Opiskelijan tulee saada lukioaikanaan jäsentynyt käsitys siitä, mitkä ovat kansalaisen perusoikeudet Suomessa, Pohjoismaissa ja Euroopan unionissa, mitä ne käytännössä merkitsevät sekä miten niitä ylläpidetään ja edistetään. Lukion tulee korostaa kestävän kehityksen periaatteita ja antaa valmiuksia kohdata muuttuvan maailman haasteet.

Lukion arvoperustaa syventävät kohdassa 5.2 esitettävät aihekokonaisuudet, jotka ovat arvokannanottoja ajankohtaisiin kasvatus- ja koulutushaasteisiin.

3.3 Toimintakulttuuri

Toimintakulttuuri on käytännön tulkinta lukion opetus- ja kasvatustehtävästä. Toimintakulttuuriin kuuluvat kaikki lukion viralliset ja epäviralliset säännöt, toiminta- ja käyttäytymismallit sekä arvot, periaatteet ja kriteerit, joihin koulutyön laatu perustuu. Toimintakulttuuri tulee esiin yksilö-, ryhmä- ja yhteisötasolla.

Lukiossa tavoitteena on opetussuunnitelmaan nojautuen toimintakulttuuri, joka korostaa koko yhteisön jäsenten vastuuta, on avoin yhteistyölle ja vuorovaikutukselle yhteiskunnan kanssa sekä maailmassa tapahtuville muutoksille. Opiskelijoilla tulee olla mahdollisuus osallistua oman työyhteisönsä kehittämiseen muun muassa oppilaskuntatoiminnan kautta.
Opetussuunnitelma määrittelee tavoiteltavan toimintakulttuurin. Tavoitteena on, että lukion kaikki käytännöt rakennetaan johdonmukaisesti tukemaan kasvatus- ja opetustyölle asetettujen tavoitteiden saavuttamista. Myös aihekokonaisuuksien tulee konkretisoitua lukion toimintakulttuurissa. Tavoitellun ja toteutuneen toimintakulttuurin yhtäpitävyyden arviointi on perusedellytys lukion jatkuvalle kehittämiselle. Toimintakulttuurin pääpiirteet tulee kuvata opetussuunnitelmassa.

3.4 Opintojen rakenne

Lukio-opinnot muodostuvat valtioneuvoston antaman asetuksen mukaisesti pakollisista, syventävistä ja soveltavista kursseista. Syventävät kurssit ovat opiskelijalle valinnaisia, oppiaineen pakollisiin kursseihin liittyviä kursseja,

joita opiskelijan on valittava opinto-ohjelmaansa vähintään kymmenen. Oppiaineiden pakollisten ja valtakunnallisesti määriteltyjen syventävien kurssien keskeiset tavoitteet ja sisällöt on määritelty luvussa 5.

4.3 Opiskelijahuolto

Opiskelijahuolto on opiskelijoiden fyysisestä, psyykkisestä ja sosiaalisesta hyvinvoinnista huolehtimista. Opiskelijahuoltoa sekä kodin ja oppilaitoksen yhteistyötä koskeva opetussuunnitelman osa laaditaan yhteistyössä kunnan sosiaali- ja terveydenhuollon toimeenpanoon kuuluvia tehtäviä hoitavien viranomaisten kanssa.

5 OPPIMISTAVOITTEET JA OPETUKSEN KESKEISET SISÄLLÖT

5.1 Opetuksen yleiset tavoitteet

Opiskelijan tietoisuutta ihmisten toiminnan vaikutuksesta maailman tilaan tulee kehittää. Lukion tulee kehittää opiskelijan taitoa tunnistaa ja käsitellä yksilöllisiä ja yhteisöllisiä eettisiä kysymyksiä. Opiskelijan tulee saada tilaisuuksia pohtia erilaisia vaihtoehtoja, tehdä valintoja ja tiedostaa valintojen välittömiä ja välillisiä seurauksia. Lukion tulee pyrkiä siihen, että opiskelijalle kehittyy halu ja kyky toimia demokraattisessa yhteiskunnassa vastuullisesti huomioiden oma ja muiden hyvinvointi.

5.2 Aihekokonaisuudet

Aihekokonaisuudet ovat yhteiskunnallisesti merkittäviä kasvatus- ja koulutushaasteita. Samalla ne ovat ajankohtaisia arvokannanottoja. Käytännössä aihekokonaisuudet ovat lukion toimintakulttuuria jäsentäviä toimintaperiaatteita ja oppiainerajat ylittäviä, opetusta eheyttäviä painotuksia. Niissä on kysymys koko elämäntapaa koskevista asioista.

Kaikkia aihekokonaisuuksia yhdistävinä tavoitteina on, että opiskelija osaa

- havainnoida ja analysoida nykyajan ilmiöitä ja toimintaympäristöjä
- esittää perusteltuja käsityksiä tavoiteltavasta tulevaisuudesta
- arvioida omaa elämäntapaansa ja vallitsevia suuntauksia tulevaisuusnäkökulmasta sekä
- tehdä valintoja ja toimia tavoiteltavana pitämänsä tulevaisuuden puolesta.

Kaikille lukioille yhteisiä aihekokonaisuuksia ovat

- aktiivinen kansalaisuus ja yrittäjyys
- hyvinvointi ja turvallisuus
- kestävä kehitys

Aihekokonaisuudet otetaan huomioon kaikkien oppiaineiden opetuksessa oppiaineeseen luontuvalla tavalla sekä lukion toimintakulttuurissa.

Kestävä kehitys

Kestävän kehityksen päämääränä on turvata nykyisille ja tuleville sukupolville hyvän elämän mahdollisuudet. Ihmisen tulee oppia kaikessa toiminnassaan sopeutumaan luonnon ehtoihin ja maapallon

kestokyvyn rajoihin. Lukion tulee kannustaa opiskelijoita kestävään elämäntapaan ja toimintaan kestävän kehityksen puolesta.

Tavoitteena on, että opiskelija

- tuntee perusasiat kestävän kehityksen ekologisesta, taloudellisesta, sosiaalisesta ja kulttuurisesta ulottuvuudesta sekä ymmärtää, että vasta niiden samanaikainen toteuttaminen tekee kehityksestä kestävän
- osaa mitata, arvioida ja analysoida sekä luonnonympäristössä että kulttuuri- ja sosiaalisessa ympäristössä tapahtuvia muutoksia
- pohtii, millainen on kestävä elämäntapa, luontoa pilaamaton ja ekotehokas tuotanto ja yhdyskunta, sosiaalista pääomaansa vahvistava yhteisö ja yhteiskunta sekä luontoperustastaan ylisukupolvisesti huolehtiva kulttuuri
- osaa ja tahtoo toimia kestävän kehityksen puolesta omassa arjessaan, lukiolaisena, kuluttajana ja aktiivisena kansalaisena
- osaa tehdä yhteistyötä paremman tulevaisuuden puolesta paikallisesti, kansallisesti ja kansainvälisesti.

Kestävän kehityksen haasteita tulee oppia tarkastelemaan monista näkökulmista: Selvitetään, miten ihmistoiminta on vaikuttanut ympäristöön ja miten ihmisen tapa muokata ympäristöjään on muuttunut kulttuurievoluution aikana. Analysoidaan maailmanlaajuisia ympäristöuhkia ja niiden syitä sekä keinoja korjata kehityksen suuntaa. Tarkastellaan väestönkasvuun, köyhyyteen ja nälkään liittyviä ongelmia. Arvioidaan aineiden ja energian kiertokulkuja luonnossa ja tuotantojärjestelmissä sekä opetellaan säästämään energiaa ja raaka-aineita. Pohditaan, millaista voisi olla taloudellinen kasvu, joka ei perustu raaka-aineiden ja energian käytön lisäämiseen, ja mikä merkitys talouden vakaudella on ympäristönsuojelulle ja ihmisten hyvinvoinnille. Tutustutaan kestävän kehityksen periaatteita toteuttaviin yrityksiin ja teknologioihin sekä opitaan käyttämään kuluttajan vaikutuskeinoja. Selvitetään, miten ihmisen toiminnot voivat sopeutua ympäristöihinsä kulttuuriperintöä arvostaen ja luonnon monimuotoisuutta vaarantamatta. Harjoitellaan kestävän elämäntavan käytäntöjä ja selvitetään niiden rakenteellisia edellytyksiä. Opetukseen ja lukion arkeen tuodaan esimerkkejä onnistuneista käytännöistä.
Rohkaistuakseen aktiiviseksi kestävän kehityksen edistäjäksi opiskelija tarvitsee kokemuksia siitä, että hänen omilla eettisillä, käytännöllisillä, taloudellisilla, yhteiskunnallisilla ja ammatillisilla valinnoillaan on merkitystä. Kestävän kehityksen edistämisessä tulee luoda yleiskuva muutostarpeiden mittavuudesta ja siitä, että tarvittaviin tuloksiin päästään vain laajalla yhteistyöllä. Opetuksen lisäksi kestävään elämäntapaan kannustavat mahdollinen lukion oma ympäristöohjelma tai kestävän kehityksen ohjelma sekä ympäristötietoinen toimintakulttuuri.

!!!Kielten opetuksessa on teemoja jotka sivuavat kestävää kehitystä kuten

6. Luonto ja kestävä kehitys

Kurssi antaa opiskelijalle valmiuksia ymmärtää ja käyttää luontoon, luonnontieteisiin ja kestävän kehityksen aihepiiriin liittyvää kieltä.

8. Luonto ja kestävä kehitys

Kurssin aihepiireinä ovat luonto ja sen ilmiöt ja luontoon suhtautuminen omassa ja kohdekielen kulttuurissa. Kurssilla painotetaan tekstin ymmärtämistä ja kirjoittamista.

5.5 Vieraat kielet

Vieraiden kielten opetus kehittää opiskelijoiden kulttuurien välisen viestinnän taitoja: se antaa heille kieleen ja sen käyttöön liittyviä tietoja ja taitoja ja tarjoaa heille mahdollisuuden kehittää opiskeltavan kielen kielialueen tai yhteisön kulttuuria koskevaa tietoisuuttaan, ymmärtämystään ja arvostustaan. Tällöin otetaan huomioon erityisesti eurooppalainen identiteetti ja eurooppalainen monikielisyys ja -kulttuurisuus. Kielten opetus antaa opiskelijoille valmiudet kielten omaehtoiseen opiskeluun auttamalla heitä ymmärtämään, että viestintätaidon saavuttaminen edellyttää pitkäjänteistä ja monipuolista viestinnällistä harjoittelua. Vieras kieli oppiaineena on taito-, tieto- ja kulttuuriaine.
Vieraista kielistä käytetään seuraavia koodeja:

EN = englannin kieli
LA = latinan kieli
RA = ranskan kieli
SM = saamen kieli
SA = saksan kieli
VE = venäjän kieli
IA = italian kieli
EA = espanjan kieli
PO = portugalin kieli
KX = muu kieli

Perusopetuksen vuosiluokilla 1–6 alkanut oppimäärä (A)
Perusopetuksen vuosiluokilla 7–9 alkanut oppimäärä (B1)

Syventävät kurssit

Syventävillä kursseilla keskitytään kielitaidon monipuoliseen kehittämiseen.

7. Luonto ja kestävä kehitys

Kurssi antaa opiskelijalle valmiuksia ymmärtää ja käyttää luontoon, luonnontieteisiin ja kestävän kehityksen aihepiiriin liittyvää kieltä.

8. Yhteinen maailma ja kansainvälistyminen

Aihealueita ovat yleismaailmalliset kehityslinjat, ajankohtaiset tapahtumat ja erilaisiin maailmankuviin liittyvät aiheet.

5.7 Biologia

Biologia on luonnontiede, joka tutkii elollisen luonnon rakennetta, toimintaa ja vuorovaikutussuhteita molekyyli- ja solutasolta biosfääriin. Biologialle tieteenä on ominaista havainnointiin ja kokeellisuuteen perustuva tiedonhankinta. Biotieteet ovat nopeasti kehittyviä tiedonaloja, joiden sovelluksia hyödynnetään laajasti yhteiskunnassa. Biologia tuo esille uutta tietoa elollisen luonnon monimuotoisuudesta ja kestävän kehityksen edistämisestä.

Biologian opetuksen tarkoituksena on, että opiskelija ymmärtää toimivan eliömaailman rakenteen ja kehityksen, ihmisen osaksi eliömaailmaa sekä ihmisen toiminnan merkityksen ympäristössä. Lukion biologian tulee myös luoda perusta ymmärtää biotieteiden tarjoamia mahdollisuuksia edistää ihmiskunnan, muun eliökunnan ja elinympäristöjen hyvinvointia. Opetus kehittää opiskelijan luonnontieteellistä ajattelua, herättää kiinnostusta biotieteisiin sekä edistää opiskelijan luonnon monimuotoisuutta säilyttävää ja ympäristövastuullista käyttäytymistä.

Opetuksen tavoitteet

Biologian opetuksen tavoitteena on, että opiskelija
- tuntee biotieteiden, esimerkiksi bioteknologian ja lääketieteen sovelluksia
- tuntee ihmiselimistön toiminnan peruspiirteet
- tiedostaa kestävän kehityksen välttämättömyyden ja ymmärtää oman vastuunsa ekosysteemien tulevaisuudesta.

Pakolliset kurssit

1. Eliömaailma (BI1)
Tavoitteet
Kurssin tavoitteena on, että opiskelija
- ymmärtää, mitä luonnon monimuotoisuus biosysteemien eri tasoilla tarkoittaa
- tuntee ekosysteemien keskeiset toimintaperiaatteet.

Syventävät kurssit

3. Ympäristöekologia (BI3)

Tavoitteet
Kurssin tavoitteena on, että opiskelija
- osaa ekologian perusteet ja ymmärtää ihmisen toiminnan vaikutuksen elolliseen luontoon
- ymmärtää biodiversiteetin merkityksen ihmiskunnan tulevaisuudelle

- hahmottaa ympäristöongelmien syitä ja niiden seurauksia ekosysteemeissä
- tutustuu suomalaisiin ekosysteemeihin ja niiden erityispiirteisiin sekä perehtyy myös ihmisen muokkaamiin ekosysteemeihin
- tuntee ja osaa arvioida menetelmiä, joilla voidaan tarkkailla ympäristön tilaa ja ratkaista syntyneitä ongelmia
- osaa suunnitella ja toteuttaa pienen tutkimuksen ympäristön tilasta ja esittää sen tulokset
- kehittää ympäristölukutaitoaan, ymmärtää vastuunsa ympäristön tilasta ja osaa toimia kestävän kehityksen periaatteiden mukaisesti.

Keskeiset sisällöt

Ekologiset ympäristöongelmat, niiden syyt ja ratkaisumahdollisuudet
- aineiden kiertoon liittyvät ongelmat
- paikalliset ympäristöongelmat

Suomen luonnon haavoittuvuus
- pohjoiset metsät
- suot
- järvet ja virtavedet
- Itämeri

Kestävä tulevaisuus
- ekologisesti kestävä kehitys ja yksilön valinnat
- rakennettu ympäristö ja kaupunkiekologia
- ekologisesti kestävä tuotanto
- ympäristötekniikan mahdollisuudet

4. Ihmisen biologia (BI4)

Tavoitteet
Kurssin tavoitteena on, että opiskelija
- osaa ihmissolun erilaistumisen pääpiirteet sekä kudosten ja elinten rakenteet ja toimintaperiaatteet

Keskeiset sisällöt
Elimistöjen rakenne, toiminta ja merkitys
- ruoansulatus ja ravitsemus

Elimistön sopeutuminen ja puolustusmekanismit
- elimistön puolustusjärjestelmät
- ihminen ja mikrobit
- myrkylliset aineet ja mutageenit

5. Bioteknologia (BI5)

Tavoitteet
Kurssin tavoitteena on, että opiskelija
- tuntee biotekniikan tarjoamia sovellusmahdollisuuksia eri biotieteissä ja teollisuudessa

- pystyy arvioimaan biotekniikan kehittymisen luomia mahdollisuuksia, uhkatekijöitä ja eettisiä ongelmia sekä tekemään niiden pohjalta perusteltuja arkielämän ratkaisuja.

Keskeiset sisällöt
Biotekniikka teollisuudessa

Kasvien ja eläinten jalostus

Geenitekniikan etiikka ja lainsäädäntö

5.8 Maantiede

Maantieteessä tarkastellaan elottoman ja elollisen luonnon sekä ihmisen luomien järjestelmien rakennetta ja toimintaa. Maantieteen opetuksen tulee ohjata opiskelijaa tiedostamaan luonnon ja ihmistoiminnan vuorovaikutussuhteita sekä tarkastelemaan maailmaa muuttuvana ja kulttuurisesti monimuotoisena elinympäristönä. Maantieteen opetuksessa integroituvat luonnontieteelliset ja yhteiskuntatieteelliset aiheet. Opetuksen tavoitteena on, että opiskelija saa valmiuksia ympäristökysymysten alueelliseen jäsentämiseen ja kestävän kehityksen mukaisten ratkaisujen etsimiseen.

Lukion maantieteen opetuksen tulee auttaa opiskelijaa ymmärtämään maailmanlaajuisia, alueellisia ja paikallisia ilmiöitä ja ongelmia sekä niiden ratkaisumahdollisuuksia. Tavoitteena on, että opiskelija oppii maantieteellisen tiedon avulla havaitsemaan muuttuvaan maailmaan vaikuttavia tekijöitä, muodostamaan perusteltuja mielipiteitä, ottamaan kantaa lähialueilla ja koko maailmassa tapahtuviin muutoksiin sekä toimimaan aktiivisesti luonnon ja ihmisen hyvinvoinnin edistämiseksi.

Opetuksen tavoitteet

Maantieteen opetuksen tavoitteena on, että opiskelija
- osaa toimia ympäröivän maailman kysymyksiin kantaaottavana ja kestävän kehityksen puolesta toimivana aktiivisena maailmankansalaisena.

Pakolliset kurssit

1. Sininen planeetta (GE1)

Tavoitteet
Kurssin tavoitteena on, että opiskelija
osaa kuvata ilma-, vesi- ja kivikehän rakenteen ja toiminnan
Keskeiset sisällöt
Sää ja ilmasto
- sää ja sen ennustaminen
- lämpö- ja ilmastovyöhykkeet
- ilmastonmuutos

Maapallon kasvillisuusvyöhykkeet
- kasvillisuusvyöhykkeiden sijainti ja kuvaus
- ihmisen toiminnan edellytykset ja vaikutukset eri kasvillisuusvyöhykkeillä

2. Yhteinen maailma (GE2)

Tavoitteet
Kurssin tavoitteena on, että opiskelija
- osaa arvioida luonnonvarojen ja ympäristön tarjoamien mahdollisuuksien vaikutusta ihmisen toimintaan eri alueilla sekä ymmärtää ekologisesti ja taloudellisesti kestävän kehityksen merkityksen
- osaa arvioida ihmisten hyvinvointia, ympäristön tilaa sekä kulttuurisesti ja sosiaalisesti kestävää kehitystä nyt ja tulevaisuudessa maapallon eri alueilla.

Keskeiset sisällöt

Luonnonvarat
- luokittelu ja riittävyys

Alkutuotanto ja ympäristö
- ravinnontuotanto ja ravinnon riittävyys sekä kestävä maa- ja kalatalous
- maatalouden muodot
- metsät luonnonvarana ja kestävä metsätalous

Liikkuminen ja vuorovaikutus
- liikennejärjestelmät
- matkailu ja sen merkitys eri alueilla
- maailmankauppa
- alueellinen leviämisilmiö – maantieteellinen diffuusio

Kehityksen ohjailu ja kestävä kehitys
- aluesuunnittelu ja osallistuvan suunnittelun periaatteet
- kehittyneisyyserot eri aluetasoilla
- kansainvälinen yhteistyö
- globalisaatio

Syventävät kurssit

3. Riskien maailma (GE3)

Tavoitteet
Kurssin tavoitteena on, että opiskelija
- tuntee luonnon toimintaan, ihmisen toimintaan sekä ihmisen ja luonnon vuorovaikutukseen liittyvät riskit maapallolla sekä osaa arvioida niiden merkitystä ihmisen ja ympäristön kannalta
- ymmärtää, että ihminen vaikuttaa omalla toiminnallaan maapallon elinkelpoisuuteen sekä ihmisten hyvinvointiin ja turvallisuuteen

- tietää mahdollisuudet ennakoida ja varautua riskeihin, säädellä ristiriitoja sekä toimia kestävän kehityksen mukaisesti.

Keskeiset sisällöt

Riskien maantiede, riskien luokittelu ja merkitys

Ihmisen ja luonnon riippuvuuteen liittyvät ympäristöriskit ja riskialueet

- luonnonvarojen käyttöön liittyvät riskit: energiakysymykset ja luonnonvarojen riittävyys, puhtaan veden saatavuus, eroosio ja aavikoituminen, ilmaston muutos, saastuminen ja biodiversiteetin heikkeneminen
- mahdollisuudet estää ja pienentää ympäristöriskejä kestävän kehityksen keinoin

Ihmiskunnan riskit ja riskialueet

- väestönkasvu ja nälkä, kaupungistuminen, globalisoitumiseen liittyvät riskit, yhteiskunnalliset ja poliittiset jännitteet, sodat, pakolaisuus ja sosiaalinen eriarvoistuminen
- ristiriitojen säätelymahdollisuudet

Tekniset riskit

5.10 Kemia

Kemian opetuksen tarkoituksena on tukea opiskelijan luonnontieteellisen ajattelun ja nykyaikaisen maailmankuvan kehittymistä osana monipuolista yleissivistystä. Opetus välittää kuvaa kemiasta yhtenä keskeisenä perusluonnontieteenä, joka tutkii ja kehittää materiaaleja, tuotteita, menetelmiä ja prosesseja kestävän kehityksen edistämiseksi. Opetus auttaa ymmärtämään jokapäiväistä elämää, luontoa ja teknologiaa sekä kemian merkitystä ihmisen ja luonnon hyvinvoinnille tutkimalla aineita, niiden rakenteita ja ominaisuuksia sekä aineiden välisiä reaktioita.
Kemian opetukselle on luonteenomaista kemiallisten ilmiöiden ja aineiden ominaisuuksien havaitseminen ja tutkiminen kokeellisesti, ilmiöiden tulkitseminen ja selittäminen mallien ja rakenteiden avulla, ilmiöiden kuvaaminen kemian merkkikielellä sekä ilmiöiden mallintaminen ja matemaattinen käsittely. Monipuolisin työtavoin ja arviointimenetelmin opiskelijoita ohjataan kemian tietojen ja taitojen sekä persoonallisuuden kaikkien osa-alueiden kehittämiseen. Kemian opetuksen toteutuksessa otetaan huomioon opiskelijoiden opiskeluvalmiudet ja luodaan myönteinen kuva kemiaa sekä sen opiskelua kohtaan.

Opetuksen tavoitteet

Kemian opetuksen tavoitteena on, että opiskelija

- osaa käyttää kemiallista tietoa kuluttajana terveyden ja kestävän kehityksen edistämisessä sekä osallistuttaessa luontoa, ympäristöä ja teknologiaa koskevaan keskusteluun ja päätöksentekoon

Pakollinen kurssi

1. Ihmisen ja elinympäristön kemia (KE1)

Tavoitteet

Kurssin tavoitteena on, että opiskelija

- osaa orgaanisten yhdisteiden rakenteita, niiden ominaisuuksia ja reaktioita sekä ymmärtää niiden merkityksen ihmiselle ja elinympäristölle

Keskeiset sisällöt

- orgaanisia yhdisteryhmiä kuten hiilivetyjä, orgaanisia happiyhdisteitä, orgaanisia typpiyhdisteitä sekä niiden ominaisuuksia ja sovelluksia

5.12 Elämänkatsomustieto

Elämänkatsomustieto oppiaineena on perustaltaan monitieteinen. Filosofian ohella se hyödyntää niin ihmis-, yhteiskunta- kuin kulttuuritieteitäkin. Elämänkatsomustiedon opetuksessa ihmisiä pidetään luonnollisina, tajunnallisina ja kulttuurisina toimijoina, jotka luovat ja uusintavat merkityksiä keskinäisessä kanssakäymisessään. Inhimilliset katsomukset ja käytännöt nähdään yksilöiden, yhteisöjen ja traditioiden vuorovaikutuksen tuloksena syntyneinä.
Elämänkatsomustiedon opetus rakentuu ihmiskäsitykselle, joka korostaa ihmisten mahdollisuutta elää vapaina ja keskenään tasavertaisina, aktiivisina ja tavoitteellisina. Oppiaineen opetuksessa painotetaan ihmisten kykyä tutkia maailmaansa ja laajentaa sitä koskevaa tietämystään sekä yhteisellä toiminnallaan tietoisesti ohjata elämäänsä. Näistä lähtökohdista oppiaine tukee opiskelijoiden elämänkatsomuksen ja identiteetin muotoutumista sekä heidän yhteisöllisten hyvän elämän ihanteidensa ja käytäntöjensä hahmottumista.
Opetuksen tavoitteet

Elämänkatsomustiedon opetuksen tavoitteena on, että opiskelija saa tukea pyrkimyksilleen

- rakentaa identiteettiään ja elämänkatsomustaan
- laajentaa katsomuksellista ja kulttuurista yleissivistystään
- kehittää arvostelu-, harkinta ja toimintakykyään
- sisäistää ihmisoikeuksien, myönteisen monikulttuurisuuden, yhteiskunnallisen ja globaalin oikeudenmukaisuuden sekä kestävän kehityksen periaatteita.

Pakolliset kurssit

3. Yksilö ja yhteisö (ET3)

Kurssilla pohditaan yksilöä, yhteisöllisyyttä, yhteiskuntaa ja ihmisten välistä vuorovaikutusta. Kurssilla perehdytään oikeudenmukaisuuden, ihmisoikeuksien ja demokratian toteutumiseen.

Tavoitteet
Kurssin tavoitteena on, että opiskelija

- ymmärtää yhteisöllisyyden merkityksen ihmisyydelle ja yksilölliselle identiteetille
- oppii arvioimaan omaa asemaansa yksilönä yhteisöissä ja yhteiskunnassa, kansalaisena valtiossa ja toimijana talous- ja järjestelmässä
- oppii tarkastelemaan yksilöiden, yhteisöjen ja instituutioiden toimintaa osana yhteiskunnallista vallankäyttöä
- oppii arvioimaan poliittisia keinoja ja päämääriä sekä kasvattaa kykyään ja haluaan rakentavaan yhteiskunnalliseen osallistumiseen
- ymmärtää ihmisoikeuksien, demokratian ja oikeudenmukaisuuden merkityksen hyvän yhteiskunnan ja tulevaisuuden kannalta.

Keskeiset sisällöt

- ihminen sosiaalisena olentona, yksilöiden vuorovaikutus ja yhteisöllisyys, yksityinen ja julkinen
- vallan käsite, vallan muodot ja valtasuhteet sekä erilaiset vaikuttamiskeinot
- teorioita yhteiskunnan rakenteesta ja muutoksesta
- hyvä kansalainen suomalaisena, eurooppalaisena ja maailmankansalaisena
- ihmisoikeudet ja niiden historia
- poliittiset ihanteet, ideologiat, utopiat ja demokratian muodot
- oikeudenmukaisuus yhteiskunnallisena, maailmanlaajuisena ja ekologisena kysymyksenä

5.14 Historia

Lukion historian opetus luo opiskelijalle edellytyksiä ymmärtää eri aikakausien luonnetta, oman aikansa ongelmia ja muutosprosesseja sekä auttaa häntä hahmottamaan kansainvälistä maailmaa. Historia on yksilöllistä, kansallista ja eurooppalaista identiteettiä luova oppiaine.

Opetuksen lähtökohtana ovat historian luonne tieteenalana ja sen tiedon muodostumisen perusteet. Sen vuoksi huomiota kiinnitetään tietojen kriittiseen pohdintaan ja tulkintaan sekä pyritään ottamaan huomioon ilmiöiden moniperspektiivisyys. Historian keskeisiä käsitteitä ovat aika, muutos ja jatkuvuus sekä syy-yhteydet. Muutoksen analyysia korostavana oppiaineena historia luo mahdollisuuksia käsitellä tulevaisuutta sekä arvioida tulevaisuuteen liittyvä mahdollisuuksia. Opetuksessa korostetaan ihmisen ja ympäristön välistä suhdetta sekä inhimillisen kulttuurin laaja-alaisuutta, kulttuurien erilaisuuden ymmärtämistä ja kansainvälisen yhteisymmärryksen merkitystä. Oman maan menneisyyttä tarkastellaan maailmanhistorian taustaa vasten.

Opetuksen tavoitteet

Historian opetuksen tavoitteena on, että opiskelija
- saa aineksia ihmisoikeuksia ja demokratiaa arvostavan maailmankuvan luomiseen sekä toimintaan vastuullisena kodinsa ja yhteisönsä jäsenenä

Pakolliset kurssit

1. Ihminen, ympäristö ja kulttuuri (HI1)

Kurssi tarkastelee ihmisen ja luonnon vuorovaikutusta sekä tämän tuloksena tapahtunutta kulttuuriympäristön rakentumista ja kehittymistä esihistoriasta nykyaikaan.

Tavoitteet
Kurssin tavoitteena on, että opiskelija
- ymmärtää ihmisen ja luonnon välisen riippuvuussuhteen osana kestävää kehitystä
- ymmärtää, miten ihminen käyttää luonnonvaroja toimeentulon lähteenä ja miten se vaikuttaa ympäristöön ja yhteiskuntarakenteeseen
- tuntee tuotantotalouden kehityslinjat ja vaikutukset elämäntapaan
- tietää väestönkasvun pääpiirteet ja siihen vaikuttavat tekijät.

Keskeiset sisällöt

Esihistoria – pyyntikulttuurin aika
- ihmisen kehitysvaiheet
- keräilijöiden ja metsästäjien elämäntapa

Maanviljely ja sen aiheuttamat muutokset
- työnjako ja kulttuurin synty
- suurten jokilaaksojen kulttuurit

Keskiajan talous- ja yhteiskuntajärjestelmä
- feodaaliyhteiskunta
- keskiajan väestö, kauppa ja kaupunki

Löytöretket
- löytöretkien edellytykset ja seuraukset
- maailmantalouden syntyminen

Teollistuva maailma
- tekniset innovaatiot ja koneteollisuuden alkuvaiheet
- muutokset sukupuolten työnjaossa
- yhteiskunnalliset muutokset ja ympäristövaikutukset
- muutokset kaupunkirakenteessa

Globaali kulutusyhteiskunta
- raaka-aineiden ja markkinoiden jakaminen
- massatuotanto ja kulutusyhteiskunta

- sosialistinen suunnitelmatalous
- kolmannen maailman muotoutuminen
- kasvun rajat ja uudet haasteet

5.20 Terveystieto

Terveystieto on monitieteiseen tietoperustaan nojautuva oppiaine, jonka tarkoitus on edistää terveyttä, hyvinvointia ja turvallisuutta tukevaa osaamista. Tämä osaaminen ilmenee tiedollisina, sosiaalisina, tunteiden käsittelyä ohjaavina, toiminnallisina, eettisinä sekä tiedonhankintavalmiuksina. Terveysosaamiseen kuuluu valmius ottaa vastuuta oman ja toisten terveyden edistämisestä. Lukion terveystiedon opetuksessa terveyttä ja sairautta sekä terveyden edistämistä ja sairauksien ehkäisyä ja hoitoa tarkastellaan yksilön, perheen, yhteisön ja yhteiskunnan näkökulmasta.

Terveys ymmärretään fyysisenä, psyykkisenä ja sosiaalisena työ- ja toimintakykynä. Lukion terveystiedon opiskelussa terveyteen ja sairauksiin liittyviä ilmiöitä tarkastellaan tutkimus- ja kokemustiedon avulla. Tärkeää on myös terveyttä koskeva arvopohdinta.

Opetuksen tavoitteet

Terveystiedon opetuksen tavoitteena on, että opiskelija

- ymmärtää työ- ja toimintakyvyn, turvallisuuden sekä sairauksien ehkäisyn ja terveyden edistämisen merkityksen
- osaa käyttää terveyden edistämiseen, terveyteen ja sairauteen liittyviä keskeisiä käsitteitä

Syventävät kurssit

2. Nuoret, terveys, ja arkielämä (TE2)

Kurssilla syvennetään pakollisen kurssin tavoitteita nuoren arkielämän terveystottumuksien ja selviytymisen keinojen osalta.

Tavoitteet

Kurssin tavoitteena on, että opiskelija

- osaa perustella omia valintojaan terveyden näkökulmasta ja arvioida elämäntapaan ja ympäristöön liittyvien valintojen merkitystä terveydelle ja hyvinvoinnille

Keskeiset sisällöt

- ruuan terveydelliset, kulttuuriset ja yhteiskunnalliset merkitykset sekä painonhallinta, terveysliikunta, syömishäiriöt

Edu.fi – opettajan verkkopalvelu

Opetussuunnitelmien perusteet

Kestävä kehitys on aihekokonaisuus sekä perusopetuksen että lukion opetussuunnitelmien perusteissa. Kestävän kehityksen tavoitteita ja sisältöjä esiintyy eri oppiaineissa niille luonteenomaisista näkökulmista.

Perusopetus

Vastuu ympäristöstä, hyvinvoinnista ja kestävästä tulevaisuudesta (aihekokonaisuutena)

Vastuu ympäristöstä, hyvinvoinnista ja kestävästä tulevaisuudesta -aihekokonaisuuden päämääränä on lisätä oppilaan valmiuksia ja motivaatiota toimia ympäristön ja ihmisen hyvinvoinnin puolesta. Perusopetuksen tavoitteena on kasvattaa ympäristötietoisia, kestävään elämäntapaan sitoutuneita kansalaisia. Koulun tulee opettaa tulevaisuusajattelua ja tulevaisuuden rakentamista ekologisesti, taloudellisesti, sosiaalisesti ja kulttuurisesti kestäville ratkaisuille.

Tavoitteet

Oppilas oppii

- ymmärtämään ympäristönsuojelun välttämättömyyden ja ihmisen hyvinvoinnin edellytykset ja niiden välisen yhteyden
- havaitsemaan ympäristössä ja ihmisten hyvinvoinnissa tapahtuvia muutoksia, selvittämään syitä ja seurauksia sekä toimimaan elinympäristön hyväksi ja hyvinvoinnin lisäämiseksi
- arvioimaan oman kulutuksensa ja arkikäytäntöjensä vaikutuksia ja omaksumaan kestävän kehityksen edellyttämiä toimintatapoja
- edistämään hyvinvointia omassa yhteisössä sekä ymmärtämään hyvinvoinnin uhkia ja mahdollisuuksia globaalilla tasolla
- ymmärtämään, että yksilö rakentaa valinnoillaan sekä omaa tulevaisuuttaan että yhteistä tulevaisuuttamme, ja toimimaan rakentavasti kestävän tulevaisuuden puolesta.

Keskeiset sisällöt

- ekologisesti, taloudellisesti, kulttuurisesti ja sosiaalisesti kestävä kehitys omassa koulussa ja elinympäristössä
- yksilön ja yhteisön vastuu elinympäristön tilasta ja ihmisten hyvinvoinnista
- ympäristöarvot ja kestävä elämäntapa
- ekotehokkuus tuotannossa ja yhteiskunnassa sekä arjen toimintavoissa, tuotteen elinkaari
- oman talouden hallinta ja kulutuskäyttäytyminen, kuluttajan vaikuttamiskeinot

- toivottava tulevaisuus ja sen edellyttämät valinnat ja toiminta.

Lukio

Kestävä kehitys (aihekokonaisuutena)

Kestävän kehityksen päämääränä on turvata nykyisille ja tuleville sukupolville hyvän elämän mahdollisuudet. Ihmisen tulee oppia kaikessa toiminnassaan sopeutumaan luonnon ehtoihin ja maapallon kestokyvyn rajoihin. Lukion tulee kannustaa opiskelijoita kestävään elämäntapaan ja toimintaan kestävän kehityksen puolesta.

Tavoitteena on, että opiskelija

- tuntee perusasiat kestävän kehityksen ekologisesta, taloudellisesta, sosiaalisesta ja kulttuurisesta ulottuvuudesta sekä ymmärtää, että vasta niiden samanaikainen toteuttaminen tekee kehityksestä kestävän
- osaa mitata, arvioida ja analysoida sekä luonnonympäristössä että kulttuuri- ja sosiaalisessa ympäristössä tapahtuvia muutoksia
- pohtii, millainen on kestävä elämäntapa, luontoa pilaamaton ja ekotehokas tuotanto ja yhdyskunta, sosiaalista pääomaansa vahvistava yhteisö ja yhteiskunta sekä luontoperustastaan ylisukupolvisesti huolehtiva kulttuuri
- osaa ja tahtoo toimia kestävän kehityksen puolesta omassa arjessaan, lukiolaisena, kuluttajana ja aktiivisena kansalaisena
- osaa tehdä yhteistyötä paremman tulevaisuuden puolesta paikallisesti, kansallisesti ja kansainvälisesti.

Kestävän kehityksen haasteita tulee oppia tarkastelemaan monista näkökulmista: Selvitetään, miten ihmistoiminta on vaikuttanut ympäristöön ja miten ihmisen tapa muokata ympäristöjään on muuttunut kulttuurievoluution aikana. Analysoidaan maailmanlaajuisia ympäristöuhkia ja niiden syitä sekä keinoja korjata kehityksen suuntaa. Tarkastellaan väestönkasvuun, köyhyyteen ja nälkään liittyviä ongelmia. Arvioidaan aineiden ja energian kiertokulkuja luonnossa ja tuotantojärjestelmissä sekä opetetaan säästämään energiaa ja raaka-aineita. Pohditaan, millaista voisi olla taloudellinen kasvu, joka ei perustu raaka-aineiden ja energian käytön lisäämiseen, ja mikä merkitys talouden vakaudella on ympäristönsuojelulle ja ihmisten hyvinvoinnille. Tutustutaan kestävän kehityksen periaatteita toteuttaviin yrityksiin ja teknologioihin sekä opitaan käyttämään kuluttajan vaikutuskeinoja. Selvitetään, miten ihmisen toiminnot voivat sopeutua ympäristöihinsä kulttuuriperintöä arvostaen ja luonnon monimuotoisuutta vaarantamatta. Harjoitellaan kestävän elämäntavan käytäntöjä ja selvitetään niiden rakenteellisia edellytyksiä. Opetukseen ja lukion arkeen tuodaan esimerkkejä onnistuneista käytännöistä.
Rohkaistuakseen aktiiviseksi kestävän kehityksen edistäjäksi opiskelija tarvitsee kokemuksia siitä, että hänen omilla eettisillä, käytännöllisillä, taloudellisilla, yhteiskunnallisilla ja ammatillisilla valinnoillaan on merkitystä. Kestävän kehityksen edistämisessä tulee luoda yleiskuva muutostarpeen mittavuudesta ja siitä, että tarvittaviin tuloksiin päästään vain laajalla yhteistyöllä. Opetuksen lisäksi kestävään elämäntapaan kannustavat mahdollinen lukion oma ympäristöohjelma tai kestävän kehityksen ohjelma sekä ympäristötietoinen toimintakulttuuri.

Appendix 3 National curriculum - Italy

Issued in 2004 from the web of the Ministry of
http://archivio.pubblica.istruzione.it/normativa/2004/allegati/all_A1_valutazione.doc

First two years of the primary school

A1 - Esempi di abilità correlate con le conoscenze, relativi alle classi fino al termine del PRIMO PERIODO della scuola PRIMARIA, desunte dagli Obiettivi specifici di apprendimento delle *Indicazioni Nazionali*

Disciplina	*ABILITÀ*
Italiano	Comprendere, ricordare e riferire i contenuti essenziali dei testi ascoltati
	Produrre semplici testi scritti descrittivi, narrativi, regolativi
	Comprendere il significato di semplici testi orali e scritti riconoscendone la funzione (descrivere, narrare, regolare, …) e individuandone gli elementi essenziali (personaggi, luoghi, tempi)
	Rispettare le convenzioni di scrittura conosciute
	....
	....

Inglese	Comprendere ed eseguire istruzioni e procedure
	Individuare luoghi e oggetti familiari e descriverne le caratteristiche generali
	Scoprire differenze di vita e di abitudini all'interno dei gruppi (familiari, scolastici…)
	Riconoscere e riprodurre suoni e ritmi della L2
	....
	....

Storia	Collocare nel tempo fatti ed esperienze vissute e riconoscere rapporti di successione esistenti tra loro
	Distinguere e confrontare alcuni tipi di fonte storica orale e scritta
	Leggere ed interpretare le testimonianze del passato presenti sul territorio
	Rilevare il rapporto di contemporaneità tra azioni e situazioni
	....
	....

Geografia	Riconoscere la propria posizione e quella degli oggetti nello spazio vissuto rispetto a diversi punti di riferimento
	Leggere semplici rappresentazioni iconiche e cartografiche, utilizzando le legende e i punti cardinali
	Riconoscere gli elementi fisici e antropici di un paesaggio, cogliendo i principali rapporti di connessione e interdipendenza
	Riconoscere le più evidenti modificazioni apportate dall'uomo nel proprio territorio
	....
	....

Matematica	Usare il numero per contare, confrontare e ordinare raggruppamenti di oggetti
	Ipotizzare l'ordine di grandezza del risultato per ciascuna delle quattro operazioni tra numeri naturali
	Costruire mediante modelli materiali, disegnare, denominare e descrivere alcune fondamentali figure geometriche del piano e dello spazio
	Effettuare misure dirette ed indirette di grandezze (lunghezze, tempi, …) ed esprimerle secondo unità di misure convenzionali e non convenzionali
	....
	....

Scienze	Stabilire e applicare criteri semplici per mettere ordine in un insieme di oggetti
	Ordinare corpi in base alle loro proprietà di leggerezza, durezza, fragilità
	Descrivere un ambiente esterno mettendolo in relazione con l'attività umana
	Comprendere la necessità di complementarietà e sinergia per la sopravvivenza dell'ambiente e dell'uomo
	....
	....

Tecnologia e Informatica	Classificare i materiali in base alle caratteristiche di: pesantezza/leggerezza, resistenza, fragilità, durezza, elasticità, plasticità
	Osservare e analizzare gli oggetti, gli strumenti e le macchine d'uso comune utilizzati nell'ambiente di vita classificandoli in base alle loro funzioni
	Scrivere semplici brani utilizzando la videoscrittura e un correttore ortografico e grammaticale
	Utilizzare il computer per eseguire semplici giochi anche didattici
	....
	....

Musica	Utilizzare la voce, il proprio corpo, e oggetti vari per espressioni parlate, recitate e cantate
	Eseguire per imitazione, semplici canti e brani, individualmente e/o in gruppo, accompagnandosi con oggetti di uso comune
	Discriminare e interpretare gli eventi sonori , dal vivo o registrati
	Riconoscere, descrivere, analizzare, classificare e memorizzare suoni ed eventi sonori in base ai parametri distintivi
	....
	....

Arte e Immagine	Rappresentare figure umane con uno schema corporeo strutturato
	Utilizzare tecniche grafiche e pittoriche, manipolare materiali plastici e polimaterici a fini espressivi
	Collocare gli oggetti nello spazio individuando i campi e i piani
	Riconoscere e usare gli elementi del linguaggio visivo: il segno, la linea, il colore, lo spazio
	....

	....

Scienze motorie e sportive	Riconoscere e denominare le varie parti del corpo
	Variare gli schemi motori in funzione di parametri di spazio, tempo, equilibri (eseguire una marcia, una danza, …)
	Utilizzare il linguaggio gestuale e motorio per comunicare, individualmente e collettivamente, stati d'animo, idee, situazioni, ecc.
	Rispettare le regole dei giochi organizzati, anche in forma di gara
	....
	....

Religione cattolica	Comprendere, attraverso i racconti biblici delle origini, che il mondo è opera di Dio, affidato alla responsabilità dell'uomo
	Cogliere i segni cristiani del Natale e della Pasqua
	Riconoscere nei santi e nei martiri, di ieri e di oggi,, progetti riusciti di vita cristiana
	Identificare tra le espressioni delle religioni la preghiera e, nel "Padre Nostro", la specificità della preghiera cristiana
	....
	....

A2 - Esempi di abilità correlate con le conoscenze, relativi alle classi del SECONDO PERIODO della scuola PRIMARIA, desunte dagli Obiettivi specifici di apprendimento delle *Indicazioni Nazionali*

Disciplina	*ABILITÀ*
Italiano	Esprimere attraverso il parlato spontaneo o parzialmente pianificato pensieri, stati d'animo, affetti rispettando l'ordine causale e temporale
	Usare registri linguistici diversi in relazione con il contesto
	Produrre testi scritti coesi e coerenti per raccontare esperienze personali o altrui, esporre argomenti noti, esprimere opinioni e stati d'animo, in forme adeguate allo scopo e al destinatario
	Riconoscere in un testo alcuni fondamentali connettivi (temporali,spaziali, logici,ecc.)
	....
	....

Inglese	Scrivere semplici messaggi seguendo un modello dato
	Comprendere semplici e chiari messaggi con lessico e strutture noti su argomenti familiari
	Rilevare diversità culturali in relazione ad abitudini di vita e a condizioni climatiche
	Produrre suoni e ritmi della L2 attribuendovi significati e funzioni
	....
	....

Storia	Individuare elementi di contemporaneità, di sviluppo nel tempo e di durata nei quadri storici di civiltà studiati
	Conoscere ed usare termini specifici del linguaggio disciplinare
	Collocare nello spazio gli eventi, individuando i possibili nessi tra eventi storici e caratteristiche geografiche di un territorio
	Scoprire radici storiche antiche della realtà locale
	....

	....

Geografia	Orientarsi e muoversi nello spazio, utilizzando piante e carte stradali
	Realizzare schizzi di percorsi finalizzati e mappe mentali di territori dell'Italia e della propria regione con la simbologia convenzionale
	Riconoscere le più evidenti modificazioni apportate nel tempo dall'uomo sul territorio regionale e nazionale, utilizzando fotografie e carte
	Progettare itinerari di viaggio, segnalando e collegando le diverse tappe sulla carta
	....
	....

Matematica	Eseguire le quattro operazioni anche con numeri decimali con consapevolezza del concetto e padronanza degli algoritmi
	In contesti diversi individuare, descrivere e costruire relazioni significative: analogie, differenze, regolarità
	Esplorare modelli di figure geometriche; costruire disegnare le principali figure geometriche esplorate
	Partendo dall'analisi del testo di un problema, individuare le informazioni necessarie per raggiungere un obiettivo, organizzare un percorso di soluzione e realizzarlo
	....
	....

Scienze	Indicare esempi di relazioni degli organismi viventi con il loro ambiente
	Descrivere il ciclo vitale di una pianta, di un animale, dell'uomo
	Effettuare esperimenti su fenomeni
	Indicare le misure di prevenzione e di intervento
	….
	….

Tecnologia e Informatica	Progettare e costruire modelli di macchine che utilizzano diverse forme di energia per scoprirne problemi e funzioni
	Adoperare le procedure più elementari dei linguaggi di rappresentazione grafico/iconico e modellistico tridimensionale
	Approfondire ed estendere l'impiego della videoscrittura
	Utilizzare semplici algoritmi per l'ordinamento e la ricerca
	…
	…

Musica	Usare le risorse espressive della vocalità, nella lettura, recitazione e drammatizzazione di testi verbali, e intonando semplici brani monodici e polifonici, singolarmente e in gruppo
	Usare lo strumentario di classe, sperimentando e perseguendo varie modalità di produzione sonora
	Cogliere i più immediati valori espressivi delle musiche ascoltate, traducendoli con la parola, l'azione motoria, il disegno
	Riconoscere alcune strutture fondamentali del linguaggio musicale, mediante l'ascolto di brani di epoche e generi diversi
	….
	….

Arte e	Identificare in un testo visivo gli elementi del relativo linguaggio (linee, colore, distribuzione delle forme, ritmi, configurazioni spaziali, sequenze, metafore, campi piani, …)
	Rielaborare, ricombinare e modificare creativamente disegni e immagini, materiali d'uso, testi, suoni per produrre immagini

Immagine	Analizzare, classificare ed apprezzare i beni del patrimonio artistico-culturale presenti sul proprio territorio
	Utilizzare tecniche artistiche tridimensionali e bidimensionali su supporti di vario tipo
	….
	….

Scienze motorie e sportive	Utilizzare schemi motori e posturali, le loro interazioni in situazione combinata e simultanea
	Eseguire semplici composizioni e/o progressioni motorie, utilizzando un'ampia gamma di codici espressivi
	Rispettare le regole dei giochi sportivi praticati
	Riconoscere il rapporto tra alimentazione e benessere fisico
	….
	….

Religione cattolica	Evidenziare la risposta della Bibbia alle domande di senso dell'uomo e confrontarla con quella delle principali religioni
	Leggere e interpretare i principali segni religiosi espressi dai diversi popoli
	Evidenziare l'apporto che, con la diffusione del Vangelo, la Chiesa ha dato alla società e alla vita di ogni persona
	Individuare significative espressioni di arte cristiana, per rilevare come la fede è stata interpretata dagli artisti nel corso dei secoli
	....
	....

Esempi di abilità correlate con le conoscenze, relativi alle discipline riferite alle classi del PRIMO PERIODO della scuola SECONDARIA DI I GRADO, desunte dagli Obiettivi specifici di apprendimento delle *Indicazioni Nazionali*

Disciplina	*ABILITÀ*
Italiano	Comprendere testi d'uso quotidiano e riorganizzare le informazioni raccolte in appunti, schemi, tabelle, testi di sintesi vari.
	Comprendere ed interpretare in forma guidata e/o autonoma testi letterari e non (espositivi, narrativi, descrittivi, regolativi,ecc.)
	Produrre testi scritti, a seconda degli scopi e dei destinatari, espositivi, epistolari, espressivi, poetici, regolativi, informativi, testi d'uso
	Svolgere progetti tematici e produrre testi adeguati sulla base di un progetto stabilito
	….
	….

Inglese	Interagire in semplici scambi dialogici relativi alla vita quotidiana dando e chiedendo informazioni
	Usare un lessico adeguato e funzioni comunicative appropriate
	Identificare informazioni specifiche in testi semi-autentici/autentici di diversa natura
	Riconoscere le caratteristiche significative di alcuni aspetti della cultura anglosassone e operare confronti con la propria
	….
	….

Seconda Lingua Comunitaria	Comprendere semplici e chiari messaggi orali riguardanti la vita quotidiana
	Leggere e comprendere brevi testi d'uso e semplici descrizioni
	Produrre brevi testi scritti, utilizzando il lessico conosciuto
	Confrontare modelli di civiltà e di cultura diversi

	….
	….

Storia	Utilizzare termini specifici del linguaggio disciplinare
	Comprendere aspetti essenziali della metodologia della ricerca storica e delle categorie di interpretazione storica
	Distinguere e selezionare vari tipi di fonte storica, ricavare informazioni da una o più fonti
	Scoprire specifiche radici storiche nella realtà locale e regionale
	….
	….

Geografia	Orientarsi sul terreno con l'uso della carta topografica, della pianta, della bussola
	Riconoscere le trasformazioni apportate dall'uomo sul territorio, utilizzando carte ed immagini
	Analizzare, mediante osservazione diretta/indiretta, un territorio per conoscere e comprendere la sua organizzazione
	Individuare aspetti e problemi dell'interazione uomo-ambiente nel tempo
	….
	….

Matematica	Risolvere problemi e calcolare semplici espressioni tra numeri interi mediante l'uso delle quattro operazioni
	Riconoscere situazioni problematiche, individuando i dati da cui partire e l'obiettivo da conseguire
	Esporre chiaramente un procedimento risolutivo, evidenziando le azioni da compiere e il loro collegamento
	Risolvere problemi usando proprietà geometriche delle figure ricorrendo a modelli materiali e a semplici deduzioni e ad opportuni strumenti di rappresentazione
	….
	….

Scienze	Raccogliere informazioni sulle catene alimentari in ambienti noti
	Effettuare semplici esperimenti di caratterizzazione di terreni diversi
	Identificare in termini essenziali i rapporti tra uomo, animali e vegetali in ambienti noti
	Riconoscere ecosistemi locali e fattori e condizioni del loro equilibrio
	….
	….

Tecnologia	Riconoscere, analizzare e descrivere oggetti, utensili, macchine, impianti, reti e assetti territoriali nelle loro procedure costruttive
	Rappresentare graficamente un oggetto in modo intuitivo o con il supporto di mezzi tecnologici
	Riconoscere ed analizzare il settore produttivo di provenienza di oggetti presi in esame
	Costruire bozzetti o modelli riferiti ad oggetti d'uso comune
	….
	….

	Utilizzare programmi specifici per presentazioni e comunicazioni di idee, contenuti, immagini ecc.

Informatica	Tradurre in programmi algoritmi (ordinamento, calcolo, ragionamento logico-matematico) utilizzando un semplice linguaggio di programmazione
	Utilizzare computer e software specifici per approfondire o recuperare aspetti disciplinari e interdisciplinari
	Utilizzare le risorse reperibili sia in Internet sia negli archivi locali
	….
	….

Musica	Possedere le elementari tecniche esecutive degli strumenti didattici e eseguire semplici brani ritmici e melodici
	Riprodurre con la voce brani corali ad una o più voci anche con appropriati arrangiamenti strumentali
	Improvvisare sequenze ritmiche e melodiche a partire da stimoli di diversa natura (musicali, grafici, verbali, ecc.).
	Riconoscere e analizzare con linguaggio appropriato le fondamentali strutture del linguaggio musicale e la loro valenza espressiva
	….
	….

Arte e Immagine	Leggere e interpretare i contenuti di messaggi visivi rapportandoli ai contesti in cui sono stati prodotti
	Inventare e produrre messaggi visivi con l'uso di tecniche e materiali diversi
	Individuare e classificare simboli e metafore utilizzate nel campo dell'arte e della pubblicità
	Riconoscere e leggere le tipologie principali dei beni artistico-culturali
	….
	….

Scienze motorie e sportive	Utilizzare efficacemente le proprie capacità in condizioni facili e normali di esecuzione
	Usare consapevolmente il linguaggio del corpo utilizzando vari codici espressivi, combinando la componente comunicativa e quella estetica
	Rispettare il codice deontologico dello sportivo e le regole delle discipline sportive praticate
	Riconoscere il corretto rapporto tra esercizio fisico - alimentazione - benessere
	….
	….

Religione Cattolica	Riconoscere le dimensioni fondamentali dell'esperienza di fede di alcuni personaggi biblici
	Confrontare spiegazioni religiose e scientifiche del mondo e della vita
	Individuare nelle testimonianze di vita evangelica scelte di libertà per un proprio progetto di vita
	Motivare le risposte del cristianesimo ai problemi della società di oggi
	….
	….

Source:
http://archivio.pubblica.istruzione.it/ministro/comunicati/2004/allegati/all_b.doc
(In this document are specified objectives of the curricula at the end of the primary school, among these there are some specific ones for the Environmental Education)

Primary school – environmental education

Educazione ambientale

- Flora, fauna, equilibri ecologici tipici del proprio ambiente di vita.
- Le tradizioni locali più significative..
- I bisogni dell'uomo e le forme di utilizzo dell'ambiente.
- Gli interventi umani che modificano il paesaggio e l'interdipendenza uomo-natura
- L'ambiente antropizzato e l'introduzione di nuove colture nel tempo e oggi.
- Orti e giardini: forme storiche e naturalistiche
- I ruoli dell'Amministrazione Comunale, delle associazioni private, delle istituzioni museali, ecc…, per la conservazione e la trasformazione dell'ambiente.

- Esplorare gli elementi tipici di un ambiente naturale ed umano, inteso come sistema ecologico.
- Comprendere l'importanza del necessario intervento dell'uomo sul proprio ambiente di vita, avvalendosi di diverse forme di documentazioni.
- Fare un bilancio dei vantaggi/svantaggi che la modifica di un certo ambiente ha recato all'uomo che lo abita.
- Rispettare le bellezze naturali ed artistiche.
- Curare e progettare aspetti della manutenzione di orti e giardini
- Elaborare semplici progetti di restauro, di conservazione, di intervento per un uso consapevole dell'ambiente.
- Visitare le principali istituzioni pubbliche che si occupano dell'ambiente e collegarsi per quanto possibile con la loro attività.
- Documentare un progetto di collaborazione tra Istituzioni diverse che operano a difesa e a valorizzazione dell'ambiente (scuola, comune, associazioni, provincia, …).
- Individuare un problema ambientale (dalla salvaguardia di un monumento alla conservazione di una spiaggia ecc…), analizzarlo ed elaborare semplici ma efficaci proposte di soluzione
- Se possibile, anche in collaborazione con altre istituzioni, intervenire per risolvere il problema.
- Realizzare un Laboratorio di restauro di piccoli oggetti legati alla tradizione locale e di progettazione di interventi per un uso consapevole dell'ambiente.
- Usare in modo corretto le risorse, evitando sprechi d'acqua e di energia, forme di inquinamento, …
- Praticare forme di riutilizzo e riciclaggio dell'energia e dei materiali.

Lower secondary school

Educazione ambientale

- Analisi scientifica dei problemi ambientali individuati nel proprio territorio.	- Individuare ed analizzare da un punto di vista scientifico le maggiori problematiche dell'ambiente in cui si vive ed elaborare ipotesi d'intervento.
- Relazione tra problematiche ambientali e patrimonio artistico.	- Scoprire problemi di manutenzione delle piante in ambienti diversi (orti, giardini interni ed esterni, serre ecc.)
- Estetica e funzionalità del territorio e delle sue sistemazioni anche paesaggistiche	- Individuare le modalità comunicative più efficaci per diffondere nel proprio territorio le analisi elaborate.
- Analisi scientifiche e differenti scuole di pensiero nell'affrontare i problemi ambientali.	- Analizzare documenti specifici elaborati da organismi nazionali ed internazionali sulle problematiche ambientali.
- Funzioni delle varie istituzioni esistenti a difesa e tutela dell'ambiente.	- Analizzare dati internazionali, nazionali, locali relativi ai più vistosi problemi ambientali. - Analizzare l'efficacia di intervento delle varie Istituzioni.
- Strumenti tecnologici utilizzati dalle varie Istituzioni per il controllo e il monitoraggio ambientale (laboratori, rilevatori satellitari, impianti di depurazione, …).	- Riconoscere in situazione gli interventi delle istituzioni pubbliche e non che si occupano dei problemi ambientali. - Progettare e realizzare visite guidate.
- Varie forme di inquinamento, desertificazione, deforestazione, effetto serra: cause ed ipotesi di soluzione; il dibattito scientifico.	- Collegamento tra locale e globale nei comportamenti individuali: il contributo di ciascuno alla soluzione dei problemi di tutti. - Individuare, nell'ambiente prossimo, un problema di salvaguardia ambientale, elaborare un progetto d'intervento e realizzarlo. - Verificare, in Laboratorio, i problemi connessi al restauro di oggetti.

Appendix 4 National curriculum - Norway

Source:
http://www.utdanningsdirektoratet.no/upload/larerplaner/Fastsatte_lareplaner_for_Kunnskapsloeftet/english/Food_and_health_subject_curriculum.rtf

FOOD AND HEALTH SUBJECT CURRICULUM

The objectives of the subject

Food and meals are important for the physical and mental health of all people and for their social well-being. Knowledge on food and meals that promotes healthy eating habits may help reduce health differences in the population. Our eating habits reflect individual choices, cultural expressions and religious convictions, and are thus a key part of our identity. In a multicultural society it is important to be aware of Norwegian food culture and Sami food traditions, and to have knowledge on and respect for food traditions in other cultures. Greater diversity in the food market places greater demands on consumer competence so that consumers may make their personal choices with more awareness of what will benefit their health and their environment.

As a general study subject, food and health shall contribute to giving pupils insight into and the ability to choose and reflect critically on food and meals, thus giving them knowledge to deal with life in a practical sense, and on a social and personal basis. As a creative subject, food and health shall allow experimentation and development of critical judgment in connection with food and meals. Thus it may inspire pupils to use their competence outside school and in later life. As a practical subject the teaching in food and health shall stimulate pupils to prepare food and experience the joy of working, to acquire good working habits and to become critical consumers so they can take responsibility for food and meals at home, in recreation situations and in working life and social life. The teaching in the subject shall contribute to a lifestyle with awareness of what promotes good health.

Preparing food for others is an expression of care, friendship and hospitality. The subject food and health is an important arena for cooperation and developing social competence for the pupils. Practical creative work, with the emphasis on skills, the trial and error approach and creativity, is important. The subject opens for cooperation with local cooks, the Norwegian Food Safety Authority and the school health service. The teaching in the subject must be adapted and based on each pupil's knowledge, skills and experiences so that they can succeed and be motivated to use the competence in day-to-day activities.

Main subject areas

The subject has been structured into main subject areas for which competence aims have been formulated. These main subject areas supplement each other and must be considered together. Satisfying a learning target in one area also gives competence in the others.

The food and health subject has competence aims after the fourth, seventh and tenth years in primary school.

Overview of main subject areas:

Year	Main subject areas		
Years 1 – 10	Food and lifestyle	Food and culture	Food and consumption

Food and lifestyle

The main subject area *food and lifestyle* focuses on developing skills and the motivation to choose a health-promoting lifestyle. Composing nutritionally safe and sound food, in accordance with guidelines for healthy eating from the health authorities, is an important basis for the teaching in this main subject area. Emphasis is placed on making the food varied, inviting and tasty. Reflection upon the relationship between food, lifestyle and health is important.

Food and consumption

The main subject area *food and consumption* focuses on becoming accustomed with different food, labelling and production, and being a critical and responsible consumer. Emphasis shall be placed on developing skills and motivation, enabling the pupils to choose a lifestyle that takes people and people and the environment into consideration. Entrepreneurship as a creative process from idea to finished product belongs in this main subject area.

Food and culture

The main subject area *food and culture* focuses on eating habits on an everyday basis, for celebrations and holidays, and on knowledge of Norwegian traditional food and food in various cultures and religions. The food must be inviting. Both the preparation and presentation of food are connected to technology and design.

Teaching hours

Teaching hours are given in 60-minute units:

Primary school
Years 1 to 7: 114 teaching hours

Lower secondary school
Years 8 to 10: 85 teaching hours

Basic skills

Basic skills are integrated in the competence aims where they contribute to development of the competence in the subject, while also being part of this competence. In the food and health subject the basic skills are understood as follows:

Being able to express oneself orally and in writing in the food and health subject includes explaining taste, smell and aesthetics. Insight into the subject material is connected to oral presentations and written work. In connection with meal situations, communication through conversation is important. Oral skills in the food and health subject are connected to explaining practical problems and formulating questions, and to arguing and communicating ideas in the subject in conversation with others. Written skills may include writing down one's own recipes and procedures, writing invitations and illustrations and assessing activities.

Being able to read in the food and health subject focuses on examining, interpreting and reflecting upon subject texts with increasing levels of difficulty. This involves being able to collect, compare and systematise information from recipes, guidelines, labelling, advertising, information materials and other factual prose texts, and assess these critically based on the objectives of the subject.

Being able to do mathematics in the food and health subject is important in practical work with recipes. It is also important to be able to assess the content of nutrients and energy and compare the price of goods.

Being able to use digital tools in food and health focuses on searching for information, comparing and assessing the content of nutrients and presenting subject material.

Competence aims in the subject

Competence aims after Year 4

Food and lifestyle

The aims for the education are that the pupil shall be able to

- prepare safe food
- compose and prepare breakfast, school meals and snacks in accordance with guidelines for healthy eating from the health authorities
- select food and beverages that are part of a healthy diet
- use measures and weights in connection with recipes and food preparation
- practise rules for good hygiene

Food and consumption

The aims for the education are that the pupil shall be able to

- test different foodstuffs for the taste experience
- understand simple labelling of goods
- tell others about a selected raw material and how this is part of the food system, from production to consumption

Food and culture

The aims for the education are that the pupil shall be able to

- help create a sense of comfort and well-being in relation to meals
- set tables and describe how meal habits are practised in different cultures
- plan and implement a dinner party in cooperation with others in connection with a holiday or another celebration
- describe Sami food traditions and how food traditions are connected to nature and living conditions

Competence aims after Year 7

Food and lifestyle

The aims for the education are that the pupil shall be able to

- prepare safe and nutritionally good food, and explain the place of the various food groups in our diet
- explain how food functions as a source of energy and body-building substances
- talk about guidelines for healthy eating from the health authorities, and provide examples of the relation between eating, health and lifestyle
- find recipes using different sources
- use mathematics to increase or reduce the amount in recipes, and then test and assess the result
- make food according to recipes
- discuss what food safety and safe food mean

Food and consumption

The aims for the education are that the pupil shall be able to

- discuss product information and advertising for various foods
- assess, choose and shop with environmental awareness
- develop, prepare and present a product
- talk about industrially prepared food and food prepared in large-scale catering

Food and culture

The aims for the education are that the pupil shall be able to

- prepare food from different cultures
- assess what good eating habits involve
- prepare Sami food and elaborate on some features of Sami food culture
- prepare food in nature and use nature as a resource

Competence aims after Year 10

Food and lifestyle

The aims for the education are that the pupil shall be able to

- plan and prepare safe and nutritionally good food, and explain the nutrient substances in the food
- compare meals pupils prepare themselves with eating guidelines from the health authorities
- use digital tools to assess the content of energy and nutrients in food and beverages, and apply the findings when preparing food
- inform others about how eating habits might influence diseases that are connected to lifestyle and eating
- assess food information and advertising in the media

Food and consumption

The aims for the education are that the pupil shall be able to

- assess and choose foods from a large food market when planning purchases
- discuss and elaborate on how different marketing methods might influence the choices of foodstuffs consumers make
- develop, produce, prepare product information and advertise for a product
- assess and choose foodstuffs based on ethical and sustainable criteria

Food and culture

The aims for the education are that the pupil shall be able to

- plan and make meals in connection with holidays or celebrations and play a host role
- prepare food for different social contexts and discuss how food helps create identity
- give examples of how kitchen utensils, methods of preparation or eating habits have changed over time or geographically and explain how this has influenced people's lives
- create and test new dishes based on different raw materials, ways of preparing them and food cultures

Subject Assessment

Provisions for final assessment:

Overall assessment grade

Year	Provision
Year 10 or the grade where the subject is completed.	The pupils shall have one overall achievement grade.

Examinations for pupils

Year	Provision
Year 10 or the grade where the subject is completed.	The pupils have no examination.

Examinations for external candidates

Year	Provision
Year 10 or the grade where the subject is completed.	There is no provision for external candidates in the subject.

The general provisions on assessment have been laid down in the Regulations relating to the Norwegian Education Act.

Source:
http://www.utdanningsdirektoratet.no/upload/larerplaner/Fastsatte_lareplaner_for_Kunnskapsloeftet/english/Natural_science_subject_curriculum.rtf

NATURAL SCIENCE SUBJECT CURRICULUM

The objectives of the subject

Natural science is the result of human curiosity and our need to find answers to questions about our existence, life and life forms, and our place in nature and the universe, and in this way it becomes part of our culture.

The laws and theories of natural science are models of a complex reality, and these models are changed or developed through new observations, experiments and ideas. In our general knowledge it is important to realise that natural science is developing, and that research and new knowledge in natural science and technology have great importance for societal development and the environment in which we live.

Even though natural science is divided into disciplines such as biology, physics, chemistry and geo-subjects, the aim is that natural science shall appear as a holistic school subject, both theoretically and practically.

Knowledge on, understanding of and experiences in nature can strengthen the will to protect natural resources, preserve biological diversity and contribute to sustainable development. In this context Sami and other indigenous peoples have knowledge of nature that it is important to respect. Natural science shall also help children and young persons attain knowledge and form attitudes that will give them a considered view of the interaction between nature, individuals, technology, society and research. This is important for the possibilities the individual has to understand various types of natural science and technological information and shall give one the basis for participation in democratic processes in society.

Practical and theoretical work in laboratories and in the field using different theses and research questions is necessary to gain experience with and develop knowledge of the methods and approaches in natural science. This may contribute to developing creativity, the critical eye, openness and active participation in situations involving natural science knowledge and expertise. Varied learning environments such as fieldwork in nature, experiments in the laboratory and excursions to museums, science centres and business enterprises/industries will enhance the teaching in natural science and impart a sense of wonder, inquisitiveness and fascination. Competence in understanding different types of natural science texts, methods and technological solutions gives a good basis for vocational training, further studies and lifelong learning, both at work and in one's leisure time

Main subject areas

The subject has been structured into main areas for which competence aims have been formulated. These main subject areas supplement each other and must be considered together.

Natural science has competence aims after the second, fourth, seventh and tenth years in primary and lower secondary education and after Vg1 (the first year) in programmes for general studies and vocational education programmes in upper secondary education.
Pupils in vocational education programmes shall have parts of the syllabus for Vg1. The main subject area *the budding researcher* is compulsory for all pupils. The pupils shall also have two main subject areas which are chosen by the school based on what is relevant for the education programme.

Pupils in vocational education programmes, and those who have a craft certificate or journeyman's certificate or other vocational competence, and who want to qualify for higher education, follow the rest of the subject curriculum for Vg1.

Overview of main subject areas:

Year	Main subject areas					
1–10	The budding researcher	Diversity in nature	Body and health	The universe	Phenomena and substances/-elements	Technology and design
Vg1	The budding researcher	Sustainable development	Nutrition and health	Radiation and radioactivity	Energy for the future	Biotechnology

The budding researcher

There are two sides to the teaching of natural science: it is a product showing the knowledge we currently have, and it is a process consisting of natural science methodologies for developing knowledge. This involves the formulation of hypotheses, experimentation, systematic observations, openness, discussions, critical assessment, argumentation, grounds for conclusion and presentation. *The budding researcher* shall work with these dimensions of education.

Diversity in nature

A central element of this main subject area is development of knowledge on and respect for the diversity of nature. To discuss this diversity it is necessary to know the names of some species of plants and animals and of the elements that are part of the interplay in an ecosystem. This main subject area also focuses on the requirements for sustainable development, the place of man in nature, and how human activities have changed and continue to change the natural environment locally and globally. Fieldwork ensures a good basis for knowledge on and attitudes in this area.

In Vg1 this main subject area is called *sustainable development,* which expresses its focus.

Body and health

The main subject area *Body and health* focuses on the structure of our bodies and how the body is affected and changed over time. Respect and care for others are also key elements in this area. Body, health, lifestyle and nutrition are frequently mentioned in the media. Knowledge and critical assessment of information in this area are important to enable pupils to assume responsibility for their body and physical and mental health.

In Vg1 this main subject area is called *body and health,* which expresses its focus.

The universe

This main subject area focuses on our own solar system, the location of the earth and outer space. Research and technological innovations are giving us more and more knowledge about the universe. The media frequently provide information about this knowledge. The topic lends itself to discussing perspectives on the future and thus opens for curiosity, a sense of wonder and fascination.

In Vg1 this main subject area is called *radiation and radioactivity,* which expresses its focus.

Phenomena and substances/elements

This main subject area focuses on key areas from physics and chemistry, and deals with the structure of substances, how substances react with each other and important phenomena such as sound, light, electricity and magnetism, energy and energy sources.

This area also focuses on the relationship between phenomena, and how mankind has learned to exploit various phenomena and substances.

In Vg1 this main subject area is called *energy for the future,* which expresses its focus.

Technology and design

The main subject area *technology and design* covers several subjects, including natural science, mathematics and arts and crafts. Technology and design focuses on planning, developing and making products that are useful in our day-to-day lives. The interaction between natural science and technology is a key part of this main subject area. Natural science principles constitute the basis for understanding technological activities.

In Vg1 this main subject area is called *biotechnology,* which expresses its focus.

Teaching hours

Teaching hours are given in 60-minute units:

PRIMARY EDUCATION
Years 1 to 7: 328 teaching hours

LOWER SECONDARY EDUCATION
Years 8 to 10: 256 teaching hours

PROGRAMMES FOR GENERAL STUDIES
Vg1: 140 teaching hours

VOCATIONAL EDUCATION PROGRAMMES
Vg1: 56 teaching hours

SUPPLEMENTARY STUDIES QUALIFYING FOR HIGHER EDUCATION

Vg3: 84 teaching hours

Basic skills

Basic skills are integrated in the competence aims where they contribute to development of the competence in the subject, while also being part of this competence. In the natural science subject the basic skills are understood as follows:

Being able to express oneself orally and in writing in the natural science subject means presenting and describing one's own experiences and observations from nature. In the natural science subject, written reports from experiments, fieldwork, excursions and technological development processes are an important part of the work. This includes the ability to formulate questions and hypotheses and to use natural science terms and concepts. Arguing for one's own assessments and giving constructive feedback is important in the natural science subject.

Being able to read in the natural science subject means collecting information, interpreting and reflecting on the content of natural science texts, brochures, newspapers, books and information on the internet. Reading in the natural science subject also includes reading manuals, recipes, tables, various graphs and symbols.

Being able to do mathematics in the natural science subject means using numbers and calculations to register and calculate results from one's own measurements and to prepare tables and graphs with natural science content. Being able to do mathematics also means using and interpreting formulas and models from the real world and processing and interpreting various types of data.

Being able to use digital tools in the natural science subject means being able to use such tools for exploration, measurement, visualisation, simulation, registration, documentation and publication when performing experiments and fieldwork. Digital animations, simulations and games are good aids for stimulating creativity, and demonstrating and visualising natural science problems and research questions. Critical assessment of internet-based information reinforces the

work in this subject. Digital communication systems make it possible to discuss natural science problems and research questions.

Competence aims in the subject

Competence aims after Year 2

The budding researcher

The aims for the education are that the pupil shall be able to

- ask questions, talk about and philosophise on experiences in nature and man's place in nature
- use his or her senses to explore the world in the local neighbourhood
- describe his or her own observations from experiments and in nature

Diversity in nature

The aims for the education are that the pupil shall be able to

- recognise and describe some plant and animal species and sort them
- describe some important characteristics of the four seasons by observing nature
- participate in various activities in nature and tell others about what has been observed

Body and health

The aims for the education are that the pupil shall be able to

- name and describe the function of some external and internal body parts
- describe and talk about our senses and use them deliberately during indoor and outdoor activities

The universe

The aims for the education are that the pupil shall be able to

- describe how the earth, moon and sun move in relation to each other
- observe and describe the seasons, day and night and different phases of the moon, and explain how Sami culture divides the year

Phenomena and substances

The aims for the education are that the pupil shall be able to

- sort various substances according to easily observable characteristics and tell others about these characteristics
- perform experiments with water and light and discuss the observations

Technology and design

The aims for the education are that the pupil shall be able to

- make artefacts that are able to be propelled by water or air and tell others about what they have made
- make artefacts that use reflection of light and tell others about what they have made

Competence aims after Year 4

The budding researcher

The aims for the education are that the pupil shall be able to

- use natural science terms to describe and present his or her own observations in various ways
- collect and systematise data and present the results with and without digital aids
- use simple measuring instruments for examinations

Diversity in nature

The aims for the education are that the pupil shall be able to

- talk about the lifecycle of some plant and animal species
- observe and note what happens with a tree or another perennial plant over time

- collect and systematise information and describe some extinct animal species and groups of animals and how they lived
- tell others about animals and discuss what is good animal welfare
- argue for appropriate behaviour in nature

Body and health

The aims for the education are that the pupil shall be able to

- talk about the development of the human body from conception to adulthood
- describe in general terms the structure of the human body, and the functions of some internal organs
- describe some common childhood diseases and what inoculation is
- observe and describe how the human body reacts in a number of situations
- discuss various emotional experiences and reactions and the relationship between physical and mental health

The universe

The aims for the education are that the pupil shall be able to

- find information with and without digital tools and tell others about some of the planets in our solar system
- recognise some constellations and describe phenomena that can be observed in the sky
- talk about myths and legends in connection with the sky and northern lights in Norwegian and Sami tradition

Phenomena and substances

The aims for the education are that the pupil shall be able to

- describe how and discuss and elaborate on why we sort waste at the source
- give examples of a lifecycle loop in nature based on biological degradation
- carry out experiments showing that substances may change their nature when subjected to various influences
- make experiments with air and sound and describe the observations
- describe his or her own observations of weather and clouds and measure temperatures and precipitation

Technology and design

The aims for the education are that the pupil shall be able to

- plan, build and test simple models of building constructions and document the process from idea to complete product
- describe constructions and discuss why some are more stable and withstand greater loads than others
- recognise and compare load-carrying structures in various buildings in the local neighbourhood

Competence aims after Year 7

The budding researcher

The aims for the education are that the pupil shall be able to

- formulate questions on something he or she is curious about, prepare a plan for examining a hypothesis he or she has formulated, carry out the examination and discuss the result
- explain why it is important to make and test hypotheses through systematic observations and experiments, and why it is important to compare results
- use digital aids and natural science equipment for experimental work and fieldwork
- extract natural science information from simple natural science texts in different media
- publish results from his or her own examinations using digital tools

Diversity in nature

The aims for the education are that the pupil shall be able to

- plan and carry out studies in some nature areas in cooperation with others

- examine and describe flowers and plants and explain the functions of the different plant parts
- describe characteristics of vertebrates and explain the functions of the most important organs
- examine and describe factors that influence the germination and growth of plants
- describe the characteristics of a selection of plant, mushroom and animal species and tell others how these are ordered systematically
- tell others about the use of some plant, mushroom and animal species according to some traditions, including Sami traditions

Body and health

The aims for the education are that the pupil shall be able to

- describe the most important organs in the human body and their functions
- describe the human skeleton and muscles and elaborate on how the body can move
- explain what happens during puberty and talk about gender identities and variation in sexual orientation
- collect information about and discuss dangers to one's health that can result from substance abuse

The universe

The aims for the education are that the pupil shall be able to

- describe our solar system and natural science theories on the origin of the earth
- describe a model of the solar system and how this model may explain observed phenomena, including night and day, phases of the moon and the sun travelling across the sky

Phenomena and substances

The aims for the education are that the pupil shall be able to

- examine and describe some central characteristics of some minerals and rocks and how they have been formed
- carry out experiments with sound, hearing and noise, describe and explain the results and how we may protect ourselves from unwanted sounds
- carry out experiments with magnetism and electricity, describe and explain the results
- elaborate on the use of some sources of energy in earlier times and in contemporary times, and describe consequences for the environment, locally and globally
- carry out relevant weather measurements and present the results with and without digital aids
- describe central characteristics of gases, liquids, solids and phase transitions using the particle model
- explain the structure of substances, and how substances may be transformed by using the concepts of atoms and molecules
- carry out experiments with chemical reactions and explain what characterises these reactions

Technology and design

The aims for the education are that the pupil shall be able to

- plan, build and test mechanical toys, describe various movements of the toys and the principles of mechanical transfer
- plan, build and test simple products that use electrical energy, explain how they work and describe the process from idea to finished product
- elaborate on how transfer of movement has been used throughout history to exploit the energy potential in wind and water

Competence aims after Year 10

The budding researcher

The aims for the education are that the pupil shall be able to

- plan and carry out experiments to test the validity of his or her own hypotheses and choose the publication method

- keep records during experiments and fieldwork and present reports using digital aids
- explain the importance of looking for relationships between cause and effect and explain why argumentation, disagreement and publication are important in natural science
- demonstrate protective and safety equipment and comply with fundamental safety procedures in natural science classes

Diversity in nature

The aims for the education are that the pupil shall be able to

- describe the structure of animal and plant cells and explain the main characteristics of photo synthesis and cell breathing
- elaborate on cell division and genetic variation and heritage
- explain the main characteristics of evolutionary theory and the underpinning of this theory
- explain the main characteristics of theories on how the earth is changing and has changed throughout all time and the underpinning of these theories
- elaborate on which biotic and abiotic factors are part of an ecosystem and explain the relationship between the factors
- observe and provide examples of how human activities have affected a nature area, identify the views of different interest groups on the effects and propose measures that might preserve nature for future generations
- give examples of how Sami people exploit resources in nature

Body and health

The aims for the education are that the pupil shall be able to

- discuss elaborate on problems and issues in connection with sexuality, different sexual orientation, contraception, abortion and sexually transmittable diseases
- explain how the human body protects itself against disease
- describe how to prevent and treat infectious diseases
- describe how hormones control different body processes
- explain how the nervous system and the hormone system control body processes
- describe the development of a foetus and how birth occurs
- elaborate on how lifestyles may lead to disease and injury and how this may be prevented
- provide examples of popular medicine, including Sami popular medicine, and discuss the difference between complementary medicine and academic medicine
- elaborate on how the use of intoxicant substances may lead to health damage and discuss how individuals and society may prevent health damage

The universe

The aims for the education are that the pupil shall be able to

- describe the universe and different theories of how it has developed
- provide an overview of technological equipment used for the exploration of space
- present the main features of the history of space travel and talk about research that determines the possibility of life on other planets
- describe the apparent motion of the planets across the sky using simulations and explain how solar and lunar eclipses and seasons come about

Phenomena and substances

The aims for the education are that the pupil shall be able to

- assess characteristics of elements and compounds using the periodic table
- carry out experiments to classify acidic and alkaline substances
- examine the chemical properties of some common everyday substances
- plan and carry out experiments with detection reactions, separation of substances in a mixture and analysis of an unknown substance
- carry out experiments with and describe hydrocarbons, alcohols and carboxylic acid and some common carbohydrates

- explain how crude oil and natural gas have come about and how these substances are used
- explain results from experiments with electrical circuits using terms such as current, voltage, resistance, output and induction
- explain how we can produce electrical power from renewable and non-renewable sources of energy
- elaborate on the concepts of velocity and acceleration, measure magnitudes using simple aids and give examples of how power is connected to acceleration
- carry out experiments and simple calculations with work, energy and output
- elaborate on how traffic safety equipment prevents and reduces injuries in accidents
- carry out experiments with light, vision and colour, describe and explain the results

Technology and design

The aims for the education are that the pupil shall be able to

- develop products based on specifications that use electronics, evaluate the design process and assess product functionality and user friendliness
- test and describe characteristics of materials used in a production process
- elaborate on electronic communication systems on the system level and discuss and elaborate on societal challenges in connection with using these

Competence aims after Vg1 – programmes for general studies

The budding researcher

The aims for the education are that the pupil shall be able to

- plan and carry out examinations in cooperation with others where parameters are identified and varied
- carry out simple data simulations to illustrate natural science phenomena and test hypotheses
- explain and assess what might be done to reduce uncertainty and error sources in measurements and results
- assess and argue for the validity and quality of one's own observation data and those of others

Sustainable development

The aims for the education are that the pupil shall be able to

- describe succession processes in an ecosystem
- examine an ecosystem and assess where it is in the succession process
- elaborate on factors that influence the size of a population
- explain what is meant by the "look-before-you-leap" principle, uncertain knowledge and the concept of sustainable development, and give examples of these
- assess environmental principles for consumer choices and energy use
- select and describe some global conflicts of interest and assess the consequences these might have for the local population and the global community
- elaborate on how the international community is working on global environmental challenges
- provide examples of nature management and changes of natural environments that may have consequences for indigenous peoples in Norway and other countries

Nutrition and health

The aims for the education are that the pupil shall be able to

- describe chemical characteristics and differences of the most important nutrition substances
- elaborate on the most important trace elements, minerals and salts in the human body
- carry out simple chemical detection of nutrients in food
- explain the main characteristics of digestion, transport and transformation of the most important nutrients
- elaborate on some main components in cosmetic products and make such a product with its own content declaration

- discuss and elaborate on issues in connection with nutrition, exercise, dieting, eating disorders, lifestyle diseases and sunbathing

Radiation and radioactivity

The aims for the education are that the pupil shall be able to

- describe how the northern lights arise, and how Norway has been and is an important country for research in this field
- explain the importance of the ozone layer with respect to solar irradiation of the earth
- explain what the greenhouse effect is and elaborate on and analyse how human activities are altering the energy balance of the atmosphere
- elaborate on some possible consequences of the increased greenhouse effect, including in Arctic areas, and the measures that are being initiated internationally to reduce the increase in the greenhouse effect
- carry out experiments with radioactivity, half-life and background radiation and explain these phenomena
- describe characteristics of different types of ionising radiation and explain how these are used for technical and medical applications
- explain how electromagnetic radiation from space may be interpreted and provide information about space

Energy for the future

The aims for the education are that the pupil shall be able to

- carry out experiments with solar cells and sun traps and explain how they work
- elaborate on the physical principles used in heat pumps, and in which contexts heat pumps are used
- explain what redox reactions are, carry out experiments with combustion, galvanic elements and electrolysis and elaborate on the results
- describe the principles and areas of use of some common rechargeable and non-rechargeable batteries and fuel cells
- elaborate on different uses of biomass as an energy source
- elaborate on hydrogen as an energy carrier

Biotechnology

The aims for the education are that the pupil shall be able to

- explain genetic coding and the main characteristics of protein synthesis and discuss the importance of heritage and the environment
- explain the concepts of cross-breeding and gene modification and how biotechnology is used for breeding plants and animals
- provide an overview of different types of medical applications of biotechnology
- assess information about and elaborate on ethical issues in connection with biotechnology

Subject assessment

Provisions for final assessment:

Overall achievement grades

Year	Provision
Year 10	The pupils shall have one overall achievement grade.
Vg1 vocational education programmes Vg1 programmes for general studies Supplementary studies qualifying for higher education	The pupils shall have one overall achievement grade.

Examinations for pupils

Year	Provision
Year 10	The pupils may be selected for an oral examination with practical elements. The oral examination is prepared and graded locally.
Vg1 vocational education programmes Vg1 programmes for general studies	The pupils may be selected for an oral examination with practical elements. The oral examination is prepared and graded locally.
Supplementary studies qualifying for higher education	The pupils may be selected for an oral examination with practical elements. The oral examination is prepared and graded locally. The examination only includes the subject as it is given in the supplementary studies qualifying for higher education (84 teaching periods).

Examinations for external candidates

Year	Provision
Year 10	See the provision in force for primary school education for adults.
Vg1 vocational education programmes	External candidates shall sit for an oral examination with practical elements. The oral examination is prepared and graded locally.
Vg1 programmes for general studies	External candidates shall sit for an examination which comprises a written paper and an oral examination with practical elements. The written paper is prepared and graded centrally. The oral examination is prepared locally. The grade is set locally.
Supplementary studies qualifying for higher education	External candidates shall sit for an oral examination with practical elements. The oral examination is prepared and graded locally. The examination only includes the subject in the supplementary year qualifying candidates for higher education (84 teaching periods).

The general provisions on assessment have been laid down in the Regulations relating to the Norwegian Education Act.

Source:
http://www.utdanningsdirektoratet.no/upload/larerplaner/Fastsatte_lareplaner_for_Kunnskapsloeftet/english/Social_studies_subject_curriculum.rtf

SOCIAL STUDIES SUBJECT CURRICULUM

The objectives of the subject

The purpose of the social studies subject is to help create understanding and belief in fundamental human rights, democratic values and equality, and to encourage the idea of active citizenship and democratic participation. The subject shall stimulate the development of knowledge on cultural diversity in the world in the past and the present, and an understanding of the relation between nature and man-made environments. The subject shall also help pupils to develop awareness that mankind is part of a historical context, and that a long chain of historical events has led us to become what we are today. This shall give the individual insight into on how society in general influences attitudes, knowledge and actions and how the individual can influence society and his or her own life situation

The teaching in social studies shall focus on natural and man-made conditions on earth. Work in the subject shall stimulate discussions on the relation between production and consumption and evaluations of the consequences that resource use and living one's life have on the environment and sustainable development. The social studies subject shall develop knowledge on working life and economics. Knowledge on the situation for indigenous peoples, minority peoples in the world in general and the Sami people in particular, is also part of the subject. The social studies subject shall help pupils to understand the value of technology and entrepreneurship. The subject shall also give an insight into the political system in Norway and in the international community and make the individual aware that politics is a matter of conflict and collaboration.

People interact through language and forms of expression that are characteristic of the culture they are growing into. As a reflecting individual, each one of us can shape ourselves as a person. As a political individual, a person can influence his or her surroundings. As a moral individual, a person is responsible for the consequences of his or her actions.

The social studies subject shall thus provide deeper understanding of the relationship between social life and personal life, and stimulate recognition of the diversity in social forms and ways of living. Bearing this in mind, the subject shall provide pupils with a greater ability to think freely, from many perspectives, in a critical and tolerant way. By influencing the desire to seek knowledge about society and culture, the subject will also promote the ability to discuss, reason and solve social problems. By sparking the pupils' curiosity and stimulating their sense of wonder and their creative activities, the subject will also help them understand themselves better, master their own world and motivate them to seek new insights and pursue lifelong learning.

Main subject areas

The subject has been structured into main subject areas for which competence aims have been formulated. These main subject areas supplement each other and must be considered together.

The social studies subject is present on all levels in primary and secondary education and training. In primary/lower secondary school this comprises the main subject areas of sociology, geography and history. Geography and history are continued as common core subjects in the programmes for general studies.

The social studies subject at the upper secondary education level comprises the following main subject areas: the individual and society, working and business life, politics and democracy, culture and international relations. Sociology and economics are integrated in each main subject area.

The social studies subject has competence aims after the fourth, seventh and tenth years in primary and lower secondary school.

In upper secondary education the social studies subject has competence aims after VG1 in programme areas for social studies and economics, science subjects and language subject is programmes for specialization in general studies.

In the programme area for arts, crafts and design studies, the social studies subject has competence aims after VG2.

In vocational education programmes and in education programmes for sports and music, dance and drama the social studies subject has competence aims after VG2.

Overview of main subject areas:

Year	Main subject areas		
1–10	History	Geography	Sociology

Vg1/Vg2	Individual and society	Working/ business life	Politics and democracy	Culture	International relations

History
The main subject area focuses on examining and discussing how man and society have changed over the centuries. History also includes how humans create pictures and shape their own understanding of the past. Developing historical overviews and insight, and training skills in everyday life and participation in society are key elements of this main subject area.

Geography
The main subject area focuses on the place and spatial dimension of society. This main subject area provides an overview of the location and extent of natural and man-made conditions on earth. Surveying and discussing change processes are key elements of this subject. Geography also focuses on explaining similarities and differences between town and country, between nations and between regions.

Sociology
The main subject area focuses on socialisation, politics, economics and culture and deals with people's sense of community and differences and contrasts in a contemporary perspective. The interaction between cultural norms and societal control on the one hand and individual actions and choices on the other are key elements of this main subject area. The value of co-citizenship and developing democratic skills are important dimensions in sociology.

Individual and society
This main subject area covers socialization, personal finances, forms of cohabitation and criminality. It also focuses on who and what influences young people today.

Working and business life
This main subject area covers business and industry, companies, found an enterprise, career choices and unemployment. It focuses on the organisations in working life and how wages are set. This main subject area also examines contemporary working life and the principles and values it is based on.

Politics and democracy
This main area covers the political system on all levels and the welfare state. It examines the political parties and what can threaten a democracy. In this main subject area emphasis is also placed on the connections between the system of government, the state governed by law and human rights.

Culture
The main subject area covers the multicultural society and the role of religion in culture. It focuses on indigenous peoples, ethnic and national minorities and how xenophobia and racism can be countered.

International relations
The main area covers international cooperation, terrorism, conflicts, conflict solving and peace work. It also focuses on globalisation, distribution of resources and sustainable development, and on Norway's role on the international stage.

Teaching hours

Teaching hours are given in 60-minute units:

Primary school
Years 1 to 7: 385 teaching hours

Lower secondary school
Years 8 to 10: 256 teaching hours

Programmes for specialization in general studies – programme areas for science subjects, language subjects and social studies and economics

Vg1: 84 hours

Vocational education programmes, education programmes for music, dance, drama and sports, and programmes for specialization in general studies – programme area for arts, crafts and design studies
Vg2: 84 hours

Basic skills

Basic skills are integrated in the competence aims where they contribute to development of the competence in the subject, while also being part of this competence. In the social studies subject the basic skills are understood as follows:

Being able to express oneself orally and in writing in social studies means telling other about events in the past and the present, explaining about places and facts and applying definitions, concepts and terms to explain causes and effects in connection with society and culture. It also means being able to present one's own work clearly and comprehensibly to others, and being able to discuss one's own presentations as well as those of others. The ability to express oneself orally and in writing means being able to reflect on the content of meaning in texts, images, film and artefacts, and being able to compare, argue and discuss the value of information and sources, and in hypotheses and models.

Being able to read in social studies means to read, examine, interpret and reflect on factual prose texts and fiction containing increasing levels of difficulty in order to experience contact with other periods, places and people. Being able to read also means processing and using varied information from images, film, drawings, graphs, tables, globes and maps. To understand and participate actively in the society we live in, it is also necessary to be able to read and collect information from reference books, newspapers and the internet, and to assess this information critically.

Being able to do mathematics in social studies means processing and comparing figures relating to topics in the subject, and using, processing and preparing graphic presentations. Mathematics in social studies also involves undertaking quantitative surveys, using map scales and time calculations.

Being able to use digital tools in social studies means being able to search for information, explore websites, critically assess sources, exercise netiquette and select relevant information on topics in the subject. Having digital skills also means being knowledgeable about privacy protection and copyrights, and being able to use and comply with rules and norms that apply to internet-based communication. Using digital communication and cooperation tools means preparing, presenting and publishing one's own and joint multimedia products, and communicating and cooperating with pupils from other schools and countries.

Competence aims in the subject

Competence aims after Year 4

History

The aims for the education are that the pupil shall be able to

- use the concepts past, present and future in relation to him-/herself and his or her family
- present historical topics using written text, drawings, images, film, models and digital tools
- create narratives about people in the past and talk about differences and similarities then and now
- explore sources and use them to make copies of artefacts from the past
- tell others about his or her own family one or two generations back in time, and about how the way of life and living conditions have changed
- recognise historical remnants in his or her own local environment and examine local collections, monuments and artefacts
- elaborate on myths, legends and folk tales with historical content
- describe how stone age people lived as hunters and gatherers by imagining about the first people who came to our country after the ice age
- tell others about the Sami people, Norway's indigenous population, and about key characteristics of the culture and living conditions for the Sami people up to the Viking period
- tell others about how agriculture changed living conditions in Norway and the Nordic countries and describe main characteristics of the bronze age and iron age
- explain why 17 May and 6 February are celebrated, and tell others about the national day in other countries

Geography

The aims for the education are that the pupil shall be able to

- name and indicate the place they come from, their home municipality, home county and country using drawings, maps or models
- describe terrain formations and geographical terms by exploring the terrain around the school and their home
- use pictures, film and other sources to tell others about important landscapes and terrain formations in Norway
- collect information from globes, maps and digital sources and use this to talk about places, people and languages
- indicate oceans and regions of the world and use main geographical terms
- indicate and orient themselves according to compass points and explain why there are time differences
- compare life and work in Norway with some other countries
- plan and present trips to neighbouring places using maps and the internet

Sociology

The aims for the education are that the pupil shall be able to

- carry out quantitative social studies surveys requiring counting and arithmetic operations, and present the result of the surveys

- look up facts in printed and digital media, sort the content into categories and produce publishable material
- comply with simple rules for privacy protection when using the internet
- talk about the tasks of family and variations in family forms, including single-provider families, extended families, families where the principal persons are of the same gender, and families with several sets of first-born
- provide examples of different expectations placed on boys and girls and discuss and elaborate how these expectations may be experienced
- describe how boys and girls spend money and discuss matters that influence consumption
- prepare an overview of norms that regulate the relationship between people and talk about the consequences of breaking with norms
- design and practise rules for interacting with others and participate in making democratic decisions in the school community
- talk about tolerance and how encounters between different cultures may be rewarding and may lead to conflicts
- discuss and elaborate on perceptions of justice and fairness

Competence aims after Year 7

History

The aims for the education are that the pupil shall be able to

- use the term "period" and show relationships between the past and the present by placing a number of historic events on a time line
- present historic events by making two narratives about the same event seen from different perspectives
- create narratives about people in the past and use these narratives to show how people think and act based on the community they are living in
- explore different sources, illustrate how they might provide different information about the past, and explain how historians use these to prepare historic presentations
- tell others about the main characteristics of social development in Norway from the Viking period and to the end of the Danish-dominated period, and explain in detail a key topic from this period
- tell others about the central characteristics of the culture and living conditions for the Sami people from the Viking period until the end of the Danish-dominated period, and about their relations to states in the north during this period
- elaborate on which national minorities exist in Norway, and describe the main characteristics of the history and living conditions of these minorities
- prepare visual presentations of two or more early river cultures using digital tools
- examine Greek and Roman communities in antiquity and find examples of how their culture has influenced our culture
- elaborate on central characteristics of the following epochs: the Middle Ages, Renaissance and Enlightenment in Europe and discuss reasons for this division into periods
- use historical maps and present trips of discovery and exploration made by Europeans, describe cultural encounters and how the different cultures perceived these encounters

Geography

The aims for the education are that the pupil shall be able to

- read and use printed and digital maps and pinpoint main geographical characteristics of his/her own county, neighbouring counties, Sami settlement areas, Norway, Europe and other regions of the world
- register and sort traces left by the ice age in the place where he or she lives and explain what the ice age meant to the formation of the terrain and the country as a whole
- explain relations between natural resources, industry, settlements and living conditions
- compare and show similarities and differences between countries in Europe and countries in other regions of the world
- tell others about the rainforest, grassy plains, deserts and other landscape types and explain how man exploits these

- explain how production and consumption can destroy ecosystems and pollute the soil, water and air, and discuss and elaborate on how this might be prevented and repaired
- explain how we in Norway use resources from other regions of the world
- register refugee flows, explain why some people flee from their country of origin, and discuss how it might feel to arrive in a foreign country as a refugee
- plan and present trips to Europe and other regions of the world using digital tools

Sociology

The aims for the education are that the pupil shall be able to

- choose a theme, formulate questions and illuminate these by using different sources
- explain how information from mass media and commercial influences can impact consumer habits
- talk about variations in sexual orientation in relation to love, cohabitation and family
- describe roles in his/her own day-to-day life and examine the expectations that come with these roles
- discuss and elaborate on issues relating to the use and abuse of alcohol and other substance abuse
- elaborate on what a society is, and reflect upon why people seek to come together in communities
- explain differences between living in a democracy and in a non-democratic society, and elaborate on the most important institutions of power in Norway
- talk about what we mean by identity and culture, recognise cultural symbols and prepare a visual presentation of them
- elaborate on the main characteristics of the Sami society today
- elaborate on a current conflict and discuss and elaborate on proposals for a solution
- provide examples of how Norway participates in international cooperation through the UN and other organisations, including international cooperation between indigenous peoples

Competence aims after Year 10

History

The aims for the education are that the pupil shall be able to

- find examples of events that have helped shape modern Norway, and reflect on how society might have been different if these events had developed differently
- present a historic event based on different ideologies
- create narratives about people in the past, and thus show how frameworks and values in society influence thoughts and actions
- search for and select sources, assess them critically and show how different sources might present history differently
- discuss and elaborate on the value of human life, and place racism and discrimination in a historical and contemporary perspective with pupils from other schools by using digital communication tools
- present the main characteristics of the history and culture of the Sami people from the end of the Danish-dominated period up to the present, and discuss and elaborate on their relation to greater society
- present important features of developments in Norwegian history in the 1800s and the first half of the 1900s, and explain how these point toward the society we have today
- explain the emergence of the welfare state and describe characteristics of modern Norway
- explain technological and social changes due to the industrial revolution
- discuss and elaborate on ideas and forces that led to the American struggle for freedom and the French revolution, and the consequences these had for the development of democracy in Norway
- elaborate on imperialism and provide examples of de-colonisation
- prepare questions on central international conflicts in the 1900s and in the present century, formulate causal explanations and discuss consequences of the conflicts
- discuss and elaborate on important changes in society in recent times and reflect on how today's society opens to new changes

Geography

The aims for the education are that the pupil shall be able to

- read, interpret and use printed and digital maps and be able to use map scales and read map legends
- elaborate on his or her own rights and consequences when working on the internet and publishing one's own material
- locate and document overviews of main geographic characteristics of the world and compare different countries and regions
- tell others about the basis in nature focusing on internal and external forces on earth, movement in air masses, circulation of water, weather, climate and vegetation, and discuss and elaborate on relations between nature and society
- describe and explain natural and cultural landscapes in the local community
- explain how people exploit resources in nature, other resources and technology in Norway and other countries in the world
- assess the use and misuse of resources, consequences this might have for the environment and society, and conflicts this can create locally and globally
- elaborate on the size, structure and growth of populations and discuss and elaborate on population development and migration in recent times, including urbanisation
- explain, discuss and elaborate on variations in living conditions in different regions of the world and compare and assess the large differences between rich and poor
- discuss and elaborate on premises for sustainable development

Sociology

The aims for the education are that the pupil shall be able to

- plan, carry out and present problem-oriented sociological surveys and assess the work process and the results
- find and present relevant social issues, distinguish between opinion and fact, formulate arguments and discuss and elaborate on the issues
- make a plan for starting and operating an enterprise based on a survey to determine the basis for such an enterprise
- analyse the development of substance abuse and smoking in Norway and reflect on the attitudes to substance abuse
- discuss and elaborate on the relationship between love and sexuality in light of cultural norms
- describe how consumer patterns have developed in Norway and elaborate on consumer rights
- explain what attitudes and prejudices are, and discuss and elaborate on opportunities and challenges in multicultural communities
- explore what a community needs to continue to exist, and compare two or more communities
- elaborate on political institutions in Norway and compare them with institutions in other countries
- provide examples of and discuss and elaborate on democracy as a form of government, elaborate on political influence and power distribution in Norway and use digital channels to exercise democracy
- discuss causes and consequences of crime, and explain how a state governed by law functions by looking into how a specified crime is dealt with
- explain why culture is not inherent, and explain and analyse cultural variations
- describe the main characteristics of the Norwegian economy and how our economy is connected to the global economy
- elaborate on fundamental human rights and discuss and elaborate on the value of respecting them

After Vg1/Vg2 in upper secondary education

The individual and society

The aims for the education are that the pupil shall be able to

- define key concepts associated with socialisation and apply these to examine features of socialisation of young people in Norway
- explain why gender roles vary from one community to the next and discuss why gender roles change over time
- calculate income, and plan family budgets using various tools and assess how saving and loans influence personal economy
- discuss and elaborate on consumer rights and discuss consumers' ethical responsibilities
- elaborate on changes in family forms and the way people cohabit
- elaborate on legal and financial aspects of entering into cohabitation and discuss consequences of break downs in relationships
- use digital tools to find information on the scope of crime in Norway, provide grounds why the community punishes lawbreakers and assess how crime may be prevented

Working and business life

The aims for the education are that the pupil shall be able to

- define the concept of living standards, explain reasons why the living standard in Norway has risen and discuss whether this has led to a better quality of life
- use digital tools to collect information on numerous professions and discuss opportunities and challenges in the labour market today
- reflect on the value of having employment and what characterises a good working environment
- elaborate on causes of unemployment and discuss ways of reducing unemployment
- discuss some ethical issues in connection with working life
- elaborate on the place of organisations in working life and discuss factors that determine wages and working conditions
- assess challenges in founding a business enterprise
- find and extract the main figures and information from the profit and loss accounts and balance sheets of enterprises using manual and digital tools

Politics and democracy

The aims for the education are that the pupil shall be able to

- elaborate on how one can participate in and influence the political system and discuss what can threaten to democracy
- discuss relations between system of government, the state governed by law and human rights
- elaborate on the type of government and the most important political bodies in Norway, and discuss and elaborate on the plural democracy in relation to indigenous peoples and minorities
- identify basic differences between the political parties in Norway and argue from different political viewpoints
- elaborate on key features of Norwegian economic policy
- explain the foundation of the welfare state and assess challenges the welfare state is facing

Culture

The aims for the education are that the pupil shall be able to

- define the concept of culture and provide examples showing that culture varies from one place to the next and changes over time
- present the main features of Sami culture today and reflect on what it means to be an indigenous person
- describe the main features of some minorities in Norway and discuss and elaborate on the challenges in multicultural societies
- explain why prejudices arise and discuss how xenophobia and racism can be combated
- provide examples of how religion influences society and culture

International affairs

The aims for the education are that the pupil shall be able to

- define the concept of power and provide examples of how power is practised in the world
- explain the concept of globalisation and assess various consequences of globalisation
- provide examples of international cooperation and describe Norway's international involvement
- elaborate on the UN's activities for peace and human rights and explain the UN's role in the international activities for indigenous peoples
- elaborate on the EU's aims and governing bodies and discuss Norway's relationship to the EU
- use digital tools to find examples of different types of conflict in the world and present an international conflict and proposals for solving this conflict
- elaborate on why some countries are poor and some rich, and discuss measures to reduce poverty in the world
- elaborate on what characterises international terrorism and reflect on the causes of terrorism
- discuss relations between economic growth, the environment and sustainable development

Subject assessment

Provisions for final assessment:

Overall achievement grade

Year	Provision
Year 10	The pupils shall have one overall achievement grade.
Vg1 – Programmes for specialization in general studies – programme area for social studies and economics, science subjects and language subjects Vg2 – Programmes for specialization in general studies – programme area for arts and crafts and design studies Vg2 education programme for sports and music, dance and drama Vg2 vocational education programmes	The pupils shall have one overall achievement grade.

Year	Provision
Year 10	The pupils may be selected for an oral examination. The oral examination is prepared and graded locally.
Vg1 – Programmes for specialization in general studies – programme area for social studies and economics, science subjects and language subjects Vg2 – Programmes for specialization in general studies – programme area for arts and crafts and design studies	The pupils may be selected for an oral examination. The oral examination is prepared and graded locally.

Vg2 education programme for sports and music, dance and drama Vg2 vocational education programmes	

Examinations for external candidates

Year	Provision
Year 10	See the provision in force for primary school education for adults.
Vg1 – Programmes for specialization in general studies – programme area for social studies and economics, science subjects and language subjects Vg2 – Programmes for specialization in general studies – programme area for arts and crafts and design studies Vg2 education programme for sports and music, dance and drama Vg2 vocational education programmes	The pupils shall sit for an oral examination. The oral examination is prepared and graded locally.

The general provisions on assessment have been laid down in the Regulations relating to the Norwegian Education Act.