Chapter 14
Food Teaching in Upper Secondary English Schools: Progression Into Food-Related Undergraduate Courses in Higher Education

Marion Rutland

Abstract The chapter looks at food teaching in English schools with specific reference to progression from the upper secondary school phase to undergraduate food-related courses in higher education and the loss of an Advanced (A)-Level Food Technology course (for pupils aged 16–18 years). Food education, known as cookery, domestic science, housecraft, home economics and food technology, is reviewed from the mid-nineteenth century to the introduction of the National Curriculum (DES. 1990). *Technology in the National curriculum*. London, UK: HMSO. A revision of the programmes of study in the English National Curriculum for Design and Technology (D&T) for pupils aged 5–14 years, (Department for Education (DfE), 2013). *Design and technology. Programmes of study for key stages* (pp. 1–3). London, UK: Department for Education and a reform of examinations for pupils aged 14–18 years (DfEa. 2014). *Reforming GCSE and a level subject content consultation*. London, UK: Department for Education all led to the loss of an A level food-related course.

A review of university undergraduate food-related courses (Rutland & Owen-Jackson, *Technology Education: Learning for Life*. Griffith University, Sydney, Australia, 2014) is followed by an investigation of A level courses taken by students before entry to food-related university undergraduate courses (Rutland, *A Level Subjects Taken Before Entry to Food-Related Degree Courses*. Unpublished research. Reading University: Department of Food and Nutritional Sciences, 2014). A small-scale research project (Rutland, The Academic Study of Food in the English Curriculum for Pupils Aged 16–18 Years: Its Demise and Future Prospects. In *PATT 37 – Conference 2019: Developing a Knowledge Economy Through Technology and Engineering Education* (pp. 373–380). University of Malta, Malta, 2019), based on the content of a new A Level food examination that could act as a pathway towards university courses and a range of employment in nutrition, dietetics, nursing, health-related professions, teaching and the food industry, is explored.

M. Rutland (✉)
School of Education, University of Roehampton, London, UK
e-mail: m.rutland@roehampton.ac.uk; marion.rutland@talk21.com

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The findings indicate an overall agreement for the composition and nutrition of food, the preservation of food to prolong self-life and the impact of new technologies. However, there was less support for the handling and preparation of food materials, the impact of the food industry and applied science and technology. It indicates an urgent need to clarify the content and assessment procedures based on the views of university course and admission tutors, the Design and Technology Association, the British Nutrition Foundation (BNF), the National STEM Learning Centre, examination boards and the DfE.

Keywords Food teaching in schools · Progression · Advanced-level examination course content · Entry requirements to food-based undergraduate university courses

The Introduction of Food in the English School Curriculum

The teaching of food as a philanthropic, utilitarian subject to prepare girls to run their home and housewifery or for paid domestic work was first introduced in the mid-nineteenth century English state elementary school system. It was not until the early twentieth century that domestic science, focusing on nutrition, was introduced in grammar schools for the more academically able girls. However, it essentially remained a practical subject with little attempt to teach underlying scientific principles (Rutland, 1997, 2006; Rutland & Owen-Jackson, 2015), thus reducing its educational value and acceptability as an entry qualification for academic courses in higher education (Rutland, 1984).

Up to the early 1970s, a domestic science GCE (General Certificate of Education) examination provided progression for pupils aged 16 years and an Advanced (A) Level GCE examination for pupils aged 18 years. Two main career opportunities for girls were available: one into non-graduate teacher training courses and another into household management and advising people how to run their homes efficiently, together with hospitality and catering. Housecraft, as a non-examination subject for the less academically able, focused on teaching girls to cook. In the early 1970s, there was a change of title to home economics with an increased emphasis on aspects of science and psychology (Owen-Jackson & Rutland, 2016).

1970s and 1980s

After the enactment of the Sex Discrimination Act (1975), food was taught to boys and girls as part of home economics, defined as the study of the needs of an individual in a community and the best use of human and physical resources in the

context of home and family (Department of Science and Education (DES), 1978). This included learning to cook, feeding the family in a domestic context, consumer awareness, nutrition and the sources and function of food in our diet. There continued to be examination courses for pupils aged 14 years and 18 years, providing progression to a range of undergraduate degree courses in higher education.

The mid-1970s saw the introduction of undergraduate home economics degree courses as science-based BSc degrees, humanities-based BA courses and B.Ed. courses preparing future teachers. Thorne (1979) explored the employment opportunities sought by home economics graduates and found that they took one of two options: either educational/social or commercial occupations.

The early 1980s saw the introduction of the Nuffield Home Economics project (1977–1981), with a more scientific, investigative approach emphasising the physical, chemical and biological principles underlying craft skills. Food activities and investigations were included, but they were not directly related to, and linked with, practical cooking activities, methods and processes. Unfortunately, many home economics teachers were not qualified to teach and were least interested in these aspects of the subject, thus resulting in little long-term changes in classroom practice and the understanding of the practical application of the underpinning scientific principles by the pupils (Davies, 1981; Owen-Jackson & Rutland, 2016; Rodwell, 1983; Rutland, 1984).

The National Curriculum in England and Wales (DES, 1990)

The National Curriculum Technology in England and Wales was introduced as a compulsory subject for all pupils aged 5–16. It incorporated home economics into D&T as food technology, focusing on food as a material for designing and creating in contexts outside the home, but there were few examples of what this meant in practice (Rutland, 2006). In England and Wales, this change of emphasis to include food production outside home development confused many food technology teachers, and they were alienated by the requirements to 'fit' into the D&T curriculum and to align themselves with other material areas. For example, pupils were asked to 'design' food products by 'drawing and sketching' and using computer-aided design and computer-aided manufacturing (CAD/CAM) packages.

There was a lack of appreciation that 'designing' with food is a 'hands-on' activity to create and develop food products for specific purposes based on an understanding of scientific and technological principles and concepts. This involves practical activities, including investigations and the application of food properties and processes involved in food preparation and cooking (Rutland & Owen-Jackson, 2012a, 2012b). Bielby (2005) noted that there had been limited research into the food curriculum and there had been significant influence by examination boards on the process of 'designing' rather than on the development of food preparation knowledge and skills.

A report by the Office for Standards in Education, Children's and Skills (Ofsted) (Ofsted, 2006, p. 2) identified 'a lack of clarity about food technology and the relationship between the teaching of food as a life skill and the use of food as a medium

for teaching D&T'. Too little time was spent on learning to cook nutritious meals (life skills) and too much time on low-level investigations and written work. However, it did note that 'in the best provision, pupils cooked or engaged in practical activity every week and theory was taught in a lively manner ... Pupils' research and analysis were tightly tailored to their product specifications that were demanding, realistic and, for older pupils, individualised' (Ofsted, 2006, p. 2). Food technology, if well taught, could teach both the practical skills of cooking and the broader skills of D&T, and students could embrace an understanding of the properties of food materials and apply this knowledge when developing food products. It was recommended that national bodies clarify the nature of food technology within the secondary school curriculum, but to the detriment of the subject, this never happened (Owen-Jackson & Rutland, 2016).

However, the introduction of food technology did increase the status of food teaching for pupils aged 5–18 years. A General Certificate of Education (GCSE) Food Technology examination was available for pupils aged 16 years, together with an A Level course for pupils aged 18 years, thus providing pupils with an understanding of food-related issues, preparing them for life in the twenty-first century and providing progression to food-related courses in further and higher education.

2013–2018

The increasing prevalence of 'obesity' in the UK became a major health issue for the government. One view is that teaching children 'cooking skills' or 'life skills' will ensure that they make healthy food choices, leading to a reduction in obesity. Yet it is known that multiple and complex factors contribute to obesity, for example socioeconomic conditions and the availability and accessibility of food. McGowan et al. (2015) note that there is limited dietary change related to an association between domestic cooking skills and food skills and that other psychological components (e.g. attitudes, food choice) and external barriers (e.g. budget, access to equipment, food storage etc.) need to be taken into account.

The 'Licence to Cook' initiative (2000–2009) was the first indication of the government's intention to focus on 'entitlement to cook' and 'life skills' in food education (Rutland, 2008). Funded by the Department for Education (DFE), it was to be integrated into the food technology curriculum for pupils aged 11–14 years but could also be delivered through after-school cooking clubs.

These dual, sometimes conflicting, strands of food teaching became a key issue in the 2013 review of the English National Curriculum for D&T for pupils aged 5–14 years. Food was retained within D&T with the inclusion of the term 'ingredients' and 'food'; however, there was a separate 'cooking and nutrition' section (DfE, 2013). Pupils were to work with food ingredients in the context of home and wider industrial settings and also were to 'learn how to cook', described as a 'crucial 'life skill'. It was not clear how learning to cook, without

an understanding of ingredients, food science and modern food technologies, would prepare pupils for their future lives or employment in the twenty-first century (Rutland, 2017).

Food Examination Courses

Following the review of the D&T curriculum, all GCSE and A Level subjects (DfEa, 2014) were reformed. The DfE decided to develop a combined *GCSE Cooking and Nutrition*, with a name change later to *GCSE Food Preparation and Nutrition*; the new qualification would focus on ensuring that students acquire a good understanding of food and nutrition, as well as excellent cooking skills (DfE, 2015, pp. 6–7). The draft GCSE Subject Content for D&T (DfEb, 2014) did not include food as a material. All the former food courses, such as home economics, hospitality and catering and food technology, were to be addressed through one examination course. A new A Level Food Technology course providing a pathway for pupils aged 18 years and progression to higher education courses would not be developed, though a number of high-quality vocational qualifications, confectionary and butchery are available (DfE, 2014).

However, it can be argued that twenty-first-century lifestyles and the increasing availability of ready-prepared food products with the growth of the food industry have led to a change in eating habits and patterns. The food and drink industry is the UK's largest manufacturing sector, contributing £28.2 bn to the economy annually and employing 400,000 people (Food & Drink Federation (fdf), 2019). In addition to developing pupils' cooking skills, food teaching should focus on developing their knowledge and understanding of all aspects of food, including food science and technology and social, political and economic food issues (Lawson, 2013; Rutland & Owen-Jackson, 2013, 2014).

An example of the content of a new GCSE Food Preparation and Nutrition (Oxford, Cambridge and RSA (OCR), 2016) consists of nutrition, food provenance and food choice, cooking and food preparation and the skills required in preparation and cooking techniques. The assessment overview is as follows:

- Food Preparation and Nutrition – 50% written examination
- Food Investigation Task – 15% non-examined assessment assessing the scientific principles underlying the preparation and cooking of food
- Food Preparation Task – 35% non-examined assessment of the planning, preparation, cooking and presentation of food

GCSE emphasises knowledge of food science to be applied in Food Investigation and requires 'a review of findings and explanations of how these can be used when developing modifying and creating new dishes' (OCR, 2016, p. 22). It does not require the candidate to apply their knowledge of food science in Food Preparation Task, which assesses the planning, preparation, cooking and presentation of food.

There is no mention of food technology or of the concept that food product development is a 'technological outcome' or a process of applying technical knowledge.

Overall, the course focuses on the general and vocational aspects of food education and the 'life skill' of cooking. It emphasises the development of food preparation skills and prepares pupils to cook food at home and for an employment in the hospitality and catering industry, but there are questions on whether it provides progression to employment in the food industry and food-related undergraduate courses in higher education.

University Food-Based Undergraduate Courses

Research carried out in 2014 (Rutland & Owen-Jackson) explored the appropriateness of the food technology school curriculum as preparation for progression to higher education. The research question was:

> 'What is the course content of university food-technology related courses?'

Data were collected through a survey of university-level food technology course content, and course information was found via a web search of The Complete University Guide http://www.thecompleteuniversityguide.co.uk/league tables/rankings?s=Food%20Science.

Thirty-six universities were listed; the top ten were selected for consideration. Only undergraduate courses were considered. Courses were found that related to food science, aspects of food technology and food and nutrition, so these three categories were used for analysis. The names of the courses (Table 14.1) were noted alongside the entry requirements and an outline of the course content.

Food and Nutrition was the most popular course. There were some links between the A Level specification and the undergraduate degree courses, for example in *Food Technology and Bioprocessing* (Reading University): food processing, food product development, food quality assurance and safety and sensory evaluation; similarly, in *Food Science*: aspects of microbiology, food processing and food quality and safety; and in *Nutrition*: food product development, nutrition and health, sensory evaluation. Seven courses included food safety and hygiene and food product design/development; four taught food processing and food issues and three food analysis/evaluation.

The study showed that there are differences amongst the A Level Food Technology specifications and that different courses may have been appropriate for pupils with different career aspirations such as *nutrition, food product development and food manufacturing.* However, it was clear that the current A Level Food Technology courses alone were considered insufficient preparation for a university entrance. The subject is so vast that it cannot all be covered in one subject on the school timetable, but in combination with chemistry and/or biology (depending on the aspiration), the A Level in Food Technology should not be dismissed.

Table 14.1 Entry requirement and content of university undergraduate food-related courses

Entry requirement	Content
Food technology: 1 course	
Reading University: 2 core sciences (chemistry, physics, biology, mathematics) Other sciences: further mathematics, statistics, psychology, geography, environmental science, applied science and geology Food technology not mentioned	Year 1: Foundations of chemistry, microbes and microbiology, cell biology Development of mathematical and computing knowledge and skills Later – microbiology, biochemistry, revisited aspects of enzymology food processing, food product development, food QA and safety and sensory evaluation
Food science: 6 courses	
Leeds: the only one that referred to food technology/home economics as a suitable A level courses	Microbes, microbiology, food processing, food quality and safety, food product development, food quality and assurance and sensory analysis All courses taught nutrition, plus cell biology, molecular biology, biochemistry/food chemistry, food production and sensory evaluation Some taught food colloids, bioethics, food materials/ingredients, food and health and physiology
Food and nutrition: 18 courses	
Entry with science subjects – some naming the subject, others only requiring 'science'; four universities named food/technology/home economics as acceptable *Leeds*: (nutrition) 'considered' *Nottingham*: (nutrition) an acceptable science subject *Newcastle* (food and human nutrition) considered in place of biology *Coventry*: (food and nutrition) food technology acceptable *University of Ulster*: home economics acceptable as a science	A high level of commonality: all taught some aspects of microbiology, cell biology or molecular biology; biochemistry and chemistry (7); physiology (12) and endocrinology (3); nutrition and health (11); clinical nutrition (3); applied nutrition (2); diet therapy/dietetics (2); sport and exercise nutrition (3); food safety/hygiene (7); psychology (5); consumer behaviour (3); nutrition/health (9); food product design/development (7); food processing (4); food analysis/evaluation (3); food marketing (1) and food issues (4) Single modules in food services and catering, food origins, food policy and eating disorders

A Level Subjects Taken by Students Before Entry to Food-Related Undergraduate Degree Courses

Alongside A Level Food Technology, it is important to consider the other A Level courses studied by students before entry to food-related undergraduate degrees. A questionnaire was completed by 77 year 1 students in the Department of Food and Nutritional Sciences at Reading University (Rutland, 2014).

It was found that the A Levels studied by the students before entry to their degrees were mainly science subjects:

- BSc Nutrition and Food Science: biology (28), chemistry (18), mathematics (8) and food technology (8)

- BSc Nutrition with Food Consumer Sciences: biology (12), chemistry (5), mathematics (4) and food technology (4)
- BSc Food Science: biology (9), chemistry (10), mathematics (3) and food technology (3)
- BSc Food Science with Business: biology (2), chemistry (5), mathematics (4) and food technology (3)
- BSc Food Technology with Bioprocessing: biology (2), chemistry (1), mathematics (1) and food technology (1)

The range of other A Level courses taken was broad, with the most popular being psychology and German. Biology (57) was the most popular A Level subject taken by students, followed by chemistry (57) and mathematics (32) as the second and third most popular, respectively, and, interestingly, food technology (19) the fourth. This was despite the lack of direct reference to food technology as an entry requirement (Rutland & Owen-Jackson, 2014). There was an acknowledgment by the admission tutor that there was a need for some revisions for a new A Level Food Technology course to make it more appropriate to the course content followed by undergraduates at Reading. However, the research indicated that an appropriate food-related A Level food course would be acceptable for entry to an undergraduate food-related degree, together with science subjects.

Exploring Views of a Draft of a New A Level Food Examination

A new A Level examination that could be considered as a pathway and progression to university courses and employment in nutrition, dietetics, nursing, health-related professions, teaching and the food industry was drafted (Rutland, 2019). The aim was to explore the potential content of a new food-based A Level examination for pupils aged 16–18 years in England. A major source of information is the book 'The Science and Technology of Foods' (Proudlove, 2009). The proposed title for the course was Food Science and Technology. The content was divided into three sections (Table 14.2).

Table 14.3 indicates the range of respondents. In total, 67 people responded, including a majority (55.22% + 11.96% + 2.99% = 69.85%) of school teachers with an additional 28.36% with middle management positions in schools.

The respondents were asked to comment on the content (Table 14.4):

- Was it sufficient?
- Should it be reduced?
- Should content be added?

The results in Table 14.4 showed a general agreement with the content of the draft A Level food-based examination. The highest responses for sufficient content were the composition and nutrition of food (89.47%), preparation and cooking food

Table 14.2 Potential content of a new A level food examination

Food consumption
The composition and nutrition of food: water, carbohydrates, lipids (fats), proteins, minerals, vitamins, pigments, flavours, additives and fortified and functional food
Human dietary and health studies: types and functions of nutrients, digestion and absorption, nutritional product analysis, nutritional labelling
Consumer choice: connections between food constituents, diet and health to understand the variability and diversity of psychological behaviour; political, cultural and social issues; changing eating patterns; obesity; malnutrition; undernutrition; emerging trends; market research
Influences of the food industry: impact on the health of highly processed food, ready meals, increasing consumption of fast food, advertising, promotion and marketing techniques
Food production
National and global issues – population growth and food supplies: food sources (animal, plant, fungi; sustainability of food, food miles, synthetic food, biotechnology of food, functional food, organic food, genetically engineered food, modification), new food sources and technologies
Environmental challenges: production of biofuels, growing demand for major food crops like wheat and rice, livestock health, production to deliver improved food security and farming sustainability, increase of factory farming, new agricultural technologies, impact of automation on food production
Handling and preparation of food materials: storage of raw materials; cleaning, sorting and grading; size reduction; mixing, filtration and blanching; distribution; and transportation of food
Preservation of food to prolong shelf life and prevent spoilage and contamination: microbiology (bacteria, moulds, yeasts, algae and viruses); food spoilage caused by yeasts, moulds and bacteria; preserving food (e.g. heat processes, chilling, freezing, canning, dehydration, UHT, irradiation, modified atmosphere packaging); food safety and hygiene (food hygiene, poisoning and cross-contamination)
Food processing
Ingredients and commodities: dairy products, meat, fish, poultry and eggs, fruit and vegetable, cereals and baked products (bread, cakes, biscuits and pastry), beverages, chocolate and confectionary
Physical and chemical working properties of ingredients: colloidal structures/systems of food (e.g. sols, gels, emulsions, foams), changes that take place during preparation and cooking (e.g. gelatinisation, coagulation, caramelisation, Maillard reaction, emulsification, fermentation, antioxidation), enzymatic changes in the production of bread, beer and wine, raising agents (yeast, chemicals)
Preparation and cooking of food products: use of a range of processes and skills, choice and use of ingredients for desired characteristics (e.g. shortening), effects of heat on different foods, use of heat transfer (e.g. radiation, convection, conduction), food safety and hygiene, sensory properties of food (flavour, odour, colour, texture and appearance)
Applied food science and technology: product design and development, manufacturing and processing, analysis, quality control and quality assurance, biotechnology and innovation in food product development
Awareness of industrial practices: manufacturing processes (product specifications, food control and safety, quality control and quality assurance, risk assessment and HACCP), transportation of food
Impact of new technologies: novel ingredients and processes, nanotechnology/packaging of food

Table 14.3 The range of respondents completing the questionnaire

School teacher 11–18	55.22%
School teacher 11–16	11.94%
Sixth-form/college teacher 16–18	2.99%
Student teacher	16.42%
Head of D&T/food department in a school or college	28.36%
School-based teacher trainer	5.97%
PGCE/education lecturer (teacher trainer)	2.99%
Other university lecturers (please note discipline in box below)	1.49%
Food science/technology professional (please note detail in box below)	2.99%
Others: BSc Nutrition student; nutritionists (2); technicians (2); worker in a hospital and special education; founder of the Food Teachers Centre	10.45%

Table 14.4 Summary of responses to the questionnaire

	Sufficient content (%)	Reduce content (%)	Add content (%)
Food consumption			
The composition and nutrition of food	89.47	3.51	7.08
Human dietary and health studies	82.46	1.75	15.79
Consumer choice	75.0	7.14	17.86
Influences of the food industry	66.0	3.57	30.36
Food production			
National and global issues: Population growth and food supplies	83.64	3.64	12.73
Environmental challenges	72.73	5.45	21.82
Handling and preparation of food materials	70.91	23.64	5.45
Preservation of food to prolong shelf life and prevent spoilage and contamination	87.04	3.70	9.26
Food processing			
Ingredients and commodities	86.79	3.77	9.43
Physical and chemical working properties of ingredients	85.19	5.56	9.26
Preparation and cooking of food products	87.04	1.85	11.11
Applied food science and technology	73.58	22.64	3.77
Awareness of industrial practices	81.13	16.98	1.89
Impact of new technologies	87.04	7.41	5.56

products (87.04%), preservation of food to prolong shelf life and prevent spoilage and contamination (87.04%) and the impact of new technologies (87.04%). The influences of the food industry response (66.0%) was the lowest. The handling and preparation of food materials (23.64%) scored the highest for reducing content. Influences of the food industry scored the highest (30.36%) in add content, followed by environmental challenges (21.82%). A reduction of applied science and technology (87.04%) and awareness of industrial practices (16.98%) were significant as they indicated a lack of understanding of the importance of food production outside the home.

Key Issues/Issues Arising in the Food Consumption Section

a. The Composition and Nutrition of Food

Issues such as energy and pigments should be added with an increased clarity of the level and detail on what should be taught. The new GCSE Food and Nutrition contains drinks (milk, juices and soft drinks), and they should be in this draft.

b. Human Dietary and Health Studies

There should be a section on diet-related conditions, e.g. coeliac, diabetes, osteoporosis, CHD, high blood pressure etc. A reduced focus on digestion and absorption should be considered, and they should be kept for 'degree' level as a lot of students would struggle with such content. The relationship between nutrients and science should be taught together with a focus on product analysis and labelling.

c. Consumer Choice

Animal welfare issues should be included, together with political, social, cultural and environmental issues. Students should be aware of the moral issues linked to food cost and choices, for example intensive farming. The in-depth focus on special diets was approved. The section provided much to think about and made links with modern-day concerns, for example obesity and the impact of marketing and social media on food trends. There was a need to clarify 'variability and diversity of psychological behaviour'. Overall, the draft provided progression from the new GCSE, and it was good to see emerging trends and market research included.

d. Influences of the Food Industry

This area will grow in importance, and improving the quality of food products should be linked to food choices and the treatment of animals in factory farming. Social, economic and technological factors should be explored, including the impact of processed food in our health and diet, consumer choice and the impact of social media, funding sources for the industry and the marketing of such food. Some influences and technological developments have been more beneficial, for example nutraceutical, sustainable food sources for the future (such as insects), 3D printing in food to produce new ways of cooking at home and new advances in food products.

Key Views/Issues Arising in the Food Production Section

a. National and Global Issues

This section builds well on the current GCSE, with a large section on food science, food provenance and sustainability. The inclusion of political and medical issues and their effects on food supply and distribution was considered to be good, e.g. animal agriculture, antibiotic resistance, possible solutions of food waste issues and food security.

b. Environmental Challenges

Food provenance is important, including 'farm to food', seasonal produce, food waste, global warming/climate change and its impact on food production and diets. New sources of proteins, more environmental-friendly ways of growing crops and the impact of intensive farming on us and other parts of the world (for example, environmental degradation due to palm oil deforestation in Indonesia and loss of South American rainforest to make way for avocado plantations) were all important. The impact of animal agriculture on land and plant crops (wheat and soya) and the need for 'feed' crops all added to food insecurity and act as a main driver for habitat loss and species extinction. Ethical issues such as human slavery and child labour in food production should be included.

On the other hand, some respondents thought that this should be discussed in less detail as it is less relevant for 16–18-year-olds and that there should be a greater focus on nutrition. Food security factory farming and the technology used in food production should be kept but would be better placed outside the new qualification.

c. Handling and Preparation of Food Materials

The inclusion of food hygiene standards and preservation was supported, but there should be less focus on the storage and distribution of raw materials and technology processes. Some views expressed were as follows: 'these issues probably need to be there but it sounds dull to teach and learn about! … they need to be discussed but at a basic level and then developed in depth at post-18 level.' 'I am unsure if it is particularly relevant', and it could be touched on but not in too much depth. On the other hand, 'it builds on the new GCSE, which looks at primary and secondary processing as well as small scale practical preparation and the inclusion of bulk manufacturing/processing. It is a step forward.'

d. Preservation of Food to Prolong Shelf Life and Prevent Spoilage

It was thought that although this was examined in the current GCSE, it would be good to see the additional depth and this was good progression from the food science element in new GCSE specification. Food safety, hygiene and spoilage should be in separate sections, along with microbiology, food safety and hygiene.

Key Views/Issues Arising in the Food Processing Section

a. Ingredients and Commodities

This is in the new GCSE, but not about commercial food processing. Carbohydrate-based food such as legumes; grains; pasta; rice; fats and oil; alternative proteins, e.g. Quorn; and novel food/vegetarian alternatives should be included. One responder thought that beverages, chocolate and confectionery and wine/beer should be removed, but another agreed that it should be there. There should be a

greater encouragement to look at healthier alternatives in a balanced teaching programme, as part of the 'mix' but not as the main focus.

b. Physical and Chemical Working Properties of Ingredients

This is the basis of food science. The new GCSE covers this in some depth and requires students to design investigations: what more will be added? On the other hand, it shows good progression from the food science element in GCSE, but more specific scientific scenarios are needed.

c. Preparation and Cooking of Food Products

The content is similar to the new GCSE, so additional depth would be required. The practical food preparation element of the course is very popular with some students, and so high-level skills should be included.

d. Applied Food Science and Technology

One respondent asked if applied food science and technology was relevant for an A Level. They thought that the content should follow directly on from the new GSCE, where design and product development has been taken out, so there should be less of manufacturing and production and more of food preparation and nutrition rather than food technology. On the other hand, another respondent's view was that applied food science and technology were important as they showed progression and a 'shift' away from the GCSE Food Preparation and Nutrition specification. Also, food styling and batch production should be included.

e. Awareness of Industrial Practices

A few respondents thought that less emphasis on this was needed at A Level, and its relevance and appropriateness were questioned. Content should follow directly on from the new GSCE, where design and product development was taken out, with a reduced emphasis on manufacturing processes and an increase on nutrition and diet. However, this was not a common response.

f. Impact of New Technologies

It was thought that this makes the content modern, although it should be more clearly defined than in the previous Food Technology GSCE/A Level. It is the future of food manufacture, but it is a difficult subject to teach in the classroom.

Do You Think That There Should Be an A Level Food-Based Course?

The response to the question on whether there should be an A Level food course was 'Yes' (100%), which was encouraging. Suggestions for titles were very broad; keywords included food; nutrition; science and technology, followed by the less

popular preparation; diet/health; the future; development; production; manufacture and industry; and home economics. It was thought that 'Food Science and Nutrition' should be avoided as there is already an examination title at this level. One view was that there should be two courses, one focusing on decorative techniques and the practicalities of working in the food industry and one on nutrition and health.

Assessment Procedures

A percentage of 92.31 agreed and 7.69 disagreed that a written examination should have short-structured questions for Paper 1 and longer essay-type questions for Paper 2. Preferences were for short-structured examination questions with course work and practical work, for example small units combined with a demonstration of practical skills or one combined paper.

Non-examination Assessment (NEA)

A total of 80.85% supported a product development project (74.47%), a case study (74.47%), an investigation (91.11%) and a presentation of specific issues or topics (80.95%). Comments included the need for some practical and experimental food work, the development of alternative ingredients, a food science experiment option, a production problem, the inclusion of practical skills, case studies of diet-related issues, a brief to test high-level skills or moving away from assessing mainly food skills.

Suggestions for Alternative Framework

These included two projects over the course, a mini project or an independent study with some experience of the type of work done in a degree course, a compulsory NEA product development project or research on topical issues as an option tailored more to students' interest, e.g. nutrition, food science or food industry. Examples of these alternative frameworks are case studies of artisan food producers, investigations into school meal menus, presentations on famine or food waste (global perspective) or an industrial research/work/placement with local businesses. It was considered important to retain the 'development of thinking and creative skills to design with imagination'.

A total of 32 respondents showed an interest in being involved in future developments.

Conclusions

This chapter has looked at the background of food education in England from the time of its introduction up to the situation in schools in 2019. The main focus has been on the need to develop a new A Level food course that would provide progression for pupils aged 16–18 years who are interested in food and want to continue their studies in higher education or follow courses leading to careers such as nutrition, dietetics, nursing, health-related professions, teaching and the food industry within an informed knowledge economy.

The recent report on food education, 'Food Education Learning Landscape' (FELL), adopted a whole school approach based on 'learning the basics of food, where it comes from, how to cook it and how it affects their bodies in food teaching in England' (Oliver, 2017, p. 6). The findings are grouped into three themes: curriculum (formal food education), culture (how a whole school approach supports food education) and choice (the food behaviour that children are adopting). This approach is very important, but it focuses on whole school managerial procedures and approaches rather than on actual 'food teaching' in the school curriculum. Though many secondary schools offer the new GCSE, overall the number of students continuing to study food in the curriculum beyond year 8 is in decline. Also, 'teachers are concerned about the removal of an A level "food" qualification in England and Wales, which negatively affects the status of the food in schools and limits career prospects in this area' (Ballam, 2018, p. 8).

It is important for the teaching of food in schools in England that a new A Level food course be re-introduced. It is a lost opportunity for food education in schools. It should address the interests of pupils wanting to study food-related courses in preparation for professional and research careers in the food sector and be acceptable as an entry requirement into courses in higher education, together with science subjects.

The chapter has looked at course content, entry requirements to food-related undergraduate courses, the A Levels taken by university students on food-related courses and the views on a draft for a new A Level course. A wider perspective is needed for a new course, that is validated by the DfE, to fully prepare pupils for a successful entry to undergraduate food-related courses. There may be a need for 'options' within the assessment programme for schools and students to choose from to take into account the broad range of the food curriculum. The food we eat directly relate to the health of our communities, and how it is produced has a direct influence on the future of the planet. More clarity on course content and assessment procedures is needed, and there is an urgent need to draw together a group of professionally interested people and organizations, including the Design and Technology Association, the British Nutrition Foundation (BNF), the National STEM Learning Centre, teachers, university course lecturers, admission tutors and examination boards to explore the issues involved in the food enterprise.

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