Better education and care

Food technology in secondary schools

This report evaluates the effectiveness of provision in secondary schools for food technology within the National Curriculum subject design and technology. It examines strengths and weaknesses in pupils' achievement and the tension between the teaching of food to develop life skills and using food as a means to teach design and technology.

The report draws on inspection evidence collected by HMI between 2003 and 2005 and data from Ofsted's section 10 inspection database.

Of particular interest to:

DfES; Qualification and Curriculum Agency; Training and Development Agency for Schools; Department of Health; Food Standards Agency; British Nutrition Foundation; Design and Technology Association; National Association of Advisers and Inspectors for D&T; teacher training providers; secondary schools

Age group	Published	Reference no.
Secondary	March 2006	HMI 2633

Document reference number: HMI 2633

Website: www.ofsted.gov.uk

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Executive summary

This report is based on a small survey into the teaching of food technology within design and technology (D&T) in 30 secondary schools, carried out by Her Majesty's Inspectors (HMI) between 2003 and 2005. It was supplemented by evidence from Ofsted's database, findings from section 10 inspections and other surveys carried out by HMI. It was conducted to enable Ofsted to respond to growing concerns about the capacity of food technology to contribute to the government's developing policies on promoting health in schools.

In recent years, pupils, parents and headteachers have expressed their concerns about food technology in the curriculum to government officials and inspectors, namely that too little time is spent learning to cook nutritious meals and too much time is devoted to low level investigations and written work, the value of which is unclear. Pupils are required to engage in complex product development before they have an adequate understanding of food ingredients, nutrition, hygiene and cooking skills. The General Certificate of Secondary Education (GCSE) D&T course places a heavy emphasis on long coursework projects, which many consider to be repetitive. Some of the subject's content, such as emphasising the designing of food products by drawing and using computer aided designing and manufacturing software, and work on systems and control, has been taken on from other parts of D&T and tends to distort the way food technology is taught. Longstanding practical difficulties continue to hinder the teaching of the subject, including the organisation of the D&T curriculum, a shortage of specialist teachers, lack of funding for ingredients and increases in the size of groups for practical work.

This survey confirmed many of these concerns. It concludes that achievement across all aspects of food technology was rarely better than satisfactory. Some of the more abstract elements of food technology were beyond the capacity of younger pupils and those of lower or average prior attainment. Too often, teachers' perceptions of what the GCSE coursework required had a detrimental effect on teaching. There is a fundamental and so far unresolved dichotomy between teaching about food to develop skills for living and using food as a means to teach the objectives of D&T.

The report makes detailed recommendations about the steps that national bodies should take, particularly to clarify the nature of food technology within the secondary curriculum. It also recommends that teachers should have access to continuing professional development.

Key findings

- Good and very good achievement across the full spectrum of food technology was rare and tended to be associated with exceptionally skilful teachers and highly motivated pupils. The highest achievement was marked by pupils' clear understanding of the various properties of food materials, effective cooking capability and strong, commercially oriented product development.
- Effective teachers planned well for pupils to develop and make food products in a commercial context, drawing upon their own knowledge and understanding of food as a material, their understanding of the ways in which food materials behave when processed and their capability in hygienic methods of food processing. They organised complex practical cooking operations competently.
- In the best provision, pupils cooked or engaged in practical activity every week and theory was taught in a lively manner, mainly through structured practical activities. Pupils' research and analysis were tightly tailored to their project specifications. Product development briefs were demanding, realistic and, for older pupils, individualised. Contact with the vocational world of cooking and product development motivated pupils and supported the teaching.
- Even in well organised food lessons, in many schools younger pupils and those of lower or average prior attainment found some of the more abstract elements of food technology beyond their capacity.
- The curriculum ranged from excellent to poor between schools. This depended on decisions schools had made about providing time and other resources for food technology.
- Teachers' understanding of the requirements of GCSE coursework determined the way they organised and taught the subject, and this often deflected attention from the curricular aims of the subject. There was a lack of clarity about the relationship between the teaching of food as a life skill and the use of food as a medium for teaching design and technology.
- The quality of teaching was often restricted by: modular timetabling in Key Stage 3 lessons, which were too short for practical cooking; inefficient use of time; boring teaching of theory; large group sizes; pupils' lack of ingredients for cooking; and a lack of continuing professional development (CPD).
- A shortage of specialist teachers restricted provision in a significant minority of schools.

Recommendations

At a national level, there is a need to:

- define the knowledge, understanding and skills which pupils in Key Stages 3 and 4 should be taught in relation to cooking, nutrition and healthy eating and incorporate these redefinitions in to the programme of study for D&T; this is presently being revised by the QCA, using terminology appropriate to food
- clarify the relationship between the teaching of food as a life skill and the use of food as a medium for teaching design and technology in order to remove the confusion for teachers and curriculum developers
- reconsider the demands made by the full spectrum of food technology on younger pupils and on pupils throughout the age range with low or average prior attainment in order to ensure that the subject meets the learning needs of all pupils
- provide teachers of food technology with training in one or more of the following:
  - increasing the rigour and industrial orientation of teaching, especially for older and abler pupils
  - providing appropriate levels of challenge for pupils of low and average prior attainment
  - motivating pupils engaged in lengthy GCSE coursework projects
  - planning the teaching of practical cooking to overcome the organisational constraints
  - increasing the liveliness of the teaching of the more abstract parts of the subject
  - maximising the use of time
- improve organisation and resourcing in schools by:
  - defining clearly the content of what secondary schools should provide in food technology, especially at Key Stage 3
  - developing guidance, drawing on expertise both in food teaching and in the management of secondary schools, which covers the minimum organisational and resourcing requirements, including funding of ingredients, length of teaching periods for practical cooking, the time needed overall to teach the subject, and the limits to group sizes needed to secure the safety of pupils in practical work
- identify precisely the shortfall in teacher supply and take steps to train specialists, including those with industrial experience in food technology, to teach in secondary schools.

Food technology in secondary schools

The curriculum

1. The prescribed content of food technology within design and technology (D&T) is outlined in the National Curriculum programme of study and, in more detail, in the GCSE specifications. With the advent of the National Curriculum in 1992, it was presented as a new subject, but its teaching was tightly circumscribed from the beginning.

2. Schools gave limited time in Key Stage 3 to the four focus areas of D&T: food, resistant materials, systems and textiles. This happened because various subjects, some representing new technologies and some previously taught separately, had been gradually amalgamated into D&T. Further, equal opportunities legislation led to all pupils being taught what had previously been restricted to either boys or girls. This reduced the time available for each focus area, typically to between 10 and 20 hours a year.

3. Schools needed to use existing, expensive specialised accommodation and to deploy teachers who had usually been trained to teach home economics rather than food technology. Both these factors influenced course structures heavily in all but the few schools which were able to appoint new staff or benefited from new or refurbished accommodation.

4. Within these historical constraints, experienced by almost all schools, the food technology curriculum varies widely. Some departments make optimum use of the limited time through excellent schemes of work, lesson planning and organisation of resources, and by a determination to make every minute count. In these departments, high volumes of coursework, especially major GCSE projects, are usually broken down into smaller, interconnected units, often related to industrial practice.

5. In one school, a local chef worked with Year 10 pupils on a 'Food with Flair' project. This resulted in a higher volume and more advanced practical work than is usually seen, with a positive impact on the pupils' GCSE results. The head of department noted that few food teachers were confident to work in that way, and that most sought security by requiring pupils to spend much time filling in and embellishing design sheets or repeatedly making the same product with minor, sometimes arbitrary, modifications, in order to meet what they perceived to be the requirements of the GCSE specifications.

6. At worst, poor planning for progression reduces the value of the already limited time. Schemes of work lack coherence and programmes contain too much theory, only tenuously related to practical work and often low level, resulting in unenthusiastic pupils. Food making skills are not efficiently developed as there is too little practical work and it lacks increasing levels of challenge. For example, time is spent studying the marketing of food products: while this promotes enterprise, it can reduce considerably the opportunities to

learn about cooking and product development. In predominantly mixed ability classes, pupils at the upper and lower levels of attainment are not being adequately challenged or encouraged to make progress. Overall, the wider the coverage in D&T, and in food technology within it, the less time there has been to deepen pupils' understanding and capability.

7. In the few highly effective courses which inspectors saw, practical food handling predominated in experiments, demonstrations or cooking practice. Theory was kept in its proper place, often taught in active ways. Pupils were therefore able to look forward to interesting practical activity in over 80% of their lessons. This percentage, however, dropped to 25% in one of the more poorly planned courses, where, in the words of the frustrated headteacher, 'the joy of children creating finished, edible products has evaporated'.

8. Designing occupies a significant place in D&T, reflecting the main areas from which the subject of craft, design and technology evolved after the 1960s. These areas had strong ties with electronics, engineering, graphics and product design, but less so with food. Although the food industry carries out significant product development, few would describe this as 'designing', except in minor areas such as 'food styling'. However, in order to fulfil National Curriculum and GCSE requirements, many teachers have gone to some lengths to include designing in their teaching of food technology. Support agencies have produced materials on incorporating CAD-CAM, for example, into school food technology, which is used in engineering, product and graphic design.[1]

9. Some schools have been more successful than others in absorbing activities such as designing, CAD-CAM and systems into their courses. At best, their focus is on product development in catering or mass production. At worst, and this is more common than it should be, pupils are taught trivial aspects, such as arranging toppings decoratively on a pizza or using complex engineering CAD software to produce very simple drawings of icing on cakes, rather than rigorous product development. In one school, Year 8 pupils' decisions about design were simply choices between colours of icing on novelty cakes. This compared badly with the rigour required in the other focus areas of D&T in the same school. In these cases, there was very little evidence that product development was based on pupils' understanding of how ingredients worked.

10. Confusion about the basic aims of food technology underlies some of the weaknesses in the curriculum. This can be traced to the influence of home economics, before food technology became part of D&T in the National Curriculum. A researcher has argued that criteria for devising dishes were sometimes mysterious to pupils.[2] In some GCSE home economics examinations, pupils were asked to devise and prepare a healthy dish and then evaluate it for

[1] Computer-aided designing and computer-aided manufacturing.
[2] *Wasting girls' time: the history and politics of home economics*, Attar, D., Virago, 1990.

its healthy eating status. To comply with the course requirements some pupils did this, using ingredients regarded as healthy but which they did not like and would not eat at home. They then felt betrayed when their teachers criticised them for throwing away the food after the exercise: they felt they had complied fully with the requirements, even though they did not want to eat what they had made.

11. This is still a problem. One Year 9 girl from a deprived area who was involved in a project to develop a stir-fry vegetable dish as a nutritious meal for an athlete commented at the end of the lesson: 'I know what my dad will say: "I'm not eating that rubbish, give it to the dog."' There was a tension between the school's definition of the task and the preferences of parents and families. In this case, the teacher's values and those of the pupil's family clashed.

12. There is a more fundamental clash, on the one hand, between teaching about healthy eating and how to cook accordingly and, on the other hand, developing food products to be marketed to meet consumer demand and make profits for a company's shareholders. Some teachers in the survey were concerned that focusing on commercial product development was leading them, tacitly, to accustoming pupils to the industrial production of meals, and its supporting advertising, and undervaluing the home cooking of fresh produce.

13. This tension confuses many teachers in their planning and is evident when the suggestions for curriculum content in the research paper, 'Getting to grips with grub', are compared. These emphasise diet and health, consumer awareness, cooking skills, hygiene and safety, while the GCSE food technology course emphasises problem solving, product development, practical skills, aesthetic, social and environmental issues, function, industrial practices and evaluation. In essence, a tension exists between teaching about food to develop skills for living and using food as a means to teach the objectives of D&T which needs to be resolved to remove many teachers' confusion.

14. Food technology GCSE courses need to incorporate the food and nutrition competences for 14–16 year olds prepared on behalf of the Food Standards Agency (FSA) and the Department for Education and Skills (DfES).[3]

15. Well planned provision is informed by excellent schemes of work, often evolved over a number of years, drawing from a range of sources and generally very concisely worded, more so than some of the published alternatives. They cover a broad range of contexts in which food processing takes place including the home, restaurants, factories, and test development kitchens. They are closely matched to external examination requirements.

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[3] *Getting to Grips with Grub – Food and Nutrition Competencies for 14–16 year olds*, Valentine, S. (BNF), Jupe, J. (DATA), DATA Research Paper 20, 2004. The awarding bodies, in conjunction with the Qualifications and Curriculum Authority (QCA), is now incorporating these.

16. Even in the very best courses seen, there was very little evidence of effective joint curriculum planning between food, science and business studies teachers, to enable pupils to apply in food technology what they had learned in science, mathematics and business studies. Schools missed opportunities to increase pupils' insight and sense of connection between subjects by synchronising the teaching of the theory, in science or business studies, with practical applications in food technology. This was reflected in the following example from a mixed ability Year 10 class.

> *The lesson dealt with gels, suspensions and foams as colloids. References were made to some of the chemical properties of eggs. Pupils at one stage perked up when volunteers were called to use different whisking techniques to create foams and compare their characteristics. The lively question and answer session which followed showed reasonable gains in pupils' knowledge. All the pupils were studying science, yet no attempt was made in planning or teaching this lesson to link colloids with they had learned in science about elements, molecules, compounds and mixtures and how colloids, as examples of mixtures, related to this basic chemistry.*

17. Some schools increased provision for food in the curriculum by organising activities during which the normal timetable was suspended. In one school, the food and other teachers set up a commercial bistro for four days in which 120 pupils helped, in turn, to make and sell lunches to pupils and staff. The food technology room became the kitchen and an adjacent classroom was decorated and fitted out as the bistro. Pupils in the previous year developed and costed a menu, cooked and served three course Italian meals. Although inspectors did not see the work themselves, pupils reportedly developed good cooking and social skills, working as chefs and waiters, and the profits were incorporated into the school's fund-raising activities for charities.

Achievement and standards

18. Pupils' achievement in food technology should include:
    - understanding the physical, chemical, biological, nutritional and sensory properties of food materials
    - applying this understanding to the skilful and hygienic preparation of food
    - developing food products, taking account of commercial manufacturing.

19. Good or very good achievement across this full spectrum was rare in the schools visited for this survey. It tended to be restricted to schools where teachers were exceptionally capable and pupils were highly motivated. High achievement was often associated with older and more able pupils, but not exclusively so. These three examples all illustrate high achievement:

> **Example 1: A school with an average intake in which pupils make good progress in all aspects of food technology**

Most pupils had a good grasp of the basic nutrients and what each contributes to human health and survival. In Key Stage 3, they had been introduced to some of the main functions of ingredients such as the use of starch as a thickening and as a raising agent; of fats for enriching and preservation; of sugar to caramelise and sweeten; and of eggs to bind or coagulate. Technical vocabulary was precise and pupils used a wide range of words to describe, for example, the sensory properties of the foods they tasted. Pupils used utensils and equipment carefully: a girl in Year 9 gently heated a white sauce, delicately using a fork to detect from the patterns it left in the sauce that it had thickened enough, something she recalled from the same processes to make lasagne in Year 8.

In a project on the batch production of biscuits, other pupils in Year 9 had considered a wide range of ingredients to modify the basic recipe and could link their properties with the end results, for example, adding bran to raise the fibre content whilst changing texture and taste. Product development was based on systematically making minor modifications to an existing recipe. Starting with an original recipe pupils experimented by changing one ingredient at a time in a measured way, promoting a degree of empirical development. Pupils evaluated each version with an interest which grew from being able to exercise choice. There was good evidence of this in their written work.

Example 2: Able pupils in a Year 9 group developing a product specification

The pupils had just finished baking a variety of biscuits to prepare for subsequent product development. They completed a sensory evaluation chart after discussing precise ways to describe appearance, taste, texture and smell. This led to a class discussion about ingredients and their functions. The teacher reminded them of the purpose of formulating a specification for developing a food product and asked them to create one for a biscuit. They were mature and co-operative and, in their discussions, drew on a good knowledge of foods, from home and foreign holidays. They worked hard, formulated very clear specifications and used their already extensive vocabulary well.

Example 3: Pupils in a highly performing suburban school studying GCSE food technology worked from design briefs through product development to quality control

Design briefs were appropriately challenging and provided realistic contexts for product development which motivated pupils. They were encouraged to pursue individual lines of enquiry and think creatively: this developed their skills and confidence as independent learners. Research was tightly tailored to the project specifications and supported by the use of templates to keep it purposeful and analytical. All pupils understood nutrition well and could link some of what they were doing to what they

had learned about food materials in science. They also had a good general understanding of healthy eating and felt confident to make their choices in their practical work. All carried out detailed computer-based nutritional analyses of their products, using appropriate software. They modelled other industrial practices effectively, for example, in using digital images of their work recorded by web cam on the food labels for their products. They had bought their own ingredients and had an accurate understanding of unit costs for their products. In practical work, for example in an exercise designed to introduce pupils in Year 10 to quality control, they were businesslike, very committed to the task, and used equipment and ingredients precisely and competently.

20. These examples, however, in three very different schools were unusual. In the many schools, one or more of the following major gaps in pupils' achievement brought standards down.

21. In one urban school, pupils in Year 9:

had a rudimentary knowledge of what might constitute a healthy diet but they lacked understanding of nutrition and how various food types might contribute to a nutritious diet. They could work effectively in the food technology kitchens on the projects they were set, but they argued that they should, by their age, be carrying out more advanced cooking than was possible in the current project, namely, to make cookies for batch production. Some were scornful when contrasting the low level skills required with those they learned from their parents at home. Older pupils were frustrated at not being able to work towards an externally validated qualification in hygienic food preparation during the time spent studying food in Key Stage 4.

22. The vast majority of teachers interviewed for this survey said that their pupils' standards of cooking skills had fallen since the advent of food technology: the subject's knowledge and skills had expanded but without additional time to teach the new content. A majority of pupils were not being prepared to cook, independently, a sufficient variety of nutritious meals, using a wide range of ingredients and techniques. Especially in Key Stage 3, their experience was often over-weighted towards making cakes, muffins and biscuits. There were a number of reasons for this, including the fact that product development could be taught more easily in the context of simple cooking techniques.

23. Product development was often not understood well. At a basic level, some of the practices in other parts of D&T, such as sketching or computer-aided drawing to express and develop ideas, were often inappropriate in food. This was exemplified in a mixed ability Year 7 lesson in which pupils were told they were designing a new product and were asked to choose one from a range of four types. Those choosing sauces were told to begin by drawing three different kinds of sauce: the resulting drawings were indistinguishable from one

another. Whereas drawing might have been an appropriate starting point in other aspects of D&T, this task was totally inappropriate and certainly did not reflect the way such a product would be developed in industry. The teacher had also confused the activity of choosing between a number of given sauces and the process of developing a new sauce, the latter arguably being beyond the pupils' competence at that stage.

24. In a similar case, but with an upper ability Year 11 GCSE group, pupils were working on their portfolios to develop products for special diets. The concept of product development was very elementary, however, going little beyond altering the type of cheese on a given topping. There is insufficient creativity or rigour in such activities, and little attempt to teach pupils, for instance, about the functional properties of ingredients and how to apply this knowledge in realistic product development.

25. Evaluation of products was sometimes conducted at a very low level, as in this example from a Year 7 class:

> *The teacher used an overhead projector to take pupils briskly through a series of tasks, including:*
>
> - *reading a word bank to identify criteria for the sensory testing of a Bolognese sauce made in the previous lesson*
> - *drawing a sensory star diagram*
> - *completing it for the same evaluation (conducted retrospectively and without a sample to taste as a reminder)*
> - *answering questions in workbooks.*
>
> *The questions in the workbooks, such as 'Were you organised?', produced low level responses such as 'Yes, I was organised'. Pupils recalled and considered their past actions, but, despite the 50 minutes spent on this and the teacher's good quality explanation, little was gained. The evaluation task was too divorced from experience and lacked rigour. Pupils were settling into a habit of doing formulaic work of little value. Some of the questions were directed at the lowest attaining pupils, leaving the rest of the class unchallenged.*

26. Similarly, weak control of evaluation was evident in this example from a Year 11 class:

> *One lower attaining pupil, who was falling well behind in completing his coursework, asked for five pupils to taste and evaluate a chocolate cake he had baked the previous day. Five of the more mature girls in the class volunteered immediately. They made judgements on a five-point scale under six sensory headings: of the 30 judgements, they graded 28 of them '5' (the highest) and two were graded '4', yet the quality of the cake was only moderate. This called into question the pupils' knowledge of what good quality chocolate cake might be like. More significantly, however, the girls' demeanour indicated that, out of sympathy, they were*

trying to encourage a peer in his coursework rather than engaging in objective evaluation. This got in the way of honest evaluation and undermined the exercise considerably.

27. Some of the schools inspected were working in very challenging circumstances. Pupils, often with very low attainment, came from homes with high levels of disadvantage. In such cases, the food technology teacher's priority was to ensure that they learned the basic skills of preparing food and developed an understanding of nutrition in order to care for themselves. Where food lessons were well organised, many pupils in these schools enjoyed cooking and were keen to acquire cooking skills. They were proud of their practical accomplishments and many used what they learnt at home. However, they often struggled with the demands of food technology courses.

28. In the survey schools, some pupils were very dependent on the teacher as they followed instructions. They lacked basic vocabulary for the subject, had difficulties in planning their time, and also found food product development very difficult. They often did not learn significantly about such concepts as clients, markets, specifications or product evaluation in relation to food, or about applying the science underlying the properties of foods. This was often observed even where the teaching was lively and matched well to the pupils' needs. It raises the question, therefore, whether the demands of food technology are too great for pupils with low or even average prior attainment, especially when time is limited and the survival skills of cooking and securing a healthy diet are so important.

Teaching and learning

29. Section 10 inspections show that the quality of teaching in D&T was at least satisfactory in over nine in ten lessons. There are fewer unsatisfactory and very good lessons in D&T than in the average of all subjects combined. As in other subjects, the teaching is better at Key Stage 4 than Key Stage 3, and included more instances of very good teaching. A similar pattern was observed in this survey. Effective teachers:

- planned well for pupils to develop and make food products in a commercial context, drawing upon knowledge and understanding of food as a material and capability in hygienic methods of food processing
- organised complex practical cooking operations competently
- understood the ways food materials behave when processed, the science of hygiene and the steps needed to secure it, and had an underlying grasp of current nutritional knowledge.

30. This following example from a Year 10 lesson, with mainly high attaining pupils but also some with learning difficulties, shows how a recently appointed teacher, with a food-related degree and industrial experience in food development and production, managed a simple yet very effective industrial simulation.

One aim was to encourage pupils to think critically about manufacturing and the consumers' trust in manufacturers when buying food. The lesson tried to clarify for pupils the nature of quality and process control, unit operations and team work.

The teacher gave a lively and authoritative introduction. Precise explanations and sharp questions required quick, short answers from pupils to determine their understanding before they began working in four teams to batch produce reduced-sugar cookies. The recipe was set by the teacher, ingredients were provided and a well designed flow chart of unit operations gave pupils a clear picture of the sequence of the work. The teacher gave each team printed labels to demarcate the areas of the stainless steel production benches into weighing, combining, shaping and portion control, and then onto baking and blast chilling for subsequent work on packaging and labelling. Pupils washed their hands and put on protective coats and hats without fuss, cooperated efficiently and resolved production issues as they arose.

The teacher's experience of industrial food production shone through in her authoritative subject knowledge, frequent references to the nature of factory operations, an uncompromising insistence on safe and hygienic practice, and hand-outs which might be used in industry, for example a quality control sheet covering a battery of checks: weight, portion size consistency, sensory evaluation, and concluding with the ultimate commercial goal: 'Batch released for sale – yes/no?'

Progress was very rapid and pupils' understanding was deepened. The pupils' very good motivation, mature behaviour and sharp time management were essential foundations for effective group practical work.

31. The best teaching set relevant aspects of product development into scientific contexts; for example, in the chemistry of food materials, the changes to their properties brought about by aging and processing, the biological and chemical bases of human nutrition or the impact of food processing on nutrition. It was also set in economic contexts with references to, for example, markets, consumer preferences and advertising.

Precision was critical in achieving the desired results, as in this example from a Year 8 class:

The class was being encouraged to develop sensory language by tasting a variety of vegetables – raw and boiled – drinking water to cleanse their palates in between, and then selecting adjectives from a list. Pupils were helped by the teacher's explanation and access to dictionaries for unfamiliar words, such as 'acidic' and 'pungent'. The teacher's careful orchestration, insistence on quiet and deliberate reflection about the

sensations felt, as well as accurate use of language, created impressive and enjoyable learning.

In good lessons, pupils were given tasks which challenged them intellectually, creatively and managerially. Many were put off, however, by being required to produce lengthy coursework. At their best, though, these were a means to an end, reflecting an emphasis on thinking, as in this example:

One high attaining pupil's research reflected good intellectual competence, showing well targeted, detailed yet concise and relevant information relating to a Year 11 coursework project on developing a healthy biscuit for sale. The research consisted mainly of text and a scattering of pertinent graphics (charts, photographs) of a wide variety of biscuits produced commercially and by the pupil. Understanding of nutrients was detailed; fat, for example, was accurately divided into three categories – saturated (butter, lard, chocolate), mono-unsaturated (olive oil, peanut oil, peanuts) and polyunsaturated (sunflower and safflower oil). Polyunsaturated oil was deemed the 'healthiest' on the grounds that it contained the least low density lipoproteins, which break up in the arteries, causing blockages in blood circulation, and that it is relatively high in high density lipoproteins, which help transport cholesterol to the liver for processing. Initial ideas had been described with photographs of existing products, annotated accurately, relevantly and in detail. There was no spurious drawing of food products.

One line of enquiry was the development of a range of Shrewsbury biscuits, based entirely on a series of variations in proportions of ingredients, carried out systematically as a series of 'fair tests'. Nutrition, sensory qualities, baking duration, finishing techniques, mass production procedures, packaging and labelling had all been investigated rigorously as part of the development process.

32. Encouraging rigour in pupils' thinking was a key feature of the best food technology teaching. Some schools had increased rigour by taking part in the Key Stage 3 Strategy D&T project. They adopted various tactics to capture pupils' interests, stimulate their thinking and strengthen their skills of product development, as in this example from an upper ability Year 7 class:

A lively word game introduced the lesson, at which point the pupils settled quickly. The lesson moved on to evaluating soups which the pupils had made. The teacher carefully explained the aims of the lesson, via the whiteboard, including 'why we evaluate food products' and 'the importance of evaluation criteria'.

The teacher drew pupils' attention to the specification for soups which they had developed and recorded previously. Brisk questions guided the class towards developing evaluation criteria for them. The able pupils

responded well to this rigour and all of them were able to see the relationship between a product specification and criteria for evaluation.

Pupils used a vivid wall display of adjectives which the teacher had selected to evaluate how well their soups had met their specifications. The teacher then invited specific pupils to describe and explain their evaluation to the class; feedback increased their technical understanding. Pupils gained considerably from this stimulating review and showed good insight into the taste and textures of vegetables, their different influences on the physical nature of the end product and the value of vegetables in diet.

33. Rigorous teaching with lower attaining pupils was equally beneficial but much less common. The following example shows high achievement from low attaining pupils in Year 10, some of whom had learning difficulties.

Half the pupils were on the school's register of pupils with special educational needs. They were studying for a food and nutrition GCSE because the school believed that food technology was too academically demanding for them. After a brisk but thorough introduction referring to nutrients in milk and its main characteristics, pupils had to taste, compare and rank five types of milk. Careful, painstaking preparation, explanation and questioning underpinned the successful teaching. This was combined with practical testing and a firm insistence that pupils concentrated on tasting. Pupils' knowledge and understanding were well developed, and there were frequent topical references, for example to the function of iron in the diet, the nature of lactose and the links between eczema and goats' milk.

34. The survey showed that highly effective teaching across the full spectrum of the subject is essential if food technology courses are to help pupils' develop life skills and meet National Curriculum requirements. Although many individual lessons were good, teaching across the full range of requirements was not sufficiently common. The less effective teaching, of which there was a worrying amount, failed to meet the educational aims of food technology, especially among pupils of average or lower prior attainment.

35. In the schools visited, teaching practical cooking was generally more effective than teaching product development, the application of the underlying science or the requirements of industry and consumers. This reflects many teachers' long experience of teaching cooking. Good practical teaching needs sufficient time and ambition, but it was often undermined by weak organisation and management. Some of these were beyond the control of the food teachers or even headteachers, but others resulted from the choices teachers or departments had made.

36. Practical activities require sufficient time for tools and ingredients to be assembled, for preparation and cooking, and for rooms to be cleared away at the end. A few exceptionally well organised teachers working with very

cooperative pupils and adequate technical support were able to manage a variety of practical tasks in the 50 or 60 minute lessons. Many, however, found this difficult. Some resorted to deploying technicians to do some of the work, such as weighing ingredients before the lesson began. This was well intentioned but deprived pupils of a chance to practise this skill. Washing up done by technicians after cooking also meant that pupils did not exercise responsibility for the equipment they used.

37. Many schools limited the scope of practical work. As a result, pupils had little opportunity to cook complex dishes. Others froze products for further processing in the next lesson or evaluated products a week after they had been made, thus limiting opportunities for pupils to carry out immediate sensory testing. Others were simply defeated by the disruption caused as pupils from the next class waited to start their lesson in a room which was not cleared up from the previous lesson. In the schools which were willing to timetable double periods for all or some of the food technology lessons, this problem diminished.

38. In many of the survey schools, some pupils often did little cooking because they did not bring in the necessary ingredients. For example, in one Year 9 class, seven of the 21 pupils had not brought ingredients to make a cake. Whilst the others cooked, the seven carried out a low level copying exercise. In another school, with excellent food technology GCSE results and teaching, an increasing number of boys in Year 9 were regularly and, according to reports, deliberately forgetting ingredients because they were caught up in a sub-culture which saw cooking as unfashionable. More generally, pupils did not bring in ingredients because they forgot them or could not afford them. This led to a form of educational exclusion.

39. Teachers reported that fewer families, even affluent ones, had stocks of basic cooking ingredients, because increasingly they bought ready-prepared meals rather than cooked at home. Teachers therefore often restricted their Key Stage 3 projects to cakes, buns and pizzas which could be made with the very basic ingredients which most homes were likely to have or find cheap to buy. All of this reduced the effectiveness of the teaching. At the root of the problem lies the unique method of funding food teaching: parents have to supply or pay for the ingredients cooked by their children in food lessons, the results of which they then take home.

40. Many teachers split classes for food technology into two, with half doing practical work and half doing theory. This was sometimes because teaching groups were too large for all to cook together, either because of the school's policy or, occasionally, because rooms did not have enough practical equipment for classes of 20 pupils to use at once. Often, however, there was no compelling reason, as in this example:

> *The recently refurbished, large food room was able to accommodate satisfactorily all pupils in a normal class to carry out practical work at one time. However, the teacher preferred to split classes so that half did*

practical work and half theory. As a result, she did not supervise all the pupils effectively. The pupils sitting at desks designed burgers by drawing and labelling. This was inappropriate, unchallenging and did not promote knowledgeable product development or an analytical understanding of food. This half of the class were quickly diverted: the pupils chattered, pace slowed and the work they produced was poor. The teacher, occupied with those who were cooking, barely noticed.

41. Low level tasks were often associated with some teachers' difficulties in teaching groups with very wide ranges of ability in their: prior attainment in literacy and numeracy; capacity to carry out the sustained written work within the research, development and evaluation required in product development; the capacity to work independently, and general capability in the subject. Many lessons were pitched at pupils in the middle of the ability range, leaving the less able floundering among the paperwork and the higher attaining pupils unchallenged. A significant number of very able pupils in the survey schools where food technology was not well taught told inspectors that food technology was enjoyable, especially the practical work, and that it was more relaxing than most of their other subjects because it was less intellectually demanding.

42. Time was often used inefficiently, and sometimes wasted, when pupils were set tasks which required them to carry out low level investigations. These filled time but demanded little beyond the desultory reading and copying of recipes, the writing up of information from questionnaires of limited scope and validity, and the colouring in or cutting and pasting of pictures in portfolios. Often, the pace of the lesson slowed: under-occupied pupils were meant to work individually but required much attention from the teacher to keep them focused on the task.

43. Some homework exercises were similarly undemanding. For example, in a Year 9 mixed ability lesson on bread making, pupils were set the 'research' task of visiting a shop or supermarket to find out the prices of two types of bread. Overall, inefficient use of time and low expectations mixed to produce unchallenging, often boring, activities and hindered teaching generally, whilst also reducing the time spent on practical cooking. In a majority of the schools visited, only half of the timetabled time was spent cooking or on related practical activities and, in some schools, this fell to below a third.

44. Added to these weaknesses in teaching and organising food technology was the lack of success in motivating pupils to learn the sometimes complex knowledge about, for example, food properties or to engage in abstract investigative and developmental work; they would rather have been doing more motivating practical work.

45. There is a major need for those involved in the subject to develop a broader repertoire of lively pedagogical skills to teach the more abstract and theoretical parts of the subject. Inspectors saw good examples of stimulating

techniques from the Key Stage 3 Strategy's D&T project training materials, but they were rare and awareness of the materials was uncommon.

Assessment and examinations

46. In the best food technology provisions in the survey schools, teacher assessment was accurate and consistent. A good understanding of the quality of the work, as it related to the levels of the National Curriculum, helped them to plan effectively to promote pupils' progress, as well as to ease pupils' transition from the primary schools from which they transferred.

47. Good assessment was integral to teaching and ensured that helpful feedback was available to all pupils. In the best practical lessons, the setting of targets was quick and devolved effectively to pupils. For example, pupils in a Year 11 lesson were asked to identify their target on the whiteboard at the beginning of the lesson. At the end, they ticked to confirm that they had achieved it and updated the record in their portfolios.

48. Portfolio work was usually assessed regularly. Positive comments on the quality of the work helped to support progression, motivate pupils, and to help them to identify their next steps clearly. The information was also used to identify those who needed extra support.

49. Where assessment for learning was successful, pupils had a very good understanding of the purposes of lessons. Effective questioning ensured that they were clear about the purpose of each activity; they were prompted to recall relevant information and build on prior learning. It was also used to develop higher order thinking skills, for example by pressing pupils to explain and justify their views. Explicit links were made to the learning outcomes of the lesson and each pupil's own target for practical work. This enabled them to work with a high degree of independence. Older pupils were generally clear about the grade they were working towards and what they needed to do to achieve it.

50. Some of the GCSE coursework assignments were unrealistic, however, as in this example from a Year 10 class.

> *The pupils had a well developed understanding of what was required in planning a GCSE project. Project briefs were taken from a previous GCSE food paper; they were very open in nature ('Design a hand-held snack product for teenagers'), but included too little supporting contextual information about the market or the existing product range of the imaginary company. Pupils' subsequent researching of this information tested their abilities to collate information, but it led to unnecessary letters to manufacturers requesting leaflets, copying or printing information from websites and embellishing folders. This took up considerable lesson time and few pupils were able to demonstrate the higher level skills of analysing and synthesising information.*

In attempting to focus on developing and searching for creative and original food products, the department adopted the practice of drawing three different variations of a food product. Drawings were brief sketches, annotated to show how ingredients could be modified and new ones introduced to change taste and texture. At best this provided opportunities for pupils to adapt recipes and use their wider knowledge and experience of food ingredients developed through tasting sessions, cultural experiences and holidays. However, pupils had few opportunities to test their ideas in practice. The trial and testing of products were brief and, in most instances, were the end point of their project rather than the beginning.

51. Such difficulties prompted some schools to consider alternative courses. In one, serving an area of considerable disadvantage, the head of department felt that the major coursework project (60% of the final marks) failed to sustain pupils' interest, so that they became demotivated and bored. The department felt that there was little room for manoeuvre to reverse this and concentrate on teaching pupils to make a wide variety of healthy meals. In another school, pupils told inspectors that the range of dishes they were able to make at GCSE level, and in the preparatory Key Stage 3 courses, was too limited. A course which focused too much on baking was contemptuously described as 'granny baking'; pupils wanted to cook full meals. In addition, some of the more health conscious wanted to use fish, which is rarely seen in food technology lessons in schools.

52. The assessment criteria for GCSE food technology are the same as for other D&T courses. Marks are awarded for investigating (10%), designing (20%), communicating and modelling (10%), knowledge of materials (5%), making (i.e. cooking) (40%), planning (5%) and evaluating (10%). This influences what is taught. Many of the problems this survey identifies can be traced to teachers' perceptions of what the GCSE requires. Many of the most effective users of assessment were those who had experience of working with GCSE awarding bodies.

53. The problems which the current courses generate, outlined in this report, suggest that the criteria and specifications should be reviewed. The QCA is carrying out such a review in conjunction with the awarding bodies.

Teacher supply

54. In a growing number of parts of the country, there is a shortage of specialist teachers of food technology. As a result, provision is reduced and, in some cases, abandoned, together with the closure of specialist teaching rooms. Two of the schools visited during the survey had abandoned attempts to recruit food technology teachers and had closed down their food courses. Both schools were popular, well run and had little difficulty in recruiting staff in most other subjects.

55. Other schools have resorted to employing teachers qualified in other focus areas of D&T, or other subjects entirely, who have expressed an interest in teaching food technology. Whilst some of these teach the subject reasonably effectively, many do not. They find it very difficult to challenge older and higher attaining pupils, and ensure their personal safety. In some areas, therefore, recruitment problems undermine schools' capacity to teach food technology effectively.

School organisation and resources

56. The report has described a number of problems faced by teachers of food technology. They result from decisions schools have taken about organisation, resources and management. To summarise:

- pupils are usually required to bring their own ingredients; as a result, in many schools, a number of pupils are unable to take part in cooking because they cannot afford, forget, or refuse to bring ingredients (paragraph 38)
- most schools where the work is timetabled in 50 or 60 minute single lessons find it difficult to provide enough time for practical cookery (paragraphs 36 and 37)
- the splitting of classes into two groups, one for practical work and one for theory, is often unnecessary (paragraph 40)
- group sizes for practical work are higher than the usually recognised limit of 20 pupils, which often reduces the attention which teachers can give to pupils in individual practical work (paragraph 40)
- the majority of lessons in Key Stages 3 and 4 are organised in mixed ability groups, but in many of these lessons better methods of challenging pupils are needed (paragraph 41)
- in Key Stage 3, the timetabling of modules, which focus on the different areas of D&T, takes too little account of effective planning for progression as pupils move one module to another (paragraphs 2 and 6).

Notes

Six of Her Majesty's Inspectors (HMI) visited 30 secondary schools between 2003 and 2005 to conduct a survey into the teaching of food technology within design and technology (D&T). The schools were selected by HMI to represent a range of attainment in GCSE results.

The survey was supplemented by evidence from Ofsted's database, findings from inspections of schools, and other surveys by HMI. It was conducted to enable Ofsted to respond to the growing concerns about the capacity of food technology, as a subject in schools, to contribute to the government's developing policies to promote health in schools.

Further information

The findings in this report were discussed by experts from a variety of backgrounds who attended an HMI invitation conference in November 2005. Readers may wish to learn about the results of these discussions and also read a related paper which sets out the context in which food technology is currently taught in schools.

Ofsted subject conference report: design and technology. Food technology in secondary schools (HMI 2508), Ofsted, 2005.
http://www.ofsted.gov.uk/publications/index.cfm?fuseaction=pubs.summary&id=4122

Every Child Matters

The Government's aim is for every child, whatever their background or their circumstances, to have the support they need to:

- Be healthy
- Stay safe
- Enjoy and achieve
- Make a positive contribution
- Achieve economic well-being.

Organisations involved with providing services to children – from hospitals and schools, to police and voluntary groups – will be teaming up in new ways, sharing information and working together, to protect children and young people from harm and help them achieve what they want in life. Children and young people will have far more say about issues that affect them, as individuals and collectively.
www.everychildmatters.gov.uk

Choosing Health

This White Paper sets out the key principles for supporting the public to make healthier and more informed choices about their health. The Government will

provide information and practical support to get people motivated and improve emotional wellbeing and access to services so that healthy choices are easier to make. The Department of Health (DH), the Department of Culture, Media and Sport and the DfES are working to halt the year-on-year rise in obesity, in particular amongst under 11s, by 2010.
www.dh.gov.uk/PublicationsAndStatistics

School Fruit and Vegetable Scheme

This is part of the 'five a day' programme to increase fruit and vegetable consumption. Under this scheme, all four to six year old children in local authority maintained infant, primary and special schools are entitled to a free piece of fruit or vegetable each school day.
www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/FiveADay

School Meals

The DfES is helping to improve the quality of school food by giving three years of transitional funding of £220 million to local authorities and schools. The use of the funding is not prescribed, but it is intended to help schools and local authorities to transform school food at local level. New food based standards are to become mandatory for all schools from September 2006. Nutrient based standards are to become mandatory for primary schools by September 2008 and secondary schools by September 2009.
www.teachernet.gov.uk/wholeschool/healthyliving/foodanddrink

School Food Trust

The School Food Trust (SFT) will give independent support to schools and parents to improve the quality of school meals. It is funded by £15 million from DfES. The SFT will also bid for funding from the Big Lottery Fund which, as part of a strategic programme to promote well-being, has decided to allocate up to £45 million to support healthy eating projects and initiatives for children, parents and their wider communities.

National Healthy Schools Programme

National Healthy School status requires schools to meet criteria in four core themes. Since September 2005 updated guidance for schools stipulates that schools must address the following to address national healthy school status:

- PSHE (including sex and relationship education and drug education)
- healthy eating
- physical activity
- emotional health and well-being (including bullying).

In the 'healthy eating' strand, pupils should have the confidence, skills and understanding to make healthy food choices. Healthy and nutritious food and drink should be available across the school day.
www.wiredforhealth.gov.uk

Food in Schools

DfES and DH are encouraging schools to look at all aspects of food during the day and to develop whole school food policies. They can also set up local food partnerships, where secondary food specialists train and support their primary colleagues, helping them to work towards the National Healthy Schools Standard.
www.foodinschools.org

Food Standards Agency

The FSA works with UK education and health departments, and other partners, to encourage schools to adopt a whole school approach to food and nutrition and to improve children's dietary health. This goes wider than that of healthy eating, embracing food safety and food allergies. The FSA is currently commissioning work to roll out 'Cook it out of hours cookery clubs' within the extended school environment.
http://www.food.gov.uk/multimedia/pdfs/bookmarknut.pdf

http://www.food.gov.uk/multimedia/pdfs/foodpolicygoverning.pdf

Annex

Schools visited for this survey

Ashington Community High School
Bexleyheath School
Evesham, Blackminster Middle School
Burnham Grammar School
Don Valley High School and Performing Arts College
Eastbourne Technology College
Grange Comprehensive School
Harper Green School
Hazel Grove High School
Hipperholme & Lightcliffe High School
Hyde Technology School and Hearing Impaired Resource Base
Kingsway High School
Middleton Technology School
Ormskirk School
Padgate Community High School
Pensby High School for Boys: A Specialist Sports College
Priestnall School
Ruffwood School
South Chadderton School
St Aelred's Catholic Technology College
St Benedict's Roman Catholic Voluntary Aided Middle School
St George's C of E High School
Sutton High School
Tarporley Community High School - A Specialist Mathematics and Computing School
The Beauchamp College
The Northicote School
The Swinton High School
The Verdin High School
Tytherington High School
Usworth High School