Developing a conceptual framework for auditing design decisions in food technology: the potential impact on initial teacher education (ITE) and classroom practice

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Developing a Conceptual Framework for Auditing Design Decisions in Food Technology: The potential impact on initial teacher education (ITE) and classroom practice

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Abstract
The paper presents the final findings and recommendations of the second of two previously reported small scale research and development projects (Barlex and Rutland, 2004; Rutland, Barlex and Jepson, 2005) with specific reference to food technology.

The paper refers briefly to the background to the research activities including key findings from the first research project and preliminary findings (Rutland, Barlex and Jepson, 2005) from the second research project. It outlines the development and refinement for food technology of the conceptual model. This paper focuses on the third food technology interventional curriculum activity implemented during the course and the trainee’s use of the food technology conceptual model as a tool to audit their design decisions. It reports on the findings from the interviews with six trainee teachers following the activity. Finally, it reports on the findings from lesson observations during their school practice for the six trainee teachers in the later part of the course.

The paper concludes by considering the impact on ITE and classroom practice of the research projects with specific reference to the conceptual model for designing in food. It comments on the positive use of the conceptual model with the current year group of PGCE Secondary food technology and BA Primary Education with Design and Technology trainees and the impact of embedding the interventional studies into the courses. Reference is made to reflections of teachers and school based mentors of the potential impact of the model as a tool to audit and track the development of design decisions.

Key words
designing, food technology, initial teacher education, secondary, primary, curriculum intervention

Background
This paper reports on the findings of a second small scale research and development project ‘Transferring a model for improving the ability of design & technology PGCE trainee teachers to teach designing: designing within food technology’ funded by the UK Teacher Development Agency (TDA). There is considerable evidence that those entering ITE PGCE courses in design and technology (D&T) have different backgrounds and experiences of designing (Lewis, 1995, 1996; Rutland 1996, 1997, 2001; Tufnell, 1997; Ofsted 2003). Ofsted (1998, 2000) has reported consistently since the introduction of D&T into the National Curriculum in England that designing skills lag behind making skills. Ofsted (2002) reported that in ‘some schools, there is insufficient attention to the processes of designing, particularly in Key Stage 3 where pupils’ experience of design and technology is merely a sequence of short focused practical tasks with no opportunity to apply their own ideas in a longer design task’.

As with the first research project ‘Improving the ability of design and technology PGCE trainee teachers to teach designing’ (Barlex and Rutland, 2004), the second project is based on the concept of deliberate interventional curriculum strategies and their impact on initial teacher education and classroom practice.

The findings of a preliminary small pilot study and the first research project were reported by Barlex and Rutland (2003 and 2004). The focus for the projects is the impact of a piece of curriculum development, designed to provide experience and acquisition of designing skills for one year PGCE trainees, on their teaching of designing as part of D&T lessons on school experience.
The key findings from the first research project included the ability of trainees to develop insights into the requirements of teaching designing and their use of these insights in developing effective practice. A conceptual model consisting of five key areas, conceptual, technical, aesthetic, constructional and marketing (Murphy et al, 2004) was used as an audit tool for design decision in their DMA activities by the trainees. Initially, they were concerned about deviating from the school’s scheme of work and noted the limited extent to which pupils aged 11-14 years and 14-16 years were engaged in designing in the prevailing D&T curriculum. By the second practice they were confident enough to negotiate and implement their own approaches to teaching designing and make significant improvements to the curriculum offered by the school. However, of relevance to this paper, it was noted that some trainees found particular difficulty in developing both their own design ability and to engage in teaching designing in school. This was particularly true for those with a background in food studies or control technology.

It was this last finding that became the focus of the second research project presented in this paper. Funding was made available by the TDA to explore the design ability and teaching of design by food technology trainee teachers using the conceptual framework developed in the initial project.

Methodology
The second research project was carried put over a single academic year 2004-2005 in two ITT institutions offering a one year PGCE Design and Technology course with a food technology option. The findings and recommendations from one of the institutions are the focus of this paper with the findings from the other institution to be presented at a later date. The research question addressed was:

‘To what extent can a deliberate curriculum intervention strategy aimed at enhancing design ability and design teaching skills of trainee teachers on a one year PGCE Design & Technology course be transferred to designing in food technology?’

As with the first research project qualitative ‘ethnographical’ research methodology involving the study of social organisations (Tesch, 1990) was used, as the data was subjective, inductive and speculative (Burgess, 1985). It included semi-structured interviews, sitting in a classroom making field notes and recording classroom activities and group discussion. The participant researchers from both institutions met to develop a plan for introducing intervention activities relevant to their course and trainees and discuss data collection procedures. The preliminary findings from the first two intervention activities, subsequent semi-structured interviews and the Autumn Term classroom observations from one institution were reported by Rutland, Barlex and Jepson (2005) and Rutland (2005). It had been noted that the food technology trainee’s confidence had risen sufficiently for them to attempt to enhance the design dimensions of designing and making. The range of strategies they used included brainstorming, questionnaires, star diagrams, product analysis, group work and team work on small projects.

This paper outlines the implementation and trainee response to a third intervention in the second half of the one year course, the findings from semi-structured interviews, two sets of lesson observations and group discussion from one of the institutions. As reported by Rutland, Barlex and Jepson (2005) the project involved fifteen PGCE trainee teachers with food technology as either a first or second design or technology specialism. Six trainees had been identified to study in greater depth through a subject audit, three of the six had food technology as a first specialism and three had chosen food technology as a second specialism.

Third intervention task: wrapped foods
The activity took place over two half days. The trainees were required to work in pairs to design and make a range of hand-held wrapped food products for a target market. Their first task was a product analysis of existing products. In groups of four they investigated a range of existing wrapped-filled products, for example a samosa, pork pie, cheese and onion slice and fruit pie against a set of design decisions criteria (Figure 1).
A range of strategies that could be used in schools when designing with food were discussed including how to modify the product through the use of questionnaires, sensory analysis, simple user trips and attribute analysis to change the size, shape, flavour, texture, image of the product and the use of nutrition, fillings and wrapping chooser chart and the Design Hexagon, a feature of the Nuffield Secondary Design and Technology Project website (Barlex, 2005). The trainees were then asked to experiment in pairs with a range of fillings and wrapping to explore the development of flavour, odour and taste and chose two to develop with different wrapping into a food product for a specific market. The trainees then wrote a design brief and develop a suitable ‘handheld’ product for their brief.

As in the first research project each of the six trainees were interviewed individually after the intervention task. The interview was semi-structured based on a series of questions:

- Which support tasks they found helpful during the task?
- Which one they felt would be helpful for pupils aged 11-14 years and why?
- Other tasks that they might develop?
- How they might structure a similar unit of work for Year 8?
- Future consideration of how they might similarly adapt one of the projects they would teach on their school experience.

The interviews were taped and transcribed.

Two sets of classroom observation of the six of trainees in their main school placements in the second half of the course were completed. The framework used to collect data for the observations through field notes, as for the first research project, included the headings of:

- The focus of the lesson – planned activities.
- Examples of design activities taking place.
- Outcomes of the design activities.
- Pupils’ response to the design activities.
- Other design activities that could take place.
- Possible barriers to implementing these activities.

At the end of the course there was a group discussion where the trainees were asked to review the course. With reference to this research project they were asked to reflect on the use of the auditing tool for design decisions, impact of the intervention tasks on their school experience and their views on their personal growth in design ability and teaching designing.
Findings from intervention task

The results from the product analysis task for each group of four trainees were analysed using a star diagram (Figure 2) and the products ranked for their potential as a hand held product by a ‘taste testing panel’ based on the whole class. The product analysis task helped the trainees identify key criteria for a ‘handheld’ product and they worked in pairs to write their design brief. Their ideas were wide ranging and included design and make:

- a range of hand-held pastry snacks for a new fast food franchise;
- a range of hand-held snack for a school trip;
- a sweet and savoury product for a children’s packed lunch box;
- healthy, deli-based food products for a champagne picnic for two;
- savoury hand-held wrapped foods for an adult summer picnic;
- hand-held wrapped picnic foods aimed at improving fruit consumption.

The trainees used the original auditing tool or conceptual model developed and implemented in the first project (Murphy et al, 2004) to audit their design ideas for their brief (Figure 3). This presented some problems as the trainees expressed some difficulties in relating the headings to food technology and required considerable clarification from the tutor. For example, the terms ‘concept’ and ‘marketing’ were clearly understood but ‘folding’, ‘making a white sauce batter and pastry’ were put in both the technical area and constructional area of design decisions. Despite these problems the range of products developed by the trainees within the context of a one day project was very broad and varied. Examples are included in Figure 4.

Findings from interviews following the third intervention task

In the interviews following the activity Trainee F, who was developing food as second specialism, commented that she ‘saw a transfer of skills from materials technology to food technology lessons’ and that ‘pupils would want to see finished products with a ‘wow’ factor’. Generally, they felt that the approach they had used would allow pupils to design more freely, rather than giving pupils a very specific brief and saying you must make… from the

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![Figure 2: Use of a star diagram to rank order criteria in a product analysis activity](image1.png)

![Figure 3: Use of the original conceptual model by one pair of trainees to audit their design decisions](image2.png)
beginning. Trainee D described the approach they had used as the ‘Ready Steady Cook’ approach where ingredients were provided and the people drew on their ‘knowledge’ base to develop their ideas.

However, a number of the trainees were concerned that ‘novice’ food technology designers in schools needed to have knowledge and understanding of basic skills ‘so they could be creative’. ‘We drew on our own knowledge’ (Trainee A, B). A number of them commented that they had seen a lot of paper based work in schools on for example, nutrition and designing ideas for a pizza on paper, rather than ‘hands on’ food handling tasks. The only design decisions made by the

![Figure 4: Final wrapped/filled products](image-url)
pupils were on paper and they were given a recipe
sheet for practical lessons (Trainee A). Trainee C felt that
it would be possible to adapt and restructure, for
example a typical ‘pastry’ project, to explore and modify
a range of fillings and wrappings taking into account,
for example nutrition, vegetarians and the target market.

Findings from classroom observations

During the classroom observation in the second and third
teaching practice the trainees taught a variety of lessons
to pupils aged 11-16 years. They ranged from ones that
were very teacher directed (Trainee C) with pupils making
no design decisions focusing on developing practical skills
to more open investigations. In a Year 9 lesson (Trainee C)
the pupils were ‘investigating burgers’ with a focus on
‘health’ and evaluating them for quality including cost,
nutrition and target market. They worked in groups, drew
up a sensory analysis chart and evaluated the burgers
against shape, size and method of cooking. The pupils’
responses were good. In another Year 8 lesson with the
same trainee, with food as first specialism, the pupils
used pastry made and frozen in the previous lesson to
develop a range of filled products for a target market
considering colour, size and shape. The pupils were
asked to consider two ways in which their products could
be improved.

One male trainee, (Trainee D) developing food as a
second area, was very successful and enthusiastic during
the university based sessions but had difficulties teaching
food technology in schools. This appeared to be partly
due to his lack of security with basic skills, but also to
some extent resulting from a lack of understanding of
some of the teachers in the school concerning
‘designing’ with food. This resistance and lack of
understanding was also noted (Trainee F) in one
traditional food technology teacher, but in this case the
trainee was able to successfully introduce some new
approaches in Year 7.

Trainee E was asked to teach a Year 8 ‘Biscuits’ project
of seven one hour lessons which were mainly paper
based with only two lessons allocated for practical
activities with food. She was able to restructure the
project to support the pupils’ designing by include
product analysis of existing products, the teaching of a
range of methods for making a variety of biscuits and
sensory analysis activities before the pupils developed
their own product for a target market taking into account
nutritional and sensory properties. This revised approach
resulted in a scheme of work with a change of balance
from two practical food and five theory paper based
sessions where the pupils were handling and working
with food in all seven sessions.

Findings from the end of course group
discussion

Overall, at the end of the year the trainees felt that there
were lost opportunities in food technology lessons that
were frequently too theory rather than practically based,
with a lack of links between practical activities and paper
based ‘designing’ tasks. Trainee A commented that
designing in food should be a concurrent activity where
pupils handle food, learn new skills and knowledge and
develop ideas. Trainee C commented, supported by the
others, that ‘designing in food is different as it is a
simultaneous activity’. For example, when different foods
are used in a product it affects both the technical,
aesthetic and constructional properties of the product.
The trainees thought that there were differences in the
language used and emphasis in food technology lessons
and other D&T specialist areas. For example, terms such
as developing a ‘product specification’ (Trainee B) were
used rather than ‘designing’ with food and there was a
high emphasis on paper based activities for industrial
practices for pupils aged 14-16 years.

Discussion

A revised model for identifying and auditing design
decisions in food technology

The second research project had used the same model
as the first project to identify and audit the sort of design
decisions that pupils can make when designing and
making products in a design and technology course
(Murphy et al, 2004). As a result of the interviews,
lesson observations and feedback from the group
discussion it was decided to modify this model (see
Figure 5). This would clarify the design decisions taking
place under the headings of the model and take into
account differences in approaches and technical
language traditionally used in food technology as a focus
area of design and technology.
The revised conceptual framework has been used
successfully in the current PGCE course for trainees to
audit design decisions in the second interventional task, wrapped foods, and introduced on the BA Primary Education Design and Technology programme. In both cases the tutor observed that it helped clarify the trainee's thinking when developing an understanding of the concept of designing in food technology as they were able to audit their design decisions using the model and present them clearly as a table. It provided a useful tool for considering design decisions in food technology (Figure 6) which had previously not been available. At the design and technology mentor meeting in the Autumn of 2005 the model was presented and one partner school was so impressed with the elegance and simplicity of the model that they reported the intention to use it with pupils.

An effective means of engaging trainees with designing
Trainees from a broader background of designing, for example where food technology was their second area of specialism in D&T and their degree was in textiles, product design or graphics, were quicker to understand the concept of designing in food. Whereas those students with food technology as a second area of specialism were able to engage with the idea of designing with food during the first intervention it was not until the third intervention, towards the end of the course, that the significance and usefulness of considering designing through making design decisions became apparent to those students whose first area of specialism was food technology. The value of the model was significantly stronger for trainees with food as a first specialism with food related degrees, for example home economics, consumer studies, food or technology science and nutrition where the use of the term ‘designing’ was not generally used. This was specifically true of more mature trainees from more traditional degree backgrounds.

![Figure 5: Modified model for design decisions in food technology](image)
The intervention enabled trainees on school placements to increase designing with food

The intervention activities developed in both ITT providers showed the trainees a range of activities and strategies that they could use to teach their pupils to design on school placements. The trainees were able to successfully adapt the schemes of work in their placement schools, without making major changes that might have proved unpopular, to ensure that pupils were making a range of design decisions. They were able to vary the target market, change the physical and nutritional properties and modify the flavour, colour or odour and experiment with a range of different ways of making a product. This is a significant shift and reveals the importance of seeing designing with food not as a pencil and paper exercise but as a series of investigations with food materials that provide enough knowledge and understanding for pupils to be able to either modify an existing recipe successfully or develop their own recipe.

Recommendations

Food technology initial teacher training courses should include a significant experience for the trainees of designing with food and they should be encouraged to develop these strategies and experiences in their school placements. School mentors should be encouraged to support their trainee in these approaches.

Food technology teachers in schools should support similar approaches for their pupils in projects when designing with food. In addition, they should be encouraged to use the model themselves to audit the designing decision opportunities in their school projects and their pupils should use the model to support their own designing activities.

Organisations, for example the Design and Technology Association, should be approached to explore further methods of disseminating the findings of the project to a wider audience.
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