DESIGNERLY THINKING IN THE FOUNDATION STAGE:

A CONTEXT FOR CONTINUING PROFESSIONAL DEVELOPMENT

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Abstract

Young children are excited to explore the world around them and it is vital to ensure that they investigate both the designed and made world as well as the natural world. As young children grow up in a rapidly changing world involving so many different technologies, it is crucial that they engage with relevant activities. Evidence suggests that young children are often denied opportunities to explore the designed and made world in their Foundation Stage (FS) settings through lack of teacher confidence, interest and appropriate knowledge and understanding. Designerly thinking in the Foundation Stage was set up as a project, funded by the Department for Education and Skills (DFES) to support this identified area of need. The project focused on the clarification of nature of design and technology and designing and offered possible strategies to help develop classroom practice relating to the designed and made world. Teachers gave their ideas and perceptions before and after the Continuing Professional Development that they undertook. The cascade model for the CPD was based on a transitional model (Kennedy 2005) and its effectiveness is discussed. Authentic activity and relevant links between theory and practice were two important factors that were considered when the CPD was planned and the data analysis offers key messages for educators, not only those of the Foundation Stage.

Introduction

This paper is based on a project - Designerly thinking in the Foundation Stage (FS) (children aged 3-5 years) - funded by the Department for Education and Skills (DFES now DCSF) that initially involved 400 teachers, working with 20 tutors across England. Since 2005, over 600 teachers more have been involved in the project, though the process has varied slightly to take account of national and local changes. Some of the changes that occurred as the project continued also involved primary teachers (teaching children 5-11 years) and secondary teachers (teaching young people 11-16 years). Although the project was initially set up to address areas of need in the Foundation Stage it became apparent that there were similar needs for teachers of older pupils.

The term ‘ Designerly thinking’ was chosen as it was felt that this best represented the area of need to be addressed. Ken Baynes had used the term (Baynes 1994)) when writing about his work with young children as they explored the designed and made world. Findings from a Qualification and Curriculum Authority (QCA) small scale research project (Benson 2003) had

highlighted the need for Continuing Professional Development (CPD) for FS teachers as majority of their planned work focused on the natural, not the designed and made, world. In fact less than 5% of the teachers questioned had an understanding of design and technology, and how activities relating to the designed and made world could be appropriately integrated into classroom practice. This meant that the children were missing out on experiences in this important area - an area that relates to their everyday lives and certainly would provide motivation for learning. Moreover, the first National Curriculum for FS children (QCA/DFES 1999; DFES 2007)) included content that related to the designed and made world and therefore had to be included in the curriculum of all FS settings.

The project used an action research based model (Costello 2003; Cohen et al 2007) The QCA research identified an area of need; a programme was created and delivered through the project; the programme was evaluated by the teachers through pre and post questionnaires after the course and through activity booklets when they had trialled activities in school, and again after a year to assess the ongoing impact. This paper focuses on the analysis of data from the pre and post course questionnaires. From Bassey's work (1999; 2001; 2003) on case study research, this evaluative study could be identified as an empirical enquiry, where sufficient data has been gathered to be able to explore significant features of what is found. In 2001 Bassey identified the idea of 'fuzzy generalisations' and talks about 'what may be' rather than 'what is'. The findings and conclusions are based on this research.

The CPD experience

The CPD experience was based on a cascade model. Initially, this involved 20 tutors in different Local Authorities from around England, with differing backgrounds (expertise tended to be in either design and technology or Foundation Stage). They had a 2 day CPD course that covered the programme for the teachers. They worked through the programme and adjustments made. All tutors were expected to run the CPD with the materials provided (included printed and CD ROM materials) so that the teachers had similar experiences, although it was stressed that tutors could and should use local examples where appropriate. The one day CPD programme for the teachers had as its main focus the designed and made world and started from the wider context of design and technology to provide tutors and teachers with a clear understanding of the nature of the subject. The contexts, activities, and products were chosen in the hope that the teachers and ultimately the children would feel personal authenticity. There was a focus on designing as it had been found (Benson 2003) that FS teachers created many opportunities for 'making' and were unsure how the designing element could be integrated into activities. It is also a clearly identified area of need in the primary phase (OFSTED 2008) In addition it was felt that it was important to stress the development of thinking skills associated with designing mainly through the use of questioning.

Activities included:

- Nature of design and technology
- Nature of designing
- Using the children's immediate environment to develop designerly thinking
- Using construction kits to link with the environment
- Evaluation of products (a set of products were given to all tutors and teachers, chosen for their cultural and personal authenticity)
- Questioning skills linked to learning

It was anticipated that the tutors' and teachers' thinking would be challenged and changes made to practice. The extent of the challenge and change would depend on their individual starting points, their willingness to reflect on their own practice, and to challenge their own values and beliefs, and to identify possible changes to their practice. This would accord with Solomon and Tresman's work (1999 and 2002) in which they stress that the most enduring form of CPD is 'a process of coming to know oneself, and one's strengths, weaknesses and commitments as a teacher'. (2002) p. 353

Findings and discussion on the activities undertaken by the teachers

Nature of design and technology

From pre questionnaires, it perhaps should not be a surprise that following findings from previous research (Benson 2003) over 90% of the Foundation Stage teachers (400 in total) identified that they had little idea as to the real nature of design and technology. Whilst the Foundation Stage curriculum is organised around 6 areas of learning and not subjects (QCA/DFES 1999; DFES 2007)), teachers need to understand the nature of design and technology as the subject is within the learning area 'Knowledge and Understanding of the World'. In addition they need to be aware of the nature and content of the subject in order for them to build appropriate blocks from which the children can progress to the primary school curriculum. Majority of the teachers used words such as 'about making', 'making things', 'technical knowledge', 'how things work', 'computing'. Only 5% used phrases such as 'design and make something' 'learning about the made world around them' and only 2% used phrases such as 'designing and making for a purpose', design and make for a user and purpose', and 'design and make something that is functional' If teachers are not confident in their understanding of the subject that they are teaching, it follows that the planning and chosen activities may not be appropriate for the children.

After the teachers undertook a quick activity that focused on the nature of design and technology there was a noticeable shift in their understanding. In the post questionnaires the teachers identified (over 75%) the importance of the product having a user and purpose, that the children should think about the design, that it was about the designed and made world, and that whilst making is important, the product should be functional. The teachers indicated that they found taking part in a practical activity that required them to think and communicate in a variety of

ways helped to clarify their understanding. Majority of teachers said that they felt more confident in their ability to review the experiences that they planned for their children and to build in authentic opportunities that related to design and technology, whilst 25% said that they felt very confident.

Nature of designing

Teachers were almost unanimous in their belief that 'drawing' was the key to designing from the pre course questionnaire. This notion is supported by findings from others (Constable 1994; Hope 2000) and again it almost certainly links with the lack of opportunity for Foundation Stage teachers to engage in CPD to develop their understanding. Indeed Hope (2000) stresses the importance of children understanding the purpose for the drawing/s before they can begin to use drawing as part of their design process. A minority of teachers (8%) indicated that designing was about 'planning', 'thinking about things that have been made', and 'exploring materials'. The ideas that designing is about imaging, trial and error, 2D and 3D modelling, discussion and evaluation of products were missing.

Following a short activity in which the teachers worked in small groups and had to sort cards with words/phrases that might or might not link to designing, their understanding appeared to change from the responses in post course questionnaire. Many indicated that it was the first time that they had really thought about and discussed the nature of designing. It helped that they had others to work with and they found the idea of some blank boxes useful as it made them review what they had been given and think about additions. Certainly the idea that designing meant drawing had changed for majority of teachers and all indicated that there were a variety of ways of designing, some of which would be suit some children better than others. Of course understanding can appear to change and deepen but the real test comes when teachers use this understanding in planning new experiences for their children.

Using the children's immediate environment to develop designerly thinking

The teachers were asked to identify experiences and activities that they already undertook with their children in relation to their environment. The use of the term 'environment' was chosen to try to capture the full range of activity connected both to the natural and to the designed and made world. An analysis of the activities showed that over 90% of the activities were linked to the natural world – nature walk, investigating plants, animals, insects, birds, weather watch, collections of natural materials such as stones, shells, leaves, visitors from the local nature centre, visit to the park to look at flora and fauna. Activities that linked to the designed and made world included investigating materials including manufactured ones, and exploring park equipment. All teachers undertook an activity in which they were asked to take a short walk around the building they were in and to identify possible avenues that children could explore. For some this proved difficult (approx. 25%). They indicated that they were not interested in looking at the building, and they could not see areas that could be developed with the children. Their

personal lack of enthusiasm prevented them from identifying opportunities. Others about (70%) found that after an initial 'panic' they started to look at the building in a different way. They would usually have used it for colour, shape, pattern, textures – all of which are excellent learning opportunities – but they now identified for example movement and mechanisms, structures, user and purpose, electrical control, user and purpose for individual products. The ability to use correct technical terms varied, almost certainly due to the teachers' own knowledge, but some (about 40% out of the 70%) indicated that they would need to gain personal understanding in order to support their children's learning. Working in pairs, the teachers were then asked to look at 2 topics or themes that they undertook with their children and to identify new experiences that they might offer the children based on this activity. From the discussions that followed and the post course questionnaire, it was evident that majority of the teachers felt that there was benefit for the children in using the designed and made environment in this way, that it might be of particular interest to some children, that is was an area that had been lacking previously in their planning, and that they needed to find out more about 'technical' areas such as structures and mechanisms in order to support their children's knowledge and understanding. They identified links between this activity and the nature of designing and discussed the importance of 'opening the children's eyes' to what was around them, to give them ideas for their own designing and making. A key perception of the impact of this activity was that whilst they had not considered in depth this type of experience mainly because of lack of knowledge and personal confidence, it was now possible to plan exciting activities that focused on these areas. Those that indicated an initial lower level of knowledge and confidence felt that they would need more CPD to enable them to do more than replicate these CPD ideas. Some (15%) however indicated that on their return to their setting, they would be working with their teams and together they could share expertise and move forward.

Using construction kits to link with the environment

Construction kits can be found in all Foundation Stage settings in England and are ideal for helping children to understand concepts relating to, for example, structures and mechanisms. Indeed designers use large scale kits when appropriate. From the pre course questionnaires over 90% of teachers indicated that the kits were mainly used for 'child initiated' activity. Children were free to choose which kit they used and how they used them. Teacher initiated activities were almost exclusively linked to those that supported learning in relation to shape, colour, and number. Less than 5% of teachers indicated that they used kits to teach children about fixed and moving joints, movement, wheels and axles, levers, pulleys and about stability and strength of structures. They indicated that they 'would not feel confident', they 'weren't sure how to introduce and develop such activities', they 'were not sure how to fit them in to the chosen theme or topic, they 'were not sure what technical vocabulary to introduce' and they 'had no experience of such activity.' Over 75% indicated that their kits were often muddled and unsorted and that the children almost always made the same or similar models with the kits.

After taking part in activities that helped to reviews kits and identify their key characteristics such as a range of joints, wheels and axles, structures, the teachers undertook quick activities that involved them in making and/or using different mechanisms, naming the parts, identifying ways of joining, making stable and unstable structures and describing reasons for these. In the post course questionnaires over 90% of teachers felt that they had been under using their kits. Over 90% of the teachers identified benefits to using the kits in new ways. They identified the links between the kits and everyday products and systems in their own environments and how they could be linked with their setting. Some (35%) indicated that they could see the value of the kits in involving parents who were not so interested in helping with reading or number work and thought about follow up activities such as after school clubs.

Evaluation of products

Exploring and investigating products provides learners with the opportunities to make judgements about, for example, how well a product is fit for purpose, who it is for, how it will be used, aesthetic qualities, how it fit together, how it works, and how it might be changed and/or improved. This type of activity can provide the learner with opportunities to develop their thinking skills in relation to design and ideas to use when designing their own products. From the pre course questionnaire over 90% of teachers felt that they gave their children few, if any, opportunities to evaluate products. Perhaps the most surprising finding was in relation to food. All teachers engaged in food activities with the children but only 3% had provided opportunities for the children to evaluate products made by others. For examples, many had made biscuits with the children but had not brought in a selection and involved the children in discussions relating to differences in shape, texture, taste, flavour, size, ingredients and reasons for these.

Each teacher was provided with a collection of products that they could use as starting points with their own children and the teachers were involved in activities that they might undertake with their children in relation to product evaluation. The products were chosen to cover a range of materials and joinings, different purposes and users, and to support the exploration of concepts relating to structures and mechanisms. The use of effective questioning was linked to these activities to indicate how children might develop their designerly thinking and teachers were involved in a number of activities that supported their learning in relation to this. The activities included examining Blooms' taxonomy (Bloom 1956), and analysing the types of questions that the teachers would ask their own children.

Some teachers (15%) felt that the types of activity that they undertook as possible examples of approaches that could be trialled in their own settings were not appropriate. They felt that young children could not evaluate products, despite the fact that from birth children find ways of indicating their likes and dislikes. The development of children's reasoning is complex but young children need to be given opportunities to develop their higher order thinking skills (Bloom1956). However, majority of teachers felt that the approaches that they trialled were not only possible but worthwhile on a number of levels. They indicated that whilst children might

not be able to articulate their reasons through lack of language or relevant thinking skills it was important to expose them to these approaches. Many identified 'surprises' that they had had when offering their children challenging activity in different contexts. As most had not undertaken activities of this nature before they were not sure how the children would react, but were enthused to try new approaches. They thought that using specific products would help the children to observe more carefully and indicated that they felt that types of questions they asked would be crucial in affecting children's learning. Again majority indicated that they had not studied questioning in depth and incorporated the use of different types of questions to match the intention of learning. Most had thought about closed and open questions but again there was a significant minority (30 %) who indicated that closed questions were 'bad', 'not suitable' to encourage learning; they did not link the type of question with the learning intention and see the value in both types of questions.

Conclusions and implications for future practice

The action research model proved an appropriate one in that the programme that was created to address an identified need was perceived useful by the teachers taking part in the course and addressed many of their needs. Many indicated that they had not realised how much this was an area of personal need until participating in the course, that they 'skipped over' the statements in the FS National Curriculum (QCA/DFES 1999, 2007) or they felt that they were covering them through the natural world. Majority of teachers' perceptions about the initial impact of the course on their ideas and practice were positive. They indicated that the course had provided authentic activity throughout and had linked theory and practice appropriately and in a way that was accessible. Although the course was short most felt that each session was broken down into mini activities that formed a cohesive whole. However, many (over 50%) felt that there was almost too much content. It depended on previous knowledge and understanding and personal starting points, but the session on questioning was felt to be too short for such an important idea. With the constant contraction of CPD opportunities worldwide (Fraser et al 2007)), it is imperative that these are able to make an impact. Teachers welcomed the pre course reading and questionnaire to help them prepare for the day, and they indicated that the follow up booklets would give a focus to the implementation of new ideas taken from the course.

It is worrying that the teachers were unclear about the nature of design and technology and designing, when there is a legal requirement to include related experiences in the children's curricula. It means that the children are not receiving their entitlement, but more importantly they are missing out on an area of learning that will become increasingly important as they grow up in a rapidly changing world of technologies. Majority of the teachers (over 95%) were women, most of who indicated that their interests lay more in the natural world and that they had few experiences that they could draw on from their personal lives, their own schooling, or Teacher Education. In addition, majority of the teachers had little confidence in their own knowledge and understanding in relation to 'technical matters' such as mechanisms and structures and the correct technical vocabulary to develop and use.

The main ways in which construction kits appeared to be used were disappointing. Few opportunities were offered to the children to develop their knowledge and understanding of areas such as mechanisms and structures, their problem solving skills and their collaborative working skills. Many teachers, reflecting on this session, realised the need to develop practice in this area and highlighted possible actions on their return to their settings, including staff sessions to review all kits and evaluate possible uses.

From the conclusions the need to offer support and ideas for classroom practice in FS programmes within Teacher Education and CPD is clearly evident especially as designerly thinking is such an important part of the children's lives now and in the future.

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The word 'setting' is used to indicate any place where children aged 3-5 years are educated.