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Teachers' professional development in design and technology through action research

Dr R Ritchie
Bath College of Higher Education

Abstract

Action research offers a means of professional development that has particular relevance to those seeking to improve their teaching of design and technology and gain a better understanding of their practice. There are parallels between the processes involved in action research and in design and technology which can be used to encourage an important metacognitive outcome to such professional development.

Curriculum co-ordinators can also carry out action research aimed at improving the support they offer less-confident colleagues, as well as acting as facilitators for their colleagues' own enquiries.

The paper outlines a model of inservice education aimed at supporting primary teachers' action research. It is based upon evidence from teachers, including those on DFE approved courses¹ and from a study conducted by the author over several years, involving teachers on inservice activities².

Introduction

The recognition that design and technology is a process, and usually one that involves meeting needs, is generally accepted in education³. The nature of that process is, however, complex and more controversial. It usually involves aspects of identifying needs, imaging new possibilities, planning to implement those ideas, making or effecting some kind of change, and evaluating outcomes. Action research can be described as an almost identical process which can be used by teachers as they strive to make their practice more effective. The key idea of this paper is that making these parallels explicit to teachers has the potential to enrich their professional development. In any situation where learning is involved, and professional development is obviously one of these, the learning can be enhanced if learners are aware of, and reflect upon, the process of their own learning. This metacognitive outcome is equally applicable to teachers' and children's learning⁴. The significance of a metacognitive outcome for adult learners was one of the main findings of the author's research into the effectiveness of inservice education². Consequently, inservice work with teachers, aimed at supporting their professional

development, should encourage them to become aware of the processes in which they engage (just as children's learning in design and technology can benefit from opportunities to reflect on the process in which they were involved¹). This paper explores ways of encouraging effective professional development for primary teachers, involving a metacognitive dimension, through inservice courses and through the role of co-ordinators in school.

Professional development in design and technology

Teaching design and technology well is a demanding task, especially for primary teachers who may have had no design and technology education themselves, and who lack confidence and experience in teaching design and technology. Professional development to improve the quality of teaching can be achieved through a number of routes, for example; courses, school-based workshops, observing colleagues or using support materials. However, ultimately, individual teachers have to take responsibility for changes to their own practice; they need ownership of those changes. That is why, for the author, action research (or action enquiries²) can play such an valuable part in

enabling teachers to make effective and manageable changes to their practice.

The nature of action research.

Action research involves teachers systematically engaging in cycles of identifying concerns about their practice, proposing new ways forward, planning, acting, observing, reflecting and evaluating as they strive to improve their professional capability and understanding of their practice⁵. It is a means of learning to be a better teacher.

The view of learning which informs the author's teaching of design and technology is a constructivist one, which recognises: that learning is an active process for individuals; that the learners' existing competence and understanding are significant for future learning; that ideas are socially constructed through interactions with others¹. Learning involves gaining new capabilities, restructuring existing ideas in the light of new experience, and applying these in new contexts. This view holds for young learners and for teachers as adult learners. All teachers have existing ideas, about, for example, children's learning, their own role in facilitating learning, and the nature of the subject they are teaching. These ideas are part of the professional understanding that informs day to day decisions. Underlying this understanding are usually deeply held and rarely examined values and beliefs, for example, that children should become independent learners. In order to make changes to practice, it helps if teachers make both these ideas and values explicit so that, through a process of reflection on what actually goes on in their classrooms, they can identify concerns about their work as a focus for development. This structuring of existing ideas and clarification of concerns about one's teaching is the first step in carrying out a systematic action enquiry: it is how teachers identify aspects of their work where their educational values are 'denied in action'⁶. Some concerns will be obvious, others may require teachers to explore their current practice more systematically. This can be achieved by collecting evidence of what actually happens during their teaching (for example, videoing, audio-taping, eliciting the children's views, or colleagues' observations). Having clarified a need for change or improvement, the next step is to generate new ways forward. This

might be helped by discussion with colleagues, observing colleagues, gaining ideas from courses, reading, or applying strategies from one situation to another. Collaboration can be particularly valuable at this stage. Once a specific change has been identified, a plan for its implementation has to be made. Planning should include decisions about the appropriate evidence to collect in order to evaluate, as objectively as possible, the effectiveness of the action.

The plans need to be implemented and evidence collected to allow the teacher, through reflection and perhaps through discussion with colleagues, to evaluate how successful the change has been. Action research involves considered judgements based upon evidence, not impressionistic judgements. Implementation might involve a single session or several weeks' work with a class, a group or an individual, depending upon the concern being tackled. The reflective phase involves analysis of evidence collected. Collaboration at the stage of reflection and evaluation allows teachers who are carrying out action enquiries to benefit from the experience and insights of others and to validate their claims: if other professionals consider the evidence available do they agree with the judgements made? The outcomes of this stage are unlikely to be claims that concerns have been addressed. Much more likely are new insights into other factors involved, new concerns or the recognition of a need for a modified approach. In this sense, action enquiries involve a cyclical process.

Action research requires a rigorous and honest approach. It requires a teacher to be open to new perspectives, to value collaboration, to take professional risks, to be creative in imagining new ways of working.

INSET aimed at encouraging action research

Supporting teachers in carrying out classroom action enquiries has been a strategy that I have used on inservice activities for some years^{7,8,9}. I have also engaged in my own workplace enquiries to improve my practice and gain insights into my understanding of my role as an INSET provider². This section outlines a model of supporting teachers that I found successful, based upon the evidence of my own research.

The DFE approved 20-day (now 10-day) design and technology courses at Bath College of Higher Education, along with similar courses in other subject areas, are based upon a model underpinned by a belief in the value of action research. As part of the course structure, teachers work collaboratively, in pairs, planning and implementing small-scale projects or action enquiries in classrooms. Often one teacher works with the children whilst the other observes and collects data for later detailed analysis of what happened. This evaluation leads to modified plans which are then put into action by the same pair, perhaps reversing roles. Sometimes, the whole group focuses upon an area of concern, such as the nature of progression in children's designing skills⁹. These sessions feed directly into work that participants carry out individually in their own classrooms and review at the next centre-based session. The reviews include discussion of the insights gained by teachers as well as the processes involved (for children and teachers) - the latter fostering the metacognitive outcome discussed above. The assignments linked with the course also encourage teachers to engage in classroom enquiries and are integral to the course structure. The first requires them to evaluate their existing classrooms in order to answer the question, 'How can I improve the environment in which I teach in order to make it more conducive to learning in design and technology?'. They examine the extent to which their teaching environments reflect their values about teaching and learning. Some teachers work collaboratively with their classes, eliciting the children's views of the learning environments and how they might be improved. Outcomes to this task have included: reorganised design and make areas; new display facilities; new or improved storage units for tools and other materials; technique packs of exemplar models. In each case, the outcome is evaluated in terms of its contribution to improving the learning opportunities for children. This first assignment often involves the teachers in designing and making something themselves and reflecting upon their own capabilities with regard to design and technology, in the context of classroom enquiries. They are asked to reflect on the processes (involved in their enquiries and in their design and technology activities) that they have used: What have they learnt and how? What aspects of the outcomes have been

successful and why? The value of writing, to facilitate reflection and clarification of learning, is strongly endorsed by tutors - assignments are not simply the means of teachers gaining accreditation for the course, they reinforce the metacognitive outcome.

A second assignment encourages teachers to answer the more general question 'How can I improve the quality of my teaching in design and technology?'. This places emphasis upon their role and interactions with children; again they are asked to begin from the values they hold as teachers. Enquiries produced in response to this question have focused on: providing differentiated learning opportunities; the effectiveness of questions asked by the teacher; the effectiveness of teachers' responses to children's requests for help; strategies for teaching particular skills; strategies to support systematic approaches to group work; enhancing independent learning; gender issues. During one course, close observation of what was actually going on in their classrooms 'shocked' and 'disturbed' two teachers. In their own words, 'we did not really want to believe that the boys were pushing the girls out of these (practical) types of activities but we were increasingly aware that this was a problem and quite a serious one'. They explored different strategies in an attempt to improve the situation and found careful selection of groups improved learning opportunities for girls and boys¹. The case studies produced by teachers as a result of these enquiries often include analyses of children's learning, in the context of evaluating their own effectiveness. The inclusion of discussion about parallels between their learning and that of the children with whom they are working is another positive feature of some of these case studies. There is often evidence that teachers are applying new strategies and understanding to their everyday classroom work; the insights gained from specific enquiries become embedded in their practice and become part of their professional repertoire.

The final assignment (on 20-day courses) requires teachers, as co-ordinators, to address the question, 'How can I improve the quality of support I offer my colleagues in the area of design and technology?'. They are encouraged to support colleagues by eliciting their needs, generating ideas for meeting those needs,

producing action plans, implementing and evaluating the programmes of support and from those evaluations setting new targets. At each of these stages, a mode of collaboration is encouraged, and, where appropriate, less-confident colleagues engage in action enquiries of their own, supported by the co-ordinator.

Case studies resulting from this assignment have included: support for individuals in their classrooms or at the stages of planning and evaluating teaching; school-based INSET; production of support materials; whole-school projects, involving teachers, children and parents. A positive outcome from this phase of the courses was the extent to which working with colleagues increased the co-ordinators' confidence in their own teaching - helping them appreciate how much development had taken place earlier in the year. A metacognitive outcome resulted from reflection upon their colleagues' learning in comparison to their own learning earlier in the course.

During discussion on one course some interesting parallels were drawn between the

co-ordinator when working with colleagues and the teacher when working with children (see Figure 1). These parallels were again used to reinforce the metacognitive dimension of the teachers' learning.

Whatever form of support is offered by co-ordinators, evidence from the courses indicate that it is most successful when based upon mutual respect between colleagues; when it is flexible and responsive to individual needs; when it is realistic and begins 'from where teachers are' and encourages small manageable steps forward.

Teachers are under considerable pressure as a result of National Curriculum demands and the aim of the courses is to help co-ordinators to support colleagues in a constructive and positive manner in dealing with these pressures.

Conclusions

Action research provides a practical and effective means for teachers to improve the quality of teaching and learning in design and technology. The similarities between the

Figure 1: Parallels between children's and teachers' learning about here

Classroom Work		Professional Development	
Children's Learning	Teachers' Strategy	Teachers' Learning	Co-ordinator's Role
Engaging with context/ need/ opportunity- being curious and interested	Orientation- unstructured exploration/ scene-setting activities	Reflection upon current practice and professional understanding	Introducing colleagues to the importance and nature of design and technology
Structuring existing ideas about the context/ problem, thinking about current skills	Elicitation - helping children to find out and clarify what they already think and can do	Structuring existing ideas about teaching and children's learning- identifying concerns	Helping colleagues identify their professional needs and planning ways of meeting those needs
Restructuring ideas by extending, developing or replacing them/ developing new skills	Intervention- encouraging children to develop, test out and implement ideas or use new skills	Trying out new ideas/ strategies in the classroom and evaluating them	Supporting colleagues- collaborative planning and evaluation, workshops or in classrooms
Application of what has been learnt to new situations/ everyday life	Application- providing challenges or contexts in which new ideas and capabilities can be tried out.	Applying new professional competence and understanding to everyday teaching situations	Supporting application of new teaching competence through whole school development- schemes of work etc.

processes involved makes the link between the two areas a valuable one. However, the literature on action research⁵ and design and technology¹⁰ highlight the disadvantages of attempting to over simplify the processes involved. In both, a complex interaction between thought and action, theory and practice, are involved. Experience resulting from the courses discussed suggests that supporting teachers in engaging in action enquiries and exploring these issues helps them appreciate the nature of children's work in design and technology. The framework offered in this paper for action research, whilst somewhat simplistic, provides a starting point from which teachers can constructively generate their own unique approaches. It is not intended to be prescriptive, nor to imply that a linear or single process is involved.

To summarise, the benefits of an action research approach to professional development in design and technology teaching are that it:

- i. provides a 'tool' which is flexible and can be applied in any classroom situation;
- ii. involves processes similar to those involved in design and technology - increasing awareness of the nature and complexity of such processes;
- iii. gives individual teachers' ownership of their own professional development;
- iv. inevitably leads to change in practice;
- v. involves teachers making their values concerning teaching and learning explicit and enables them to ensure their practice reflects, more completely, those values;
- vii. encourages collaboration amongst colleagues;
- viii. fosters a metacognitive dimension to learning - contributing to teachers' understanding of their own learning and that of children.

Action research is not a panacea and will not suit all teachers equally. However, the author's own first-hand experience has convinced him that it has potential for improving the quality of design and technology teaching in primary schools.

References

- 1 Ritchie, R. *Design and Technology: a Process for Learning*. David Fulton Publishers, London (1995)
- 2 Ritchie, R. *An evaluation of a practitioners' approach to the initial and inservice education of teachers*. Unpublished PhD thesis, University of Bath (1993).
- 3 National Curriculum Council. *Non-statutory Guidance: Design and Technology Capability*. York, NCC (1990).
- 4 Fisher, R. *Teaching Children to Think*. Basil Blackwell, Oxford (1990).
- 5 McNiff, J. *Action Research: Principles and Practice*. MacMillan, Basingstoke (1988).
- 6 Whitehead, J. 'How do we improve research-based professionalism in education?' *British Educational Research Journal*, 15 (1), pp.3-15 (1989).
- 7 Ollerenshaw, C. & Ritchie, R. 'Looking at Learning: a classroom research project'. *Primary Science Review*, 10, Summer, pp.22-23 (1989).
- 8 Ollerenshaw, C. & Ritchie, R. *Primary Science: Making it Work*. David Fulton publishers, London (1993).
- 9 Ritchie, R. 'Generating designs at Key Stages 1 & 2'. *Design and Technology Teaching*, 23 (3), pp.132-134 (1991).
- 10 Assessment and Performance Unit (APU). *Design and Technological Activity: a Framework for Assessment*. APU, London (1987).