Building Thinking Skills in Thinking Classrooms: ACTS in Northern Ireland

Carol McGuinness, Angela Eakin, Carol Curry & Noel Sheehy
Queen's University, Northern Ireland
E-mail:
c.mcguinness@qub.ac.uk
a.eakin@qub.ac.uk
c.curry@qub.ac.uk
n.sheehy@qub.ac.uk

Brendan Bunting
University of Ulster, Northern Ireland
E-mail: bh.bunting@ulster.ac.uk

Abstract
A longitudinal evaluation of the effects of a metacognitively-rich pedagogy on children's thinking skills in primary classrooms in Northern Ireland is reported (ACTS – Activating Children's Thinking Skills). Participating in ACTS produced positive changes in children's self-evaluations of their learning and thinking strategies. However, the changes took time to build and were not even across all learners. The implications for classroom practices for teaching thinking, and for school reform, are noted.

Keywords: Metacognition, thinking skills, pedagogy, primary school, evaluation

1 Introduction

The purpose of the paper is to present some of the findings from the ACTS (Activating Children's Thinking Skills) project in Northern Ireland. This project was designed to create and develop teaching methods to improve learning in primary schools, through enhancing children's thinking skills across the curriculum. Three strands of investigation were pursued. The first strand comprised the main study: it evaluated an intervention process to enhance 8-11 year old children's thinking and learning, and the effects on both pupils' and teachers' learning were appraised. In a second study, thinking lessons were video recorded to identify features of classroom dialogue likely to mediate the development of metacognition. The final strand aimed to design a professional development programme for teachers, to write curriculum materials, and to create longer term strategies for sustaining thinking classrooms. This paper presents the outcomes for children's learning only (the first strand).

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Further details of the project are available from:
www.sustainablethinkingclassrooms.qub.ac.uk

2 The Framework

It is generally agreed that children cannot become better thinkers – able to give reasons for their conclusions, to think flexibly and creatively, to solve problems and make good decisions – solely by learning a content-based curriculum. We must make clear what we mean by these different forms of thinking and set out to teach them more explicitly than we normally do in classrooms.

Various models of thinking can be used to guide such teaching. A core distinction is between 'enrichment' and 'infusion' approaches. Enrichment approaches generally draw on a

specific cognitive theory. Lessons are pre-designed and are taught in parallel with existing ones. Examples include Cognitive Acceleration programmes (Adey & Shayer, 1994; Shayer & Adey, 2002) and Instrumental Enrichment. In contrast, infusion approaches place thinking in the context of normal curricular topics so that topic understanding and thinking can be taught simultaneously. Infusion can be subject-specific (science, mathematics, history) or may be developed on a wider scale across the curriculum (see McGuinness, 2005 for a further elaboration)

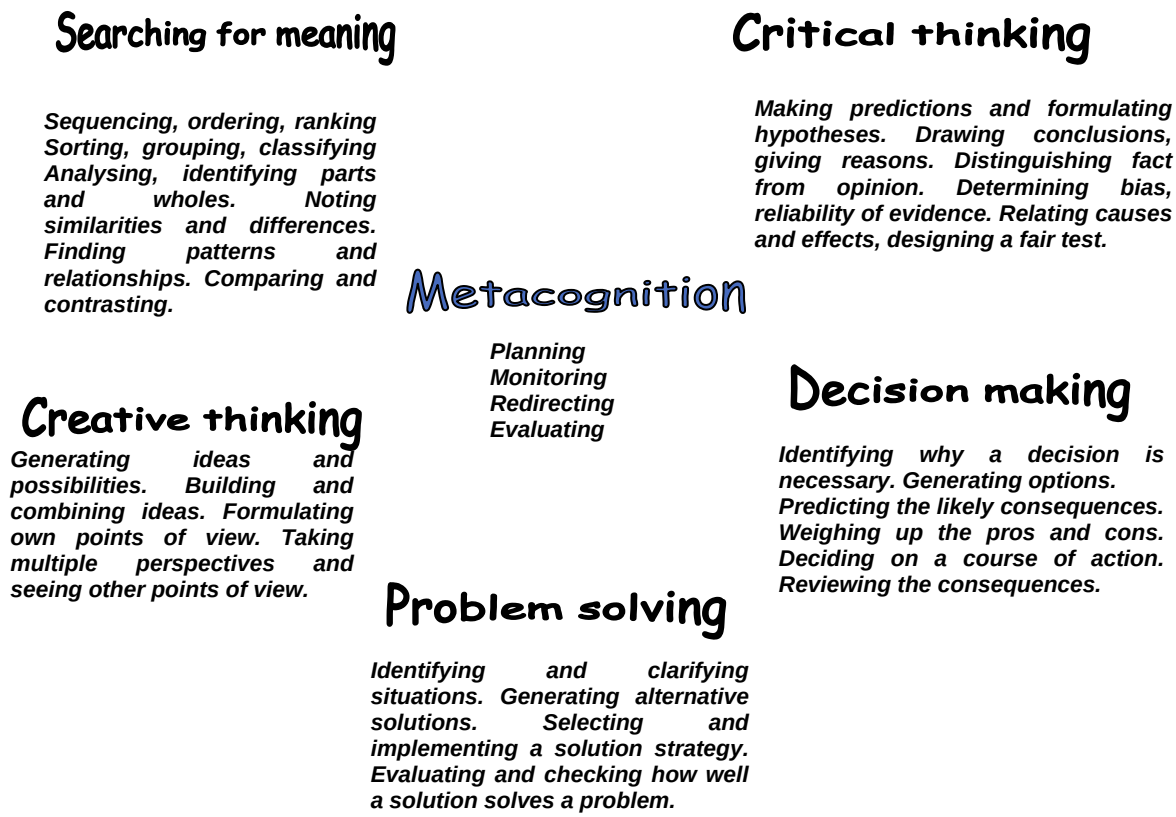
It has been argued that infusion across the curriculum is a good strategy for developing 'intelligent' novices who can recognise and use common patterns of thinking, deepen their understanding of curriculum topics, make connections between them, and thus be a position to capitalise on new learning opportunities (Bruer, 1993). ACTS (Activating Children's Thinking Skills) adopted an infusion approach and built on the work of Swartz & Parks (1994) and Tishman, Perkins & Jay (1995) in the US.

Figure 1 shows the ACTS thinking framework. It includes a range of different types of thinking. For example, they include pattern-making through analysing wholes and parts, noting similarities and differences (Searching for Meaning); making predictions and justifying conclusions, reasoning about cause and effect (Critical Thinking); generating ideas and possibilities, seeing multiple perspectives (Creative Thinking); solving problems and evaluating solutions (Problem-Solving); weighing up pros and cons, and making decisions (Decision-Making). The types of thinking identified in the framework formed the basis for designing infusion lessons. At the heart of the framework is a different type of thinking – metacognition. Metacognition refers to learners' capacity not only to engage in these explicit forms of thinking but also to use their emergent knowledge about thinking to plan, monitor and adjust their future learning and thinking. Thus metacognition has potential to facilitate the transfer of learning.

Several different theoretical meanings of metacognition, related to both individual and social learning, were drawn upon in the project. The ACTS Thinking Framework was derived from a cognitive perspective and acknowledged the importance of metacognition for cognitive development - not only as a *product* of development but also as potential means for fostering development. Within the cognitive developmental tradition, Kuhn (1999) has most recently articulated that position but it can be traced back to Flavell's original writings.

How can the ACTS Thinking Framework be harnessed pedagogically? In our work this required two theoretical shifts. The first shift was from considering metacognition as 'revealing' cognitive development, to a more constructivist perspective on metacognition as fostering or 'creating' development. The second shift acknowledged the power of social learning as a mediator for metacognition and the perspective shifted to social-constructivism, particularly to the role of classroom dialogue (e.g., Mercer, 2000; Wells, 1999). Hence language and dialogue were of primary interest in the video study. Finally, as our ultimate goal was that the ACTS intervention should have an impact on children's capacity to manage their own thinking – to think independently - we linked the concept of metacognition within a broader cognitive-motivational framework of self-regulation (e.g., Boekaerts, 1997). The concern with fostering self-regulation represents a convergence of many different theoretical perspectives (Piagetian, information-processing, Vygotskyan, motivational and self theorists). Thus, the research findings reported in this paper relate to the impact of the ACTS pedagogy on cognitive and motivational indicators of children's learning and thinking.

Figure 1. ACTS Framework for Thinking



3 Working with Teachers

134 teachers of different ages and years of teaching experience participated in **five** ACTS professional development days sustained over the school year (September- June). During that time they learned about the ACTS framework, how to design infusion lessons, and how to adopt more metacognitive approaches to their teaching. The professional development which they received was based on the notion of teacher collaboration. Teachers planned, designed and taught infusion thinking lessons to 8-11 year old children (Key Stage 2 in Northern Ireland) from a variety of social backgrounds. Infusion lessons were taught across all areas of the curriculum and integrated into schemes of work.

4 Methods

4.1 Design and Sample

In the main intervention study, comparisons were made between three groups of children. Two groups of children participated in ACTS for different lengths of time: one group for three years (N=292, 12 classes) and another group for one or two years (N=412, 17 classes). Children from these ACTS classes were compared with a third group of similar children from **different** schools who were not taught using the ACTS pedagogy (N=548, 25 classes). The children's learning from all groups was tracked longitudinally over three years.

4.2 Measures

In terms of evaluating the impact of the ACTS intervention on children's learning, we positioned our analyses within a more learner-centered framework that included both cognitive and motivational constructs. We used a suite of self-assessment inventories, Assessment of Learner-Centered Practices, ALCPs (McCombs, 1997) developed from the American Psychological Association's learner-centered principles (www.apa.org/ed/lcp.html). Seven scales enabled pupils to evaluate their learning (rated on a four-point likert scale) with regard to a range of cognitive and motivational constructs called - *Active Learning Strategies (cognitive and metacognitive), Knowledge Seeking Curiosity, Task Mastery, Performance-Oriented Goals, Effort Avoidance Strategies, Work Avoidance Goals, and Self-Efficacy*. Subsequent psychometric evaluation showed that the scales had good internal reliabilities for the Northern Ireland sample at all ages (ranging from .57-.86, with the vast majority being over .75).

4.3 Statistical Analyses

Latent growth analyses were carried out on the longitudinal data at four time points. The predictor variables in all analyses of outcome variables were Intervention (ACTS 3-Years, ACTS1/2 Years, No intervention), gender (girls/boys); age in class (varied by 12 months) and percent free schools meals (measured at the level of the class). Exploratory graphical and statistical analysis indicated that developed ability, had a potent and potentially non-linear effect on many of the pupil outcome variables. For this reason, separate analyses were carried out on Low, Moderate and High Ability groups. All analyses take the clustering of the data at the level of class into account.

5 Results and Discussion

One of the most important findings relates to the pattern of change over three years in **children's self-ratings** on three ALCPS scales – *Active Learning Strategies*, *Effort Avoidance Strategies*, and *Work Avoidance Goals* – identified through latent growth modeling. Participating in ACTS had a statistically significant positive effect on how children rated themselves with regard to their use of cognitive and metacognitive strategies, their willingness to work harder and to put in more effort. For example, ACTS children rated themselves higher than control children on items such as "I ask myself questions when I do my work to make sure I understand", "I spend some time thinking about how to do my work before I begin it", and they rated themselves lower on items such as "When I do work I just want to get it done as quickly as possible". **We have identified this pattern of change as a 'pro-active' learning effect.** Overall, girls rated themselves more positively than boys on the learning scales, but the pro-active learning effect was similar for both groups

There are important qualifications to this general conclusion. The pattern of change took time to build and those children who participated in ACTS for three years benefited most – there were few effects for those who participated for one or two years. In addition, the positive benefits were not even across all learners. Moderate to high ability children (who represented 80% of the sample) benefited most. No positive outcomes were identified for lower ability children, at least on these self-rating measures. However, when poorer children were given problems to solve, they did show positive changes in their strategies compared to control children, but these specific achievement did not translate into how the children rated themselves more generally.

While all of the self-rating measures were significantly correlated with measures of attainment in reading and mathematics, the effects were small when compared to the impact of other variables such as prior ability. Consequently, the positive *changes* in children's self-

ratings had only weak effects on attainment, although they were statistically significant in some cases.

A final word about the images of active learning that underpinned this project and how they contrasted with more passive images of learning that can dominate a content-based curriculum. Learners were viewed as potential agents in their own learning and expectations were set for high quality thinking and learning. Learners were considered as capable of being both mindful and resourceful about their learning and were encouraged to participate in joint meaning making. In terms of the findings, the image was not fully realised in all the children's experiences, yet it did prove possible to 'turn around' a large number of children to be more proactive about their learning and thinking. We also found that teachers experienced important changes in their images of themselves as teachers. They described an increased awareness of the importance and value of teaching thinking, of being more open to alternative approaches and allowing children to be more independent in their learning.

National curriculum planners across the UK and elsewhere are now engaged in revising and redesigning their curricula and writing guidance materials to help schools move in the direction of developing children's thinking. The methodology and findings from the ACTS project are informing their policies and practices. The biggest challenge will be to find ways of making long-lasting changes to classroom pedagogy so that children's capacity to become independent and self-regulated learners can be promoted and sustained. The research findings from ACTS give some direction with regard to a theoretical approach, curriculum planning and classroom pedagogy but they also show that there are no quick fixes.

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Dr Carol McGuinness is a cognitive psychologist and Professor of Psychology at Queen's University, Belfast. She directed the Activating Children's Thinking (ACTS) project in Northern Ireland, which used an infusion methodology for enhancing children's thinking across-the-curriculum. She is author of the influential report, *From Thinking Skills to Thinking Classrooms,* which was commissioned by the Department of Education in London (1999). She has devised professional development programmes for teachers who are about to embark on thinking developments in their classrooms, and acts as an advisor to the Northern Ireland Curriculum Council (CCEA) developing a Framework for Thinking Skills and Personal Capabilities which will be part of their revised curriculum.

Dr Noel Sheehy is a social developmental psychologist and was Professor of Psychology at Queen's University, Belfast. He recently moved to Liverpool John Moore's University (2006). He co-directed the Activating Children's Thinking (ACTS) project in Northern Ireland, which used an infusion methodology for enhancing children's thinking across-the-curriculum.

Dr Brendan Bunting is Professor of Psychology at the University of Ulster, Magee Campus, in Northern Ireland. He is an expert in measurement and statistical modelling. He acted as a consultant to the Activating Children's Thinking (ACTS) project in Northern Ireland, which used an infusion methodology for enhancing children's thinking across-the-curriculum. In particular, he advised on methods for analyzing the longitudinal data sets.

Dr Carol Curry is a developmental psychologist and was a Research Fellow at the School of Psychology, Queen's University, Belfast, working on several educational research projects. She was project manager and co-ordinator of the Activating Children's Thinking (ACTS) project in Northern Ireland, which used an infusion methodology for enhancing children's thinking across-the-curriculum. In particular, she acted as liaison with schools and managed the teacher development programmes.

Dr Angela Eakin is a social/cognitive psychologist and was Research Fellow at the School of Psychology, Queen's University, Belfast. She provided research assistance to the Activating Children's Thinking (ACTS) project in Northern Ireland, which used an infusion methodology for enhancing children's thinking across-the-curriculum, and acted as project manager in the later stages of the project. In particular, she managed and statistically analysed the longitudinal data sets. She has recently taken up a new post with the National Foundation of Educational Research at Queen's.