

Teaching and Learning Research Programme



ACTS (Activating Children's Thinking Skills):

A methodology for enhancing thinking skills

across the curriculum

(with a focus on knowledge transformation)

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This paper sets out to elaborate on three points:

- Firstly, to give a brief overview of the ACTS project, at a fairly factual level, explaining what it is, what it set out to achieve, how it was run and so on.
- Secondly, in the context of the “knowledge transformation” theme of the conference, to examine what kinds of knowledge were transformed - or at least considered for transformation - during the course of the project.
- Finally, to identify the kinds of difficulties the project encountered and to interpret these in knowledge transformation terms.

What is ACTS?

The purpose of ACTS was to promote the development of thinking skills in ordinary classrooms in Northern Ireland at upper primary level (Key Stage 2). More specifically, we worked in partnership with a small group of Key Stage 2 teachers to trial an infusion methodology across the curriculum, to produce a handbook of example lessons, and to gauge teachers’ initial reactions and evaluations of the methodology.

In contrast to approaches to teaching thinking which target either generic thinking skills, e.g., Instrumental Enrichment (Feuerstein et al., 1980) or subject specific thinking, e.g., Cognitive Acceleration through Science Education (Adey & Shayer, 1994), ACTS adopted an infusion methodology. An infusion approach seeks to identify contexts across the curriculum where particular thinking skills can be developed; for example, causal reasoning in a science lesson, classification of mathematical shapes, decision-making with reference to personal decisions or to fictional/historical characters. The benefits of infusion were seen as - matching thinking skills directly with topics in the curriculum; invigorating content instruction leading to deeper understanding; using classroom time optimally; directly supporting teaching for thoughtfulness across the curriculum; and facilitating transfer and reinforcement of learning. Moreover, the approach seemed

particularly appropriate for primary level where the teacher is in charge of the whole curriculum in a classroom. However, the method is not confined to primary level and has since been successfully adopted by a group of teachers working in subject areas at post-primary level. It is also very similar to strategies adopted by Viv Baumfield and David Leat at the University of Newcastle, e.g., *Thinking through Geography*, (Leat, 1998).

Most attempts to teach thinking are based on some formal analysis of the components of thinking. Irrespective of their precise theoretical foundation, what they are all attempting to do is to develop the pupil's thinking to a qualitatively higher level - to change thinking into a higher gear. Some approaches draw clearly on one particular theoretical viewpoint about the nature of thinking and cognitive development. For example, the CASE/CAME family of curriculum materials are clearly positioned in a Piagetian framework (Adey & Shayer, 1994); *Philosophy for Children* is founded on the importance of philosophical inquiry, critical thinking and Socratic dialogue (Lipman, 1980; Fisher, 1998) and Gardner's work is derived from his theory of multiple intelligences (Gardner, 1993). Other approaches have more eclectic theoretical orientations (Marzano et al., 1988). For a fuller analysis of the theoretical orientations of thinking skills approaches and their associated teaching methods, see McGuinness (1993), McGuinness (1999), McGuinness & Nisbet (1991).

Because of the infusion approach, ACTS opted for a more general theoretical framework and drew particularly on Swartz & Parks' (1994) taxonomy of thinking skills. Examples of the types of thinking within the ACTS framework are (and this is not an exhaustive list):

- Sequencing, ordering information; sorting, classifying, grouping; analysing, part/whole relationships, comparing and contrasting. This group can be characterised as **searching out order and imposing meaning on information**.
- Making predictions, hypothesising; drawing conclusions, justifying conclusions, distinguishing fact from opinion; determining bias, checking the reliability of

evidence; relating causes and effects. This group can be characterised as **critical thinking**, questioning/scrutinising information and making judgements about it.

- Generating new ideas; brainstorming; formulating own points of view, combining ideas, recognising and using analogies. This group can be characterised as **creative thinking**.
- **Problem-solving**; defining problems, thinking up different solutions, testing solutions.
- **Planning**; setting up sub-goals, monitoring progress.
- **Making decisions**; generating options, weighing up the pros and cons, choosing a course of action.

(Problem-solving and decision-making draw on thinking components from the earlier groupings.)

Having identified an appropriate thinking skills' taxonomy, ACTS systematised a set of teaching strategies - a thinking skills' pedagogy - which were identified in previous studies as characteristic of successful learning environments (e.g., De Corte, 1990). In particular, we presumed that thinking was a "hidden skill" and, as such, needed to be made explicit through a variety of strategies. Unlike other sorts of skills where the component parts are more overt (e.g., motor skills), the components of thinking are not always clearly "visible" to learners. Hence, strategies were adopted to make the components of thinking more explicit, to develop a language for talking about thinking, to model and coach novice learners in the ways of good thinking. For example, we developed strategies to help teachers and pupils develop a vocabulary for talking about thinking, to use thinking diagrams to clarify the steps or components in a thinking process, to make pupils' thinking more explicit through discussion, reflection and collaborative enquiry. In general, we advocated taking a metacognitive perspective.

Figure 1 is an overview.

Putting thinking on the agenda

Making thinking skills explicit

Developing a thinking
vocabulary

Thinking Skills' Pedagogy

Feedback, coaching, scaffolding

Reflection, discussion
metacognition, transfer

Dispositions for thinking
Thinking classrooms

Running the project: Seventeen upper primary teachers participated in the project. They attended 6 training days, distributed over 6 months, and scripted some of their own lessons for the handbook. After an initial 2-day induction to the method (which included modelling infusion lessons), each teacher designed lessons, experimented in their own classrooms, recorded their results and returned the following month to discuss achievements and difficulties and to exchange good practice. On these review days, additional thinking skills were introduced, teachers were given feedback, and more advanced questioning and teaching-for-transfer skills were discussed. By the end of the year, over 100 infusion lessons had been taught to some 300 pupils; 24 of those lessons were included in the handbook and they illustrate how 10 different thinking skills can be taught in nine areas of the Northern Ireland Curriculum .

Evaluation: The primary purpose of the project was to develop the methodology, produce the handbook and to gauge initial reactions of teachers and students; children's learning gains were not monitored at this stage.

However, at the end of the year teachers completed an 18-item open-ended questionnaire about ACTS. Their evaluations of the impact of ACTS on the pupils and themselves were very positive. For example, all teachers identified benefits for children's thinking. They referred to children's greater reasoning powers and increased creativity, their ability to clarify their thinking processes, to see links between different subject areas, and to be more structured and focused in their approach to thinking. With regard to

themselves, teachers noted that the approach had sharpened their own concept of thinking skills, enabled them to review their schemes of work and encouraged more effective planning. Some teachers emphasised the across-the-curriculum effects and noted changes in the nature of classroom interaction, that there was an increased level of interaction, that group work was more structured, there was more open discussion and sharing of ideas and that children expected to be "pushed" more.

Time was identified as the main constraint. Much of the problem was attributed to relative inexperience with the approach which required more planning and pre-class preparation. The requirement to design lessons which matched topics with appropriate thinking skills was not easy. Teachers also commented that thinking skills lessons often went on for longer than initially planned, and that they had to be careful to allow time for thinking and not jump in with ready-made answers. Children's main difficulty was the absence of an adequate language for talking about thinking.

All teachers commented positively on how useful the ACTS methodology had been for their continuing professional development. All were very experienced teachers yet they commented that "it was a refreshing focus on the nature of learning", "it made me rethink the way that we, as teachers, teach", "I was delighted to find something new", "it encouraged self-evaluation of my own teaching style".

As is clear from the above, teachers were very satisfied overall with the ACTS methodology. They quickly adapted the method to their own teaching style and needs (one of the strengths of the approach). Even within a short time they could see benefits for the children's thinking, for their own teaching, and for the classroom in general.

From a training point of view, one of the primary difficulties with the infusion methodology was enabling teachers to sharpen their understanding of thinking skills, to keep the twin perspectives of thinking skill and content objectives simultaneously in view, and to develop and sustain the metacognitive perspective.

In the context of developing the infusion methodology, it became increasingly clear that developing children's thinking goes far beyond an understanding of how children learn. Issues to do with curriculum design, availability of curriculum materials, the nature of pedagogy, teachers' beliefs about learning and teaching as well as their professional development came to the fore. Perhaps it was not surprising that the

emphasis in the ACTS project shifted from thinking-as-a-skill to concepts such as thinking curriculum, thinking classrooms and schools for thought. (For a fuller review of the ACTS project, see McGuinness, 2000 and McGuinness et al., 1997.)

Knowledge Transformation: Lessons.....?

What did we learn with regard to the transformation of knowledge about thinking skills into effective teaching and learning practices? I could answer this about the specifics of thinking skills but it might be more useful to critically reflect on our experiences of ACTS and to frame the lessons we learned in more general terms.

Let me begin by putting forward - at a simple-minded level - one version of what might be understood by knowledge transformation.

Knowledge Transformation: Version 1

There is a body of knowledge about teaching thinking skills (research evidence) which the research team (the experts) had access to; they summarised it in a straightforward way, told the teachers (the practitioners) about it. The teachers then brought this knowledge to their classrooms, taught the children differently (classroom practice), and the children learned better (learning outcomes). Now that the teachers know about it, they will be better teachers and will continue to use the knowledge they learned about during the project. Other teachers will read about the project (dissemination) and will be convinced by the evidence and will adopt similar classroom practices. In this way, educational standards will be raised andand so on.

At one level of meaning what happened during the ACTS could be captured by the above description. But Version 1 relies heavily on a knowledge-transmission model of learning and does not do justice either to the original epistemological assumptions about children's learning and thinking which underpinned the project, the pedagogical practices which it

advocated teachers to adopt in their classrooms, or the more general understandings about knowledge transformation which emerged as the project progressed.

Rather, it is may be more useful to think of a project like ACTS as a series of learning sites or learning partnerships around which knowledge about teaching thinking was constructed and reconstructed. Reflecting on the project, it is clear now that, while the nature of several of the learning partnerships were explicitly developed (theoretically and evidence-based), others were severely undertheorised and relied on tacit knowledge, professional judgement and worked within practical constraints that had very little to do with any explicit knowledge base (for example, the number of training days decided upon was entirely a pragmatic decision based on available funding).

Let's consider some of these learning partnerships.

ACTS Teachers/Pupils: This was the primary learning partnership which was to be affected by the project - to activate children's thinking skills through enhancing the teachers' pedagogical practices. The knowledge base to be transformed here was well identified - a cognitive intervention, a thinking skills framework, a curriculum design methodology (infusion) and a pedagogical framework (metacognition, coaching, etc). Nevertheless, the extent and security of the knowledge base differed even under these headings. For example, the infusion methodology was being trialled in the project and hence was at the level of knowledge creation; and the pedagogical framework was underspecified empirically. (The project which has just been funded by the ESRC programme seeks to further develop metacognitive aspects of the pedagogy both theoretically and empirically.)

ACTS Research Team/ACTS Teachers: Before any impact could be made on the children's learning, the research team and the teachers engaged in a joint act of knowledge construction and transformation and followed a research-based/teaching partnership approach to professional development. The partners brought different kinds of knowledge to this transaction - the research team drew on their expertise with regard to

cognitive instruction while the teachers had extensive pedagogical expertise as well as different classroom experiences and teaching styles.

But, of course, when the research team moved to design the so-called training days, they shifted perspective from researchers to professional developers. For this, we relied on our own curriculum design and pedagogical expertise. If any formal model guided our design it was the idea of the learning cycle (Kolb) for adult learning where learning is seen as cycling from theoretical learning (about thinking skills, infusion, metacognition) to experiential/concrete learning (model infusion lessons) to experimentation with learning (designing own lessons in own classroom) to reflection on learning (review days, sharing practice). This general viewpoint underpinned the design of the curriculum and how the material was organised for the training days as it seemed consistent with a general constructivist approach and permitted the teachers to “create” their own lessons over time - a requirement for the handbook. This aspect of ACTS was undertheorised at the beginning.

ACTS Teachers/Teachers: Because of the nature of the infusion methodology and the requirement to design infusion lessons over time, teacher/teacher exchanges during review days became a powerful site for learning - another aspect of professional development which was undertheorised. Teachers spontaneously began to act as their own coaches and created new knowledge to be shared and systematised at least for the participating team. In the evaluation of the project, the opportunities to share good practice was rated very highly by the teachers. (The forthcoming project will attempt to theorise more explicitly about models of teacher support and teacher coaching as part of professional development for teaching thinking skills.)

ACTS Research Team/Funders/System: The project was funded by the Northern Ireland Council for Curriculum, Examinations and Assessment (similar to QCA) and the written outcomes of ACTS included a report for CCEA so that they could plan a curriculum review strategy as well as have some materials for dissemination (the Handbook). Liaison between the ACTS team and the funders was maintained through an

Advisory Group to the project whose membership included curriculum advisors from all Education and Library Boards in Northern Ireland as well as through continuous contact between the Director of ACTS and a senior officer in CCEA. Several briefings on the implications of ACTS were given to CCEA officers as well as to Education and Library Boards.

The impact of the project can be clearly seen in the current Northern Ireland Curriculum Review document where a general skills framework (which includes thinking skills) has been developed based on an infusion methodology. As yet, the Handbook remains the primary source for dissemination to ordinary teachers and schools.

To summarise the lessons from ACTS into a Version 2 statement about knowledge transformation:

Knowledge Transformation - Version 2

There is a body of knowledge about teaching thinking skills to which the research team had access. In the light of this knowledge, a series of learning partnerships were set up (some not deliberately planned) in an effort to reconstruct that body of knowledge for classroom practice (knowledge co-construction). This co-construction drew on a vast store of additional professional knowledge of both the researchers and the teachers (knowledge creation). It soon became obvious that, even where the body of knowledge was well developed, it was underspecified in certain ways and was certainly not sufficient to underpin all the learning relationships particularly with regard to teachers' professional development (new theorising and evidence required).

What did we learn? That transforming knowledge bases into effective teaching and learning practices is more like Version 2 than Version 1!

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