The Routledge International Handbook of Research on Teaching Thinking

Rupert Wegerif, Li Li, James C. Kaufman

Do they really work?

Publication details

Robert Burden
Published online on: 03 Jun 2015

How to cite: Robert Burden. 03 Jun 2015, Do they really work? from: The Routledge International Handbook of Research on Teaching Thinking Routledge
Accessed on: 31 Oct 2023

PLEASE SCROLL DOWN FOR DOCUMENT

Full terms and conditions of use: https://www.routledgehandbooks.com/legal-notices/terms

This Document PDF may be used for research, teaching and private study purposes. Any substantial or systematic reproductions, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The publisher shall not be liable for an loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.
Section V

The assessment of thinking
Do they really work?
Evidence for the efficacy of thinking skills approaches in affecting learning outcomes: the need for a broader perspective

Robert Burden
UNIVERSITY OF EXETER, UK

Introduction
Claims for the value of teaching thinking date back to at least the early Greeks. At one level the underlying message is indisputable as in generation after generation the disastrous consequences of the lack of careful, caring, creative thought within society are all too evident. However, the issue of what can be counted as acceptable evidence for the successful outcomes of cognitive education is rather more problematic. There are those such as Smith (1992) who dispute the very value of the word ‘thinking’ because of its many manifestations according to time, place and circumstance. There is also a longstanding debate as to whether thinking (or ‘learning to learn’) can best be taught as a stand-alone activity, as advocated by Feuerstein and his followers, or should be taught by infusion into various aspects of curriculum studies, as concluded by McGuinness in an influential report to the UK Government (McGuinness, 1999). If we are to be able to answer the fundamental question to which this chapter is aimed, we must therefore seek to define our terms.

- What exactly are we implying when we refer to cognitive education?
- What, if any, are the most fundamental ways in which thinking is made manifest?
- Is there some form of developmental sequence by which we can tell if our level of thinking is improving?
- What is the exact nature of the relationship between thinking and learning?
- The very nature of cognitive education implies a theory of education with very specific outcomes. How specific or broad should these outcomes be?
- What precise inputs are likely to lead to specific outputs and under what circumstances?

These and other related questions underlie the need for some form of conceptual framework within which the responses can be linked and analysed. The approach to be taken here is that of...
Robert Burden

social interactionism (Williams & Burden, 1997), whereby the contributions made to any form of learning by the dynamic interactions between teachers, learners, tasks and context will be analysed. This enables us to narrow down our earlier questions even further, as follows:

- From an educational perspective, what exactly is it that we require our students to learn?
- What specific approaches are likely to produce the desired outcomes?
- How can we measure success?
- How long is this likely to last?
- What are the attributes of a successful teacher of thinking?
- Do these approaches work with everyone?
- What are the key aspects of a supportive environment?

Many of these questions have been addressed on numerous occasions, some of which have been summarised by Burden (1998) and by Fisher (2012). In particular, Burden refers to seven important aspects of the thinking process identified by Nickerson (1999). These are:

- the basic operations or processes involved when we think, such as observing, using space/time relationships, measuring, classifying, predicting and inferring;
- domain specific (declarative) knowledge;
- knowledge of the normative principles of reassuring, such as logic and probabilistic thinking;
- use of higher order tools of thought such as heuristics or strategies;
- metacognitive knowledge about one’s own thinking process;
- attitudinal and dispositional variables such as those identified by Costa as ‘habits of mind’;
- the effects of belief such as epistemological beliefs about the nature of intelligence.

Answers to these other questions are most likely to emerge from a consideration of the evidence arising from different studies applying a range of methodologies and approaches to evaluation.

Three meta-analytic studies stand out as indicators of the efficacy of thinking skills training in enhancing learning outcomes (Hattie et al., 1996; Marzano, 1998; Moseley et al., 2004). The study by Moseley and his colleagues is particularly persuasive as it focuses explicitly on the nature of this relationship rather than seeking to identify all forms of practice that appear to influence learning. All three studies claim to have found medium to strong effect sizes of thinking skills programmes on learning outcomes (Hattie 0.4; Marzano 0.65; Moseley 0.62). The application of metacognitive strategies was found in every case to provide a particularly significant impact (Cardelle-Elawar, 1992; Hock et al., 1999; Masquid, 1998; Ward & Traveck, 1993).

A detailed consideration of the report by Moseley and his colleagues helps to highlight both strengths and weaknesses of the meta-analytic approach to educational research. In keeping with the demands of post-positive research methodology, only studies involving control/comparison groups were considered eligible. This meant that only 29 of the original 191 studies uncovered in this area following a wide literature sweep were deemed worthy of closer analysis. These studies were carried out across primary, secondary and special schools in 12 different countries, so they met the criterion of generalisability and had a sample size of between 11 and 100 pupils. Three forms of outcomes were considered: (a) the cognitive effect as measured by some form of intelligence testing (e.g. Raven’s Progressive Matrices (Raven & Court, 1998)); (b) curriculum based assessment in three main areas – science, mathematics and literacy; (c) attitudinal and dispositional change.

The overall effect sizes for both cognitive and curriculum outcomes were established at 0.62 but there was considerable variation across programmes and curriculum subjects. The most
The efficacy of thinking skills approaches

widely evaluated programme, Feuerstein’s Instrumental Enrichment, employed mainly with those suffering from different forms of disability, produced an overall effect size of 0.52 mainly on the Raven’s Matrices test. Programmes geared towards improvement in curriculum subject areas, such as CASE (Curriculum Acceleration in Science Education) and CAME (Curriculum Acceleration in Mathematics Education) (Adey & Shayer, 1994), appeared to have considerable impact on examination success, but this tended to vary across subject, age and gender (Chang & Barufaldi, 1991; Cunningham et al., 2002; Strang & Shayer, 1993).

Moseley et al. point out that only ‘fuzzy generalisations’ can be drawn from this data, particularly since studies reported little about the programmes or aspects of implementation and use within classrooms, thereby making it difficult to identify common features between programmes. Main points to arise from their conclusions are that use needs to be matched to the particular teaching context and monitored critically to ensure potential benefits. Moreover, further research was needed to clarify specific causes of any benefits and to identify where most impact was likely to occur, in terms of age groups and curriculum aspects.

Some of these issues have been taken up in subsequent studies. The impressive work of Topping and Trickey, for example, focusing explicitly on the effects of introducing Philosophy for Children into the curriculum of mainstream schools, took a longitudinal, multilevel approach. In a review of the literature (Trickey & Topping, 2004) they describe in detail the fundamental aspects of Philosophy for Children and summarise previous investigations into this approach. A subsequent paper (Trickey & Topping, 2006) describes in detail the introduction of P4C into Scottish primary schools and how the results of this intervention were evaluated. A third paper (Topping and Trickey, 2007) describes the continuing improvement of the students involved after 18 months and also focuses on the changes in the pupils’ perceptions of themselves as learners.

The Trickey and Topping studies demonstrate a thorough but rare attempt in work on thinking training outcomes. They also show how to overcome many of the weaknesses of previous studies and how studies of this kind can be implemented in schools. They selected what they considered to be relevant outcome measures in both curriculum and affective areas and they followed through the effects sometime after the intervention had finished.

Exemplary studies

It is not the intention of this chapter to provide a comprehensive list of positive and negative evaluation studies, but to focus rather on a small sample of studies which highlight specific aspects of evaluation that need to be taken into account in providing a comprehensive review.

There are several readily identifiable features of Feuerstein’s Instrumental Enrichment (FIE) that lend themselves to the evaluation process. It is a highly structured programme, built upon a sound theoretical rationale, involving an intensive period of specialist training, requiring at least two hours input per day over two to three years. This means that FIE interventions have tended to be focused on specific groups of young people and adults rather than general school populations. Several early positive reviews of the effectiveness of FIE (Savell, Twohig & Rachford, 1986; Shayer & Beasley, 1998) have identified these features whilst others have identified special groups where positive changes have been found in both intelligence and behaviour.

One group of disabled learners for whom FIE appears to have been particularly effective is those with hearing impairment (Hayward et al., 1988; Thickpenny & Howie, 1990). A South African study by Skuy and his colleagues (1995) introducing this programme into a disadvantaged mining community produced impressive anecdotal results, whilst a further study by Kaufman and Burden (2004) revealed a remarkable increase in self-esteem of a group of severely
disabled adolescents over a 18 month period of intensive training. At the other end of the scale, Kaniel and Reichenberg (1992) report the effects of generalisability when the programme was used with a group of talented adolescents in Israel. Kozulin (2000) summarises many similar studies in highlighting the diversity of instrumental enrichment application. Each of these studies in themselves helps us to identify important variables contributing to successful outcomes.

One of the most intensive approaches to cognitive acceleration in the UK has been that of the Kings College London team under the leadership of Philip Adey and Michael Shayer (Shayer & Adey, 2002). From the early 1990s onwards their impressive evaluations of their CASE (Cognitive Acceleration through Science Education) and CAME (Cognitive Acceleration through Mathematics Education) programmes, designed specifically to promote higher level thinking in young adolescents, have provided convincing evidence for positive effects on grades achieved at later stages in formal public examinations (Adey & Shayer, 1994). A further investigation by Shayer (1999) revealed that schools taking this approach produced significant academic added value over a five-year period compared with matched comparisons schools in the same area.

Adey, Robertson and Venville (2002) investigated the evidence of applying the Kings College cognitive acceleration method to 5 and 6 year olds in a disadvantaged inner city area. Approximately 300 children in 14 Year 1 classes in 10 schools for the experimental group and 170 children in eight classes in five schools constituted the control. Children in experimental classes experienced a set of 29 activities designed to promote cognitive conflict and encourage social construction and metacognition over one school year. The experimental group overall made significantly greater gains in cognitive development over the period of the experiment than the controls in both direct (effect size 0.47) and transfer (effect size 0.43) tests, although the difference was significantly more pronounced for the girls than the boys. Of particular interest in this study are the specific tests of cognitive ability constructed by the researchers, the nature of the intervention programme and the findings with regard to gender difference.

Burke and Williams (2008) devised a programme for explicitly teaching thinking skills to 11/12 year olds over an intensive period of 8 weeks. An infusion approach was taken whereby the language of thinking, the development of meta-cognition and the promotion of thinking dispositions were introduced across the curriculum. A sample of 178 students were taught across three conditions: individual learning, collaborative learning and a control group.

Of particular interest to the present chapter is the approach that was used by the researchers to identify possible changes in the students’ thinking skills and their perceptions of their ability as learners. These included an individualised test based on Beyer’s (1997) six-task format, qualitative tests of learners’ conceptions of good thinking (Burke & Williams, 2008), the Myself-As-a-Learner Scale (Burden, 2012) and the Assessment of Learner Centred Principles (McCombs, 1999).

The results claimed to show a significant improvement in the thinking ability of both the individual and collaborative groups and in the use of meta-cognitive reflection questions. These findings applied also to the results of the qualitative tests of learners’ conceptions of good thinking. However, the main difference between scores on the MALS was in favour of the collaborative learning group, most specifically with regard to enjoyment in problem solving.

Further light on the importance of collaborative thinking is thrown by the ‘teaching thinking through talking’ project of Wegerif, Mercer and Dawes (1999), both through its positive results on improving individual and collective reasoning scores on Raven’s Progressive Matrices, but, more significantly by the kind of dialogic reasoning that the primary school children were able to show. While some of the ways of talking taught in the programme were found to promote critical thinking by challenging claims with explicit verbal reasons in the form of ‘I disagree with
The efficacy of thinking skills approaches

x because of y', creative reasoning was also promoted by means of listening to others carefully, asking open questions and seeking alternatives.

Whilst these results appear to be very encouraging, they reveal no follow-up data on the possible continuation of the intervention or its results. Moreover, no information is given on the potential transfer of thinking skills into different curriculum areas. Finally, the study once again demonstrates reliance upon an experimental-control group methodology which fails to take into account the specific and broader context of the study, the reactions of the teachers involved and the effects upon which school community. The tests themselves nevertheless provide an interesting creative approach to obtaining outcome measures.

A paper by Hu et al. (2010) describes how a theory-based learn to think (LTT) curriculum for primary school students sought to draw upon the strengths of both out-of-context and infusion approaches. One hundred and sixty-six students in three classes of Grade 1 (6+ years old), Grade 2 (7+ years old) and Grade 3 (8+ years old) in a primary school in Shanxi province, China were randomly ascribed to experimental and control groups. All students were pre-tested for non-verbal intelligence and academic achievement. Experimental students followed the LTT curriculum (one activity every two weeks) for four school years. All were post-tested on three occasions for thinking ability and four times for academic achievement. Grade 1 and Grade 2 students showed positive effects of LTT from one year after their start and increasing in thinking ability, Chinese and mathematics, with the main effects showing with students in the middle band of initial ability. Of particular value in this study is its longitudinal nature and its randomised control design, together with the specific measure of thinking skills that the researchers constructed.

Taking a broader perspective

A paper by Dewey and Bento (2009) serves to exemplify the complexities of unravelling the outcomes of even sophisticated well-designed cognitive education projects. A reasonably large scale sample of 384 primary school pupils were divided into experimental and control groups and taught by the infusion method of activating children’s thinking skills (ACTS), as advocated by McGuiness (1999). Pre and post measures of change were implemented over a two-year period involving both quantitative and qualitative instruments. Results showed a slight improvement on cognitive testing with a small effect size and clear signs of more sophisticated use of language and questioning. However, no improvement was found in the pupils’ perception of themselves as learners or in their behaviour in problem situations. The teachers nevertheless commented positively on their own satisfaction with the infusion method.

One major problem throughout was the issue of programme fidelity. That is, the question of how to monitor whether ACTS was actually being implemented, by which teachers, at what level, and to which (groups of) pupils. This serves to highlight opportunities that can be missed in apparently negative studies in helping our understanding of why an intervention appears to work and brings us back to the need for even more fine-grained mixed method studies in which quantitative and qualitative data work together in identifying exactly what kind of input leads to what specific output.

By drawing upon an alternative research design utilising an action research framework, Burden and Nichols (2001) were able to investigate in close detail exactly why a promising thinking skills intervention also met with failure. In this instance an illuminative approach to evaluation based upon earlier work of Stufflebeam (1971) and Parlett and Hamilton (1972) examined the key elements of setting, plans, action and participant reactions in contributing to evaluation as an aid to decision making. The model, referred to hitherto as SPARE, directed
the evaluators to describe in detail the setting of the project in a large urban secondary school, to record the plans or intentions of the instigator of the project (in this instance the school principal), the actions taken by the school faculty to introduce thinking skills across all aspects of the curriculum, followed by the reactions of all stakeholders (staff and students). The main focus of the evaluators in this instance was the very process by which decisions were made at one level of the management hierarchy and carried through by those at the workforce, particularly with regard to the attitudes of the participants to the nature of the proposed and implemented changes. It became clear, as a result, that not enough consultation and preparation was carried out before instigating curriculum changes in an autocratic manner, that the majority of the teaching faculty were not only resistant but openly hostile to the proposed changes, and that this reluctance was passed on to the students who were thus unable to comprehend how learning to think was of any value to their own perceived educational objectives.

A further negative study

One of the most salutary studies of the effects of introducing Feuerstein’s Instrumental Enrichment programme into British Schools was carried out by Blagg (1991). The study has a number of exemplary aspects. It received substantial government funding as part of a Low Achieving Pupil project which enabled researchers to follow through the effects of introducing FIE into four secondary schools in the South-West of England over a three-year period. A comprehensive research design enabled Blagg and his colleagues to obtain wide-ranging data of both a quantitative and qualitative nature relating to the effects on both students and teachers. Whilst the results were somewhat equivocal, the nature of the design made it possible to identify exactly what went wrong and why.

It had the benefit of being a well-funded government initiative to explore ways of providing a more effective education for those pupils in their final two years in school who were not benefiting from the traditional system of public examinations. Thus, it was geared at a relatively small, specific group and not aimed at wider generalisations. In many ways the care and attention given to the evaluation was greater than that given to the implementation of this project. Both quantitative and qualitative assessment procedures were employed within an illuminative design based on Stufflebeam’s (1971) CIPP model.

As a ‘top down’ initiative, all project funding was controlled by administrative officers and advisors without any ‘grass roots’ commitment from teachers, who were generally ill prepared and given little choice as to their involvement. This was largely overcome as the project progressed, but, despite the high level of funding, the attrition rate amongst the four secondary schools involved was high. The assessment procedures included pre and post measures of the pupils’ intellectual ability, their reading, mathematics and study skills and their attitude towards themselves as learners and schoolwork in general, largely by means of a critical incident observation schedule. Changes in the teachers, meanwhile, were assessed by means of a critical self-reflection schedule and applications of Cattell’s 16PF questionnaire.

In terms of outcome, no significant improvements overall were found in any of the pupil basic subjects attainments, although the observation schedules revealed them as being more actively involved in class discussions, more self-disciplined, becoming better listeners and more likely to defend their opinions on the basis of logical evidence. Many gained in confidence and showed improved self-esteem over the intervention period. No improvements were found in intelligence test scores.

Teacher-focused outcomes were considerably more promising. Scores on the 16PF demonstrated that, in general, by the end of the project teachers had become more assertive, confident and self-reliant. Compared with those teaching the control groups, the FIE teachers became more positive about their roles, feeling more satisfied with their job, more confident in their
The efficacy of thinking skills approaches

teaching abilities, more committed to their profession and more valued in their work. Their attitudes towards the capabilities of low achieving pupils also became much more positive.

One of the most important lessons to be learnt from Blagg’s study was the powerful part played by the context into which any thinking skills programme is introduced. Whilst Blagg clearly identifies weaknesses within the rigid structure and transfer difficulties inherent within the FIE programme, the obstacles provided by the historical and social setting of this particular intervention make plain the need for a much broader perspective to be taken than that of a simple input-output design.

Key variables to be taken into account in evaluation studies

Identifying the variables involved in each of these research studies described above makes it possible to draw up the following list:

**Design factors**

- pre/post implementation data to be collected
- involvement of control/comparison groups
- randomised sampling
- quantitative/qualitative methods
- positivist/illuminative paradigm

**Input**

- the nature of the programme to be implemented
- stand alone v infusion methodology
- length of input
- training and commitment of teachers

**Recipients**

- general population
- age, gender, disability, cultural background

**Nature of assessment producers**

- structured tasks/standardised v home-grown
- application of Bloom's Taxonomy
- questionnaires
- interviews
- 'real world observations'
- criterion-referenced portfolios

The importance of context

One further area in need of consideration is that of context. A somewhat independent body of research has investigated the nature of the contexts within which thinking and learning can thrive. Hadjioannnon (2007), for example, posed the fundamental question of what classroom environments that support authentic discussion look like. After defining authentic discussions as dialogically oriented interactions where participants present and consider multiple perspectives and often
use others’ input in constructing their contributions, this author carried out a qualitative analysis of a fifth-grade classroom community where such discussions were frequent. Seven aspects of a supportive classroom environment were identified: the nature of the physical environment, curriculum demands and enacted curriculum, teacher beliefs, student beliefs about discussions, relationships amongst members, classroom procedures and norms of classroom participation.

A longstanding tradition of research into effective learning environments has emanated largely from Australia, particularly with regard to the teaching of science and mathematics. Although terminology has tended to differ slightly across studies, a paper by Dorman (2001) summarises succinctly ten dimensions of a positive classroom climate contributing to academic efficacy: student cohesiveness, teacher support, investigation task orientation, co-operation, equity, involvement, personal relevance, shared control, student negotiation.

Allodi (2010), by contrast, whilst recognising that social climate is an essential factor in the educational process, identified several reasons why this had been neglected in the Swedish context: dualistic and hierarchical views, bureaucratic systems, reductionist interpretation, difficulties in handling and evaluating social values and goals, and post-modern criticism of scientific knowledge and psychology.

De Corte, Verschaffel and Masui (2004) have provided a framework for designing powerful learning environments for thinking and problem solving. Referred to as the CLIA model, the focus here is upon competence, learning, intervention and assessment. Building upon the earlier work of Brown and Campione (1996) and their ‘Fostering of Learning Communities’ (FLC) project, these authors posit that effective learning communities are learner-centred, knowledge-centred, assessment-centred and community-centred which need to be aligned in ways that mutually support each other.

In examining more explicitly the four components of the CLIA model, De Corte et al. (2004) identify the importance of developing competence in both cognitive and conative components involving motivation and volition; a definition of learning as active/constructive, cumulative, self-regulated, goal directed, situated and both collaboratively and individually constructed; intervention should initiate and support the active, construction acquisition process in all students, the development of self-regulation strategies, preferably in real-life situations and across different subjects, and a culture of self-reflection. Assessment should be aligned with these components; developing competence in specific areas, diagnostic feedback about deep understanding of content and their mastery and productive use of thinking skills, together with alternative forms of assessment geared to both individual and group self-assessment. The De Corte et al. model (2004) is probably the most comprehensive and fine-tuned approach to understanding the contribution of context to learning outcomes that has yet been devised.

Taking a whole school approach

The importance of recognising the vital part played by the educational context (Sellstrom & Bremberg, 2006) was a key factor in the establishment of the Cognitive Education Centre at the University of Exeter’s Graduate School of Education in 2005. Drawing upon a substantial body of research in the UK into the elements of effective schools, the definition of a ‘thinking school’ began to emerge as follows:

A thinking school is . . . an educational community in which all members share a common understanding and vision of the nature of high quality learning and teaching for all pupils, and are committed to working together to make this vision a reality. They think deeply about their work, reflectively, critically and creatively, and spend time discussing the best ways to
co-construct both a meaningful and purposeful curriculum and associated activities, drawing on a wide range of learning opportunities. They are committed to their own learning, keep abreast of research, learn from each other and are open to new ideas, considering these carefully before deciding whether they will usefully contribute to their vision for a thinking school.

A school which is successfully developed as a thinking community will strive to ensure that all pupils are developing and demonstrating independent and co-operative learning skills using a range of thinking tools and strategies. The school will generate high levels of achievement and an excitement and enthusiasm for lifelong learning. All members of the community will interact with and show consideration for each other, in such a way as to enable the positive psychological wellbeing of both pupils and staff to flourish.

It can be seen from this definition that essential elements of such schools are the notions of a community of co-constructing thinkers and learners who share common goals in a caring, supportive manner. A further emphasis is upon the commitment of all stakeholders, teachers, pupils, parents, to achieving a broad range of educational outcomes. But what might those outcomes be? **Figure 24.1** provides a framework in which some outcomes have been identified. **Table 24.1** lists a number of student behavioural indicators of goals to be accomplished.

![Figure 24.1 Thinking Schools outcomes](image)

**Source:** CEDU 2014
In order to achieve these goals and gain formal recognition from the University’s CEC (later renamed Cognitive Education Development Unit (CEDU)) schools are required to provide a portfolio of evidence as to how they meet a number of specific criteria, as shown in Table 24.2. Several of these criteria reflect the current workplace situation in British schools, i.e. the appointment of a significant body of learning support staff in every classroom, the ‘hands on’ approach of school governors and parents, the requirement of all schools to provide on-going staff training, the emphasis upon internal local and government led inspections on the quality of teaching and learning and a broader perspective on what is meant by educational achievement.

Figure 24.2 provides further identification of the range of areas to be assessed. Much of the subsequent work at Exeter’s CEDU has been devoted to constructing questionnaires and other techniques for assessing pupil and teacher attitudes and dispositions in particular. Thus, techniques are currently available and in use for assessing pupils’ conceptions of themselves as learners (e.g. the Myself-As-a-Learner Scale, Burden, 2012). Teachers also may be asked to record their reactions to teaching thinking in general and/or more specific ‘thinking tools’ such as Hyerle’s Thinking Maps (Hyerle, 1996). To date much of this research has been carried out in small-scale in-house studies in schools applying for formal accreditation as a Thinking School. However, since several dozen schools in the UK and elsewhere have, at the time of writing, successfully achieved such recognition by meeting the set criteria, a considerable amount of positive data is gradually being gathered. Further analysis and synthesis of the data is now underway.

Ercikan and Seixas (2011) identify three main areas for outcome-based measures of higher order thinking skills, which they refer to as the Cognitive and Learning model, the Task model and the Evidence model. In applying the Cognitive and Learning model assessment practice will focus on elements of knowledge, competencies and thinking at which the intervention is aimed; the Task model will describe evidence of learning progression in specified areas of the curriculum; while the Evidence model describes criteria for what should be measured as well as how they can be scored.

This approach can be very helpful in unravelling the different kinds of evidence on offer in various research studies to support claims of the effectiveness of one or another intervention.

### Table 24.1 Behavioural indicators

- pupils’ ability to describe thinking tools and indicate clearly how, when and why one would use them
- evidence of this being put into practice
- high incidence and level of questioning
- indications of improved attainment/achievement in a range of areas, e.g. language, literacy, maths, science, geography, history . . .
- use of tools outside school +/- or across subject areas
- independent choice of tools to assist their learning
- successful group-oriented problem solving
- high levels of attendance
- low level of bullying
- low levels of disruptive behaviour/disaffection
- high expressed satisfaction, enjoyment in school
- understanding of the long-term purpose of schooling
- deep vs surface approach to learning
- differentiated learning outcomes
Table 24.2 Thinking Schools criteria

<table>
<thead>
<tr>
<th>Evidence needed of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 whole school commitment by</td>
</tr>
<tr>
<td>• principal</td>
</tr>
<tr>
<td>• all teachers</td>
</tr>
<tr>
<td>• support staff</td>
</tr>
<tr>
<td>• school governors</td>
</tr>
<tr>
<td>• parents;</td>
</tr>
<tr>
<td>2 appointment of Cognitive Education Co-ordinator and ongoing task force;</td>
</tr>
<tr>
<td>3 provision of external and ‘in-house’ training;</td>
</tr>
<tr>
<td>4 ongoing whole school planning, implementation, reflection and reviews;</td>
</tr>
<tr>
<td>5 alternative approaches to assessment;</td>
</tr>
<tr>
<td>6 learning outcomes, attitudes, behaviours;</td>
</tr>
<tr>
<td>7 positive whole school ethos.</td>
</tr>
</tbody>
</table>

Table 24.2 Thinking Schools criteria

<table>
<thead>
<tr>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills</td>
</tr>
<tr>
<td>Pupils</td>
</tr>
<tr>
<td>Independent problem solving</td>
</tr>
<tr>
<td>Asking higher order questions</td>
</tr>
<tr>
<td>Working together in pairs</td>
</tr>
<tr>
<td>Applying Bloom’s Taxonomy</td>
</tr>
</tbody>
</table>

Figure 24.2 Assessment

Thus, the application of various IQ type measures in a before and after design (e.g. see Topping & Trickey, 2007) can be seen as an example of the Cognitive and Learning model. The success of students in public examinations following the application of Adey and Shayer’s CASE and CAME programmes, on the other hand, can be seen as an example of the Task model. Alternatively, by drawing up 14 criteria against which to judge the status of a ‘Thinking School’, the University of Exeter’s Cognitive Education Development Unit made use of the Evidence.
model. Ideally, it can be argued that a combination of assessment techniques reflecting all three models would substantially increase the power of any evaluation study.

**Conclusion**

Despite the plethora of interventions in recent years aimed at enhancing thinking in classrooms and beyond, this review has shown that critical evaluation of their effectiveness has been limited by different conceptualisations of what it means to be an effective thinker. In addition to this, it has been argued that our overall understanding of the experience of thinking in situ is under-researched and poorly understood. This has had a knock on effect on what researchers are looking for, what it is they are trying to find out, the terms they use to describe what they are looking at and for, how they choose to design their interventions, the population at which they are aiming, and how they choose to design their approach to evaluation including the selection of measuring instruments to determine change. For example, Trickey and Topping (2004, 2006) and Topping and Trickey (2007) focused on philosophy for children whilst Yang and Chung (2009) investigated the cultivation of critical thinking within civic education. Dewey and Bento (2009), on the other hand, took an ‘infusion methodology’ approach whereby teachers were trained to identify specific types of thinking and map these on to existing areas of the curriculum. Others still such as De Corte et al. (2001) have examined cognitive and metacognitive strategies that facilitate understanding including text comprehension.

Although this chapter has revealed the complexity of the situation and the difficulty in drawing out common threads and lessons learnt which, to an extent, has limited the development of knowledge and understanding, it has also demonstrated that much has been achieved. The weight of evidence from a multitude of research studies taking a range of different perspectives is strongly supportive of the value of teaching people of all ages and impairments how to think critically, creatively and ethically, at least in the shorter and medium term. However, we need to be absolutely clear as to what we want to achieve and what the conditions are under which this can best be accomplished. To do this we need to begin with a theory of education which goes beyond the passing of examinations or even increasing population IQ levels. We therefore need to develop more sophisticated methods to investigate both internal and external change, mentally and behaviourally, particularly with regard to decision making within real world situations. The issues are too multilevel and complex to encompass within any one research study. However, a more fine grained analysis of the contribution played by the variables identified in this chapter, involving both quantitative and qualitative methods within an interpretative paradigm can go a long way in helping to answer many of the questions set at the beginning.

**References**


The efficacy of thinking skills approaches


