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Deposited in DRO:

03 August 2015

Version of attached file:

Accepted Version

Peer-review status of attached file:

Peer-reviewed

Citation for published item:

Higgins, S. (2015) 'A recent history of teaching thinking.', in The Routledge international handbook of research on teaching thinking. Abingdon, Oxon: Routledge, pp. 19-28. The Routledge international handbook series.

Further information on publisher's website:

<http://www.routledge.com/9780415747493>

Publisher's copyright statement:

This is an Accepted Manuscript of a book chapter published by Routledge in The Routledge International Handbook of Research on Teaching Thinking on 03/06/2015, available online: <http://www.routledge.com/9780415747493>

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A Recent History of Teaching Thinking

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Abstract

This chapter describes the development of teaching thinking and its uptake in schools over the last sixty years. The influence of key individuals, research and projects, as well as developments in other fields such as neuroscience, can all be identified. From a theoretical view, there are three broad strands drawing on psychology, philosophy and our understanding of the physiology of the brain. The recent history of teaching thinking in education reflects these perspectives, however the underpinning values about thinking and learning indicate that teaching thinking is likely to remain of enduring educational interest.

Introduction

There have always been arguments about what the terms ‘teaching thinking’ (Sternberg & Berg, 1992) and ‘thinking skills’ mean since they first came into vogue in the late 1970s (McGregor, 2007). Indeed some argue that the concept of teaching general thinking or thinking skills is misguided, while others focus on its utility in the classroom to provoke more complex thinking and to help teachers develop appropriate pedagogies to support learners’ development (Higgins & Baumfield, 1998). A host of different programmes and approaches have advocated teaching thinking skills (see Nickerson, Perkins and Smith (1985) for an account of developments, particularly in North America through the 1970s and the early 1980s and Hamers, van Luit and Csapó, 1999 for a European perspective up to the turn of the century, or McGregor (2007) for more recent developments. One way to understand the development of teaching thinking is to start with the influence of three key individuals who exemplify the different strands of teaching thinking in schools. Each have pioneered a different approach, and their ideas have influenced and inspired other programmes and approaches over the last 60 years. Subsequently, as teachers have adopted these ideas, and as researchers have explored their effects, there has been a cross-fertilisation of ideas, with increasing emphasis on the impact of different approaches so their inclusion can be justified in an increasingly scrutinised curriculum.

Reuven Feuerstein and Instrumental Enrichment

After the World War II, young people flooded into Israel. Many of them had experienced traumatic experiences and had suffered alienation from anything which could be described as a coherent cultural inheritance. On intelligence and standardised tests many of these youngsters scored so badly as to appear ineducable. Rather than simply accept this conclusion and deny any chance of recovery, Reuven Feuerstein devised ways of finding out:

- exactly what cognitive functions they were deficient in,

- how they could be helped to develop these functions,
- what was each individual's potential for learning.

Feuerstein developed a set of techniques that helped these learners succeed on subsequent tests. These methods were termed 'dynamic', in that they were studying changes in the *process* of learning, as opposed to 'static' traditional assessments. He argued that this process was much more likely to predict how someone might learn in the future (Feuerstein, Rand, Hoffman, & Miller, 1980). The complex diagnostic instrument which he and his colleagues developed was called the Learning Potential Assessment Device (LPAD). It measures an individual's intellectual change, known as "cognitive modifiability" (Sharron & Coulter, 1994). Different tasks or 'instruments' were devised, to tackle different underlying difficulties. As the whole process is an enriching one, the programme was labelled "*Instrumental Enrichment*". Feuerstein's ideas have influenced work on teaching thinking, his innovative theory of mediated learning in particular which led to the development of dynamic assessment (Tsurriel, 2001; Haywood, & Lidz, 2007) and more broadly, his cognitive, task-based approach supported by teacher mediation: for evidence impact see Romney and Samuels (2001).

Matthew Lipman and Philosophy for Children (P4C)

Another important pioneer, in what in the United States is termed the Critical Thinking movement, is the American philosopher, Matthew Lipman. Originally a university philosophy professor, Lipman was unhappy at what he saw as the poverty of thinking in his students. He became convinced that something was wrong with the way they had been taught in school when they were younger. They seemed to have been encouraged to learn facts and to accept authoritative opinions, but not to think for themselves. He therefore founded the Institute for the Advancement of Philosophy for Children (IAPC) at Montclair State College, New Jersey, in 1972. Since then and until his death in 2010, he and his colleagues developed material for use in schools, to help young people to think. One of Lipman's basic convictions is that children are natural philosophers, and view the world with curiosity and wonder. That is all that is needed as a starting-point for enquiry, which can legitimately be termed "philosophical". The *Philosophy for Children* (P4C) programme (Lipman, Sharp & Oscanyan, 1980) rests on certain assumptions, such as that discussion skills precede and form the basis for better thinking. Through engaging in group dialogue and a "community of enquiry", children can become more effective thinkers.

The IAPC has produced a number of novels, into which strange and anomalous points have been woven. As a class reads a page together, the text encourages them to raise questions. These queries form the basis of guided discussions. The teacher does not try to control what questions are asked, since it is the children's curiosity which needs to be tapped to promote active participation and learning. The text steers the children's questions into certain areas, suitable for exploration, and the novels provide a model of philosophical enquiry, describing fictional children engaging in argument, debate and discussion.

The adoption and impact of P4C has been worldwide, in countries, from Australia (Splitter & Sharp, 1995) to Iceland (Sigurborsdottir, 1998) and in other subjects such as science (Sprod, 1998). It has been developed for and younger children, through '*Teaching Philosophy with Picture Books*' and '*Storywise*' (Murriss, 1992; Murriss and Haynes 2001; Haynes & Murriss, 2011). Other school-age programmes draw on the "community of enquiry" approach (Fisher, 1996, 1998; see also the work of the Society for the Advancement of Philosophical Enquiry and Reflection in Education (SAPERE)). An interest in philosophical ideas, as opposed to psychological ones, predominates and the

approach sees its lineage through Lipman to the work of John Dewey. This '*community of inquiry*' approach has also expanded and influenced the development of online learning in universities (Garrison, Anderson & Archer, 2010). For an overall synthesis of impact see Trickey & Topping's review (2004).

Edward de Bono's thinking tools

Edward de Bono's key contribution has been in developing a range of widely and easily applicable thinking tools which have captured popular imagination, accompanied by considerable commercial success. One of the first of these was '*Lateral thinking*' in 1967: solving problems with an indirect and creative approach, involving ideas that may not be obtainable by using only traditional step-by-step logic (de Bono, 1970). He has developed a range of other popular approaches, such as '*Six Thinking Hats*', which is perhaps the most widely known. This is a tool for group discussion and individual thinking involving six coloured hats, with each hat representing a different kind of thinking. '*Six Thinking Hats*' and the associated idea of 'parallel thinking' aims to provide a way for people to plan their thinking in a more detailed and explicit way. Throughout his writings, (e.g. 1970, 1992, 2010), de Bono stresses the importance of consciously practising certain strategies in order to become a more effective thinker. His *CoRT* (Cognitive Research Trust) materials refer to "thinking tools", which are made easy for children to remember, with acronym titles such as PMI (Plus Minus Interesting) or CAF (Consider All Factors). He claims his tools are based on his understanding of the brain as a self-organizing system and that he has updated and developed his thinking tools as knowledge of the brain has developed (Dudgeon, 2001). However, his work has also been criticised from an academic perspective as lacking theoretical coherence (Sternberg & Lubart, 1999) and empirical validation (Moseley et al. 2005). Despite these criticisms his work remains internationally influential and widely used.

De Bono is different from the other approaches, on at least the following two counts. First, his theory of how the human mind works has tried to remain consistent with developing knowledge of how the brain functions and his tools and ideas are based on these inspirations. Second, he is more concerned with innovation and creativity than developing or proving psychological or educational theory.

Approaches such as Tony Buzan's '*Mind Mapping*' (2006) or Alistair Smith's '*Accelerated Learning*' (e.g. Smith, Call & Baton, 1999) follow de Bono's inspiration and use information about the brain to inspire teachers and learners to adopt specific techniques. Other brain-based approaches have found the gap between neurological research and practice hard to bridge with tenable or testable theories, such as *Neuro-Linguistic Programming* (NLP), developed by Richard Bandler and John Grinder in the United States in the 1970s, or Paul and Gail Dennison's '*brain-gym*' and '*educational kinesiology*'. What is interesting with a number of these approaches, which can only be described as pseudo-scientific, is that they remain popular with practitioners, suggesting that although the theoretical explanations offered by the developers may not be coherent and certainly lack robust evidence, the practices undertaken in schools may have some educational value for other reasons. This has been ignored by academics and scientists who appear to believe the approaches cannot 'work', because the underlying theorisation is flawed. This displays a certain lack of critical (or scientific) thinking, as brain-gym or NLP may be reliably effective at achieving certain outcomes, just not for the reasons the proponents expound. Only rigorous experimental research can identify which causal outcomes (if any) are reliably associated with which particular practices and whether this is consistent with the underpinning theorisation. As our understanding of the brain develops, the promise of neuro-scientific explanations are seductive (Weisberg, Keil, Goodstein,

Rawson & Gray, 2008), but the gap between physiological understanding and educational practice remains challenging (Howard-Jones, 2010) and ultimately limited to questions of efficacy, rather than those of educational value (Davis, 2004). Just because an approach is 'brain-friendly' does not mean it is educationally desirable.

The expansion of teaching thinking: cognitive perspectives

Each of these leading figures held similar beliefs about children and young people's abilities. They all consider that through specific and explicit thinking activities learners can improve their thinking and exceed the predicted competence that psychometric or school-based tests may have suggested is their limit. New thinking capabilities can be developed and extended with practice. Each of the pioneers has, in turn, fostered a series of developments growing from their three different initial perspectives of improving cognitive capabilities, applying thinking tools based on brain-based understanding, and promoting philosophical reasoning through discussion.

In the 1970s and 1980s work on teaching thinking burgeoned and inspired development in schools, often supported by academic theorising and research. One of the most ambitious of these collaborations was 'Project Intelligence', a partnership between the Venezuelan Government, Harvard University and BBN Technologies (originally Bolt, Beranek and Newman, all from Massachusetts Institute of Technology, who were the pioneers of computer networking, e-mail and the LOGO programming language). The project was the inspiration of Dr Luis Alberto Machado, the Minister of State for the Development of Human Intelligence, who was committed to the idea that every child should be able to develop to their full potential (Machado, 1978). The project developed and evaluated methods for teaching cognitive skills in seventh grade classrooms in Venezuela with materials to improve specific capabilities such as observation, classification, reasoning, problem solving, inventive thinking and decision-making. A fuller account of the program and its impacts can be found in a range of publications (e.g. Nickerson, 1985; Nickerson, Perkins and Smith, 1985; Hernstein, Nickerson, de Sanchez, & Swets, 1986).

This illustrates how the development of teaching thinking is often clustered around people, projects and places. Project Zero is the name associated with a number of independently-sponsored research projects at the Harvard Graduate School of Education, many of which relate to teaching thinking. Since 1967, Project Zero has examined the development of learning processes in children, adults, and organizations and includes the work of Howard Gardner and David Perkins on themes such as multiple intelligences, teaching for understanding and thinking dispositions (Gardner, 1983; Gardner & Perkins, 1988).

Many of the academic classifications of thinking and cognition have fostered their own specific tools and programmes (see Moseley and colleagues (2005) analysis of over 40 thinking frameworks). This includes examples such as the '*Structure of Intellect Program*' (Meeker, 1969) based on Guilford's (1967) model or '*Science a Process Approach*' drawing on Gagné's ideas about structuring and sequencing (Klausmeier & Sipple, 1980), or Klauer's (1990) inductive reasoning with recent implementation in Australia (Barkl, Porter, & Ginns, 2012) and Hungary (Molnár, 2011). As early as 1985, Nickerson, Perkins and Smith (1985) could identify thirty different programmes based to varying degrees on cognitive approaches. Feuerstein's ideas are widely acknowledged to be seminal in this area and have also inspired other programmes, such as, in the UK, the *Somerset Thinking Skills Course* (Blagg, Ballinger & Gardner, 1988), aimed at the secondary age pupils, and *Top Ten Thinking Tactics* (Lake & Needham, 1993; Baumfield & Higgins, 1997) for primary or elementary age children. Programmes following a cognitive

approach tend to structure a series of tasks and activities according to their underlying cognitive theorisation. When these programmes are evaluated the emphasis is not purely on the efficacy of the approach in terms of improving learning in schools, but is often testing aspects of the underpinning theory.

An example of this is Piaget's stage theory of development and moving learners from concrete to formal operational thinking. This has inspired a number of approaches including *Operational Enrichment* (Csapó, 1992) and *Cognitive Acceleration Through Science Education (CASE)*. Cognitive acceleration was developed by Michael Shayer and Philip Adey in the early 1980s at King's College, London (Adey, Shayer & Yates, 1995; Adey & Shayer, 2002). The approach builds on both Piaget's and Vygotsky's ideas and takes a broadly constructivist approach. *CASE* has been developed in other curriculum areas such as mathematics and technology education as well as for use with younger pupils (*Let's Think*) which has been successfully trialled in Finland (Aunio, Hautamäki & Van Luit, 2005) and China (Hu, Adey, Jia, Liu, Zhang, Li & Dong, 2011), though with varying results.

Socio-cultural approaches have similarly influenced thinking skills programmes and approaches. Drawing on the work of the Russian psychologist, Lev Vygotsky, the emphasis is on talking and discussion and 'scaffolded' experiences where children develop understanding through communicating their ideas and being exposed to others' ideas. The *Thinking Together* programme, developed by a team at the Open University (Dawes, Mercer & Wegerif 2000), draws explicitly on Vygotsky, whilst also incorporating wider theoretical ideas about talk, dialogue and interaction (Wegerif, Mercer & Dawes, 1999; Mercer, 2004; Wegerif, 2008;), in both the UK and Mexico (Wegerif, Perez Linares, Rojas-Drummond, Mercer & Velez, 2005).

Pragmatic solutions

A number of further approaches to teaching thinking have looked at the extensive range of programmes and their underpinning theories and classroom techniques and have distilled key elements to produce an approach which can be more easily adopted by practitioners. Examples of these are Swartz and Parks' (1994) thinking diagrams and, in the UK, approaches such as *TASC (Thinking Actively in a Social Context)*: Wallace & Adams, 1993) or *ACTS (Activating Children's Thinking Skills)*: McGuinness, 1999; Dewey & Bento, 2009) or the '*Thinking Through...*' strategies developed in by a team at Newcastle University (Leat, 1998; Higgins, 2001; Baumfield and Leat, 2002: see also van der Schee, Leat & Vankan, 2006). These techniques and approaches are infused into specific subjects through the use of 'powerful pedagogical strategies' (Leat & Higgins, 2002). Such 'thinking routines' (Ritchhart, Church, & Morrison 2011) help to provide a manageable unit of change for teachers and a practical way to try out such approaches in the classroom. As 'catalytic tools' (Baumfield, Hall, Higgins & Wall, 2009) they also provide the opportunity for teachers to investigate the value of such approaches and sustain their use in their professional practice. These resulting hybrid approaches are then hard to classify though elements from the other approaches can be seen. Most programmes and approaches acknowledge the importance of language, articulation and discussion as a key element. From this perspective teaching thinking approaches chime with many practitioners views and values about what is important in education and therefore often provide a productive arena for professional enquiry and development (Baumfield, 2006).

Challenges and controversies in teaching thinking

A key controversy which triggered the development of teaching thinking and which clearly influenced Feuerstein, de Bono and Lipman, was the notion of fixed ability or intelligence. This has now been reasonably conclusively answered by cognitive science, in favour of the views of the teaching thinking pioneers. Brain plasticity and developmental patterns of neuronal development indicate that intelligence, at least when crudely conceptualised, is not fixed. Though we may not yet fully understand how to benefit from this understanding in designing educational programmes and activities to maximise any individual's potential, it has reinvigorated the challenge (Howard-Jones, 2010).

In the 1980s and 1990s much time was spent in arguments about how explicit or implicit approaches to teaching thinking should be. Each of the programmes and approaches can be categorised as to whether they adopt an 'enrichment' approach where they are taught through extra or separate lessons or 'infusion' where skills and practices are embedded in the curriculum (McGuinness, 2005). Evidence from meta-analysis (Abrami et al., 2008) indicates that answer is an emphatic 'both'. Combined approaches where skills are taught explicitly as critical thinking lessons and combined with curriculum teaching which is infused with these skills, is the most effective approach (an effect size of 0.94). If you teach critical thinking separately, then learners do improve (an effect size of 0.38), but perhaps don't know how or when to employ these skills. If you teach skills embedded or infused into a curriculum, this is slightly more effective than teaching them separately (with an effect size of 0.54) but learners may not be so aware of them or of how they might need to be adapted for a different context or subject (see also Higgins et al. 2005).

Not all of the controversies have been answered so clearly. For Garnham and Oakhill (1994), the thorniest problem facing all teaching thinking programmes and approaches was that of transfer. This is one reason for developing both general and subject-specific programmes. There is insufficient space here to get involved in the complex transfer debate (e.g. Higgins & Baumfield, 1998), but one way through the controversy is through self-regulation. McGuinness and Nisbet (1991), in reviewing the European scene, pointed to two themes: a "thinking curriculum" and "a growing recognition of the importance of affective factors in thinking - attitudes, motivation and disposition - and of social factors in helping to establish appropriate habits of thought." Motivation, renewal of belief in oneself as a learner, and a disposition to want to learn may all be as important as an outcome of teaching thinking, as any improvement of a distinct aspect of thinking, such as inference or creativity.

The evolution of teaching thinking through cognitive tools, meta-cognitive approaches and self-regulation is reflected in the development of programmes adopted in Europe and North America (Hamers et al., 1999). It can also be seen from an academic perspective with the recent focus on self-regulation in Europe (Dignath, Buettner & Langfeldt, 2008) In North America the development of '*habits of mind*' (Costa & Kallick, 2000) and '*thinking dispositions*' (Perkins & Salomon, 2012) both aim to combine these cognitive and conative aspects of thinking.

Overall no single perspective has evidence of superior results in terms of either theoretical coherence or impact on learning outcomes. Researchers and developers of a wide range of teaching thinking programmes and approaches using different theoretical standpoints have all had some success. This suggests that although research and theorisation is working in a productive area, the concepts and ideas may benefit from further exploration, development and evaluation.

Teaching thinking and classroom talk

One of the areas where our understanding of the pedagogical rationale for teaching thinking has strengthened is in the nature of classroom talk. There is considerable evidence that most lessons in schools follow a similar interaction or 'discourse' pattern (Edwards & Westgate 1994). This is described as 'Initiate Respond Evaluate' (I-R-E) or 'Initiate Respond Feedback' (I-R-F) (Sinclair and Coulthard, 1992). One of the advantages of this type of discourse structure is that teacher is clearly in control of both the content and turn-taking in any classroom discussion. In addition, it may promote effective transmission of information, as pupils are encouraged mainly to recall information (Edwards, 1980; Edwards & Westgate 1994 p.156). The level of demand on students' thinking was an issue which Benjamin Bloom had observed in the 1950s and classified as 'lower order' (Bloom, 1974). Over the intervening decades an understanding of teachers' questioning, evaluation and feedback and how this sets the level of demand for learners' thinking has been described (Crooks, 1988). The value of collaborative work in enabling different kinds of talk is also now well established (Kutnick & Blatchford, 2014).

Teaching thinking approaches advocate a less directive role for the teacher and which encourages mediation or scaffolding of pupil's thinking. Because of the difficulties of managing the turn-taking of a large numbers of pupils, some (Barnes & Todd, 1995) advocate the use of collaborative group work as a way of 'decentralising' classroom communication so as to encourage more pupils to participate in and practice forms of academic discourse normally dominated by the teacher. Proponents of teaching thinking approaches argue that such 'decentralising' can happen in both small groups and whole class situations such as the structuring of talk and turn-taking in P4C. The '*Thinking Together*' approach, developed by Neil Mercer and a team at the Open University, has also shown over a number of projects that children's individual reasoning (as measured by Raven's matrices, a standardised test of abstract reasoning) improves when they are taught how to discuss and exchange ideas in groups and by explicitly developing 'talk rules' to define social norms and make the meta-discursive rules explicit (Mercer, Wegerif & Dawes, 1999). One perspective on teaching thinking approaches therefore is that they provide structures, tools or contexts for teachers to alter the default pattern of interaction in classrooms. Learners engage in and articulate more complex forms of thinking and develop their thinking through reasoning and discussion. This is often interpreted as more dialogic, more inclusive or more learner-centred teaching (Padget, 2012).

21st Century Skills and Teaching Thinking

Renewed interest of teaching thinking has been ignited by the development of digital and networked technologies (Wegerif, 2006) and the emergence of '21st Century Skills' (Voogt et al. 2013). The argument here is that new technological tools and digital data have changed the nature of knowledge for the next generation of learners. Whilst it has certainly changed the nature of information in terms of its representation, translation, and access, the nature of knowing is more problematic (Higgins, 2014). Overall the arguments that the digital world requires a different emphasis in the school curriculum is a persuasive one, particularly in terms of developing a critical understanding of the nature of information and its value to help answer particular questions or solve particular problems. Access to information is clearly a part of that process, and young people are certainly more adept at looking for information on line to help them find out how to do something new. This has its limits however. Whilst it may be possible to Google how to undertake brain surgery, the expertise required is more complex than simply having access to the information and watching a YouTube video. What is less commonly talked about in discussions of 21st Century education is the potential of teaching thinking approaches, and the philosophical

perspective in particular, to be of value in communicating understanding. This includes the importance of being able to argue for a position or course of action, but also to be able to concede to stronger arguments and evidence.

Conclusion

The teaching thinking movement has been and will continue to be of interest within education. It will continue to have a history. Its various strands stem from a reaction against the assumption implicit in much educational practice and theory that intelligence and ability are fixed. While there is a scientific basis for this belief it is also driven by values, reflecting a desire to help each individual student reach their full potential.

Teaching thinking will also continue to resonate because of the interaction between educational and psychological (or cognitive science) theories about thinking and learning. The challenge of operationalising such theories and enabling educational practice to benefit will always provide stimulus for educational development. There will always be programmes and approaches developed to test contemporary aspects of learning theory so programmes and approaches which promote more complex and more demanding thinking will continue to emerge. New understandings from neuro-science will no doubt also influence this interaction, both positively and negatively as they have in the past. Such physiological understandings will never withstand moral or ethical imperatives about educational values as these judgements about the aims and purposes of education, or desirable approaches from a value-based position, will always precede questions of efficiency and effectiveness, which an understanding the brain may advance. Just because something is efficient or effective does not necessarily make it desirable. Technological developments will also challenge the nature of information and knowledge and their relevance to the school curriculum, again spurring on further debate about the teaching *of* and teaching *for* thinking. The philosophical perspective will also endure as this connects with educators concerns about the role of developing reasoning and being able to reason with others. This is at the core of a culture which seeks to maintain a democratic and pluralist society where its citizens (and teachers) are engaged in a process of inquiry into its maintenance, development and renewal (Dewey, 1916).

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