Thinking skills in the early years: a literature review

A team of researchers at the National Foundation for Educational Research (NFER) carried out a literature review exploring thinking skills in the early years (for children aged three to seven). Kate Ridley summarises the main findings from the review and provides some practical recommendations for teachers seeking to further promote thinking skills in the early years.

About the study

Since 1999, thinking skills have been included in the National Curriculum alongside 'key skills' such as those to do with communication. Thinking skills are expected to be developed at all key stages and to centre on: information-processing skills, reasoning skills, enquiry skills, creative thinking skills and evaluation skills.

The review covered post-2000 publications and provided an update of the evidence on thinking skills approaches. It also suggested areas where more research is needed and made some practical recommendations for researchers, policy makers and practitioners.

The review aimed to address the following three questions.

1. What classroom-based approaches to developing thinking skills currently exist for children between the ages of three and seven?
2. What are the thinking skills that children are able to demonstrate at this age?
3. What is the relationship between these thinking capabilities and those that the teaching approaches are aiming to develop?

There were three phases to the research, each of which reflected one of the research questions above. The focus of phase 1 was on classroom approaches to developing young children's thinking skills (27 documents were reviewed). Phase 2 covered understanding about the thinking skill capabilities of young children (24 documents were reviewed). The final phase of the research systematically compared and combined the findings from the previous two phases to draw conclusions about the topic.

Main findings

The first phase of the research explored classroom-based approaches to developing thinking skills (i.e. research within an educational setting). Many of the articles reviewed were examples or case studies of classroom practice and effective teaching and, though these were informative and will be useful to practitioners, they tended not to be methodologically rigorous (a bibliography of all the articles reviewed can be found in the main report and a selection of further reading is at the end of this article). Many of the approaches focused on embedding thinking skills within everyday teaching rather than having separate programmes or activities to develop these skills. The approaches tended to focus on practitioners encouraging independent play, promoting persistence and using engaging and exciting classroom events. They also suggested that practitioners reflect on their own ways of thinking creatively and solving problems, and that they use this to inform their own teaching.

The second phase of the research explored what the thinking skill capabilities of young children are, as identified by research. The literature from this phase indicated that, by the age of seven (and given the right assistance), children are able to think in many different ways. The following list may be helpful to practitioners as it shows the wide range of capabilities that young children have; these are illustrated with examples from the literature.

Young children can use thinking language involving words such as 'think', 'know', 'guess' and 'remember'.

Astington (2000) suggested that there are 'mental verbs' that allow children to acquire an understanding of thoughts and beliefs. She described a study with over 100 four- and five-year-olds in which they were individually read a story and asked to retell it. Whilst the older children were starting to incorporate the mental language into their retelling, the younger ones tended to retell the story purely as a sequence of actions taken by the characters.

Young children can understand that the beliefs of others may be different from their own (also known as having a 'theory of mind').

Mitchell and Riggs (2000) gave an account of a seminal study in the theory of mind literature in which very young children were asked to 'mind read'. Children were presented with a scenario in which a character called Maxi put some chocolate in one location and left for school. While he was absent, the chocolate was moved. The children were then asked where Maxi would think the chocolate would be. Three-year-old children tended to answer on the basis of their own knowledge, whilst older children (between the ages of three and five) were correctly able to answer based on Maxi's point of view. This is called a 'false belief' test since it examines the ability of children to 'put on hold' their own knowledge in order to recognise the different, false knowledge of another.

Young children can understand that because someone has partial knowledge of something they will not necessarily have all of it.

For example, children might be told that a puppet knows that a dice is in a box, but does not know that the dice is really an eraser. The children are then asked 'Is there an eraser in the box?' (Yes) 'Does the puppet know that the dice is an eraser?' (No) 'Does the puppet know that there is an eraser in the box?' (No). (Based on studies described in Kassawar and Homer, 2000.)

Young children can not only hypothesise about what might happen in the future, but also suggest alternative actions that could have been taken in the past (although this is more difficult than thinking about the future).

Harris and Leavers (2000) described the success that young children commonly have answering 'counterfactual' (alternatives to the situation before them) questions following a hypothetical mishap or accident. For example, if a puppet is 'accidentally' dropped in some water, children as young as two years old could answer correctly whether the puppet would have got wet if it had been dropped in some popcorn or some milk.

Young children can sort objects according to one or more criteria.

Smidts *et al*. (2004) used an object classification task with children between the ages of three and seven. There were three available criteria; colour, size and type of toy. Children were asked to explain which criteria they used to sort the objects. All children over the age of four could sort six toys once, but many needed guidance to sort a second time. The seven year olds were significantly better at sorting independently than five year olds.

Young children can reason logically based on given rules.

Harris and Leavers (2000) invited children to reason according to premises that run counter to experience, rather than lying completely outside it, as in the case of fanta-

sy. For example, 'All fishes live in trees. Tot is a fish. Does Tot live in water?' The researchers found that children aged four to six were able to reason in this manner, particularly when a problem was presented as part of a make-believe game.

Relationship between thinking capabilities and classroom approaches

In the final phase of the research we brought together all the previous evidence in order to explore the relationship between thinking capabilities and the classroom-based approaches. That is, does what is being taught match up with what children are capable of at this age? This led to the following conclusions.

- Classroom approaches did appear to be well matched to the psychological capabilities of young children.
- Teacher questioning, dialogue, story and play are central to the process of developing and researching young children's thinking skills (see Figure 1 for further details).

Figure 1 Approaches to developing thinking skills in young children

Story

- Children can develop a 'mental vocabulary' through identifying with characters in stories.
- Stories about misadventures stimulate the ability to reason counterfactually.
- Stories provide a stimulus for 'paired thinking' sessions in which pupils can reason together.
- Stories provide a context in which children can develop a theory of mind. The ability to take on another's point of view is vital for comprehending the actions of characters in stories.
- Writing stories provides a good opportunity for children to demonstrate that they can put themselves into the mindset of someone else.

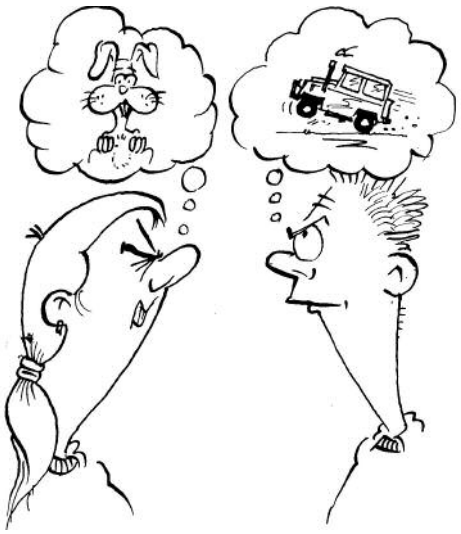
Dialogue

- Classroom approaches to thinking skills place a great emphasis on dialogue, between pupils and between pupils and adults, as a primary means of challenging assumptions and deepening thinking.
- Children develop a 'thinking language' by incorporating words such as 'know' and 'remember' into their speech.

Play

- Solitary role-play can help children to develop divergent thinking.
- Symbolic play helps young children to develop mental flexibility and to understand that people can have different perspectives of the same objects.
- Make-believe play provides opportunities for children to reason counterfactually without confusing this with their 'real world' knowledge.
- Child-directed play is an opportunity for early years practitioners to guide children sensitively into a deeper consideration of the subject matter.

- The expectations of the National Curriculum are generally appropriate in the light of young children's cognitive abilities.
- Although the literature emphasised the importance of play in the development of thinking skills, play is not mentioned in this part of the National Curriculum.
- The emphasis on dialogue in classroom approaches is backed up by the psychological literature, which stresses the importance of acquiring and developing a vocabulary of mental terminology and learning skills through communication with others.
- Whilst the psychological literature reveals that children find some kinds of question more difficult or confusing than others, none of the studies relating to classroom approaches focused on questioning specifically.
- Whilst there is evidence to show that young children can compose a written argument, most approaches to teaching thinking skills emphasise spoken language only.
- None of the classroom based-approaches explicitly referred to strategies for helping pupils develop a theory of mind or their skills in counterfactual reasoning.



very young children were asked to 'mind read'

Recommendations

The evidence from the literature review led us to make the following recommendations to practitioners. When teaching thinking skills in the early years, practitioners should consider the extent to which:

- their questions can focus on stimulating children's thinking and how different styles of question can encourage different kinds of thinking (see Table 1)
- they can create timetabled opportunities for 'thinking times' that signal to the children that a non-ordinary (and possibly counterfactual) kind of thinking is being encouraged – this helps children to understand that they can behave and think differently from what is usually expected of them
- more opportunities can be created in the classroom for structured dialogue
- children can be invited to construct written opinions and arguments
- 'story-time' can become an opportunity to develop children's thinking by encouraging them to think about and discuss the story
- traditional sorting and sequencing tasks can be an opportunity for children to verbalise their thinking
- play equipment can present children with possibilities for developing their imagination
- children can be given opportunities for solitary as well as social play
- children can be asked to evaluate their work critically and verbalise what their thinking process was and how and why it was correct or could be improved
- additional adults in the classroom can be used to develop children's thinking
- creative activities can encourage creative 'possibility thinking' as well as creative skills.

by the age of seven children are able to think in many different ways

One of the main areas where practitioners can help to develop thinking skills is in the area of the questions that they use. Table 1 shows how their questions can focus specifically on stimulating children's thinking in different ways.

Table 1 Stimulating children's thinking

Focus	Question
Evidence	How do you know Winnie the Pooh got stuck in the rabbit hole?
Reasons/theory	Why did Winnie the Pooh get stuck in the rabbit hole?
Counterfactual suggestion	What would have happened if Winnie the Pooh had not eaten the honey?
False belief	What does Winnie the Pooh think has happened to stop him getting out?
Future hypothetical suggestion	What could Winnie the Pooh do next?

References

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Useful weblinks/ further reading

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Early Years journal

Teaching Thinking magazine

About the author

Kate Ridley was a senior research officer at the NFER from 2002 to 2006. During that time she worked on projects covering topics such as special educational needs, urban deprivation, gifted and talented provision and thinking skills in the early years. Kate moved to the DfES in 2006 to work on early years research.

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