Metacognition in the Foundation Phase: Using VSRD to Help Young Children Talk about their Thinking

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ABSTRACT

The extent to which children in the Foundation Phase are capable of metacognition is contested. Although projects based on metacognitive approaches have reported success with young children, the association between some aspects of metacognition and reflected abstraction has led others to question the extent to which young children are capable of metacognition. This paper reports on a small scale project, funded by the Welsh Educational Research Network (WERN) which used video stimulated reflective dialogue (VSRD) to help young children to talk about their thinking. The VSRD discussions were based on short episodes that were selected and videoed by the children themselves. The strategies employed helped the children in the case study schools to talk about their thinking and examples of dialogues associated with metacognitive processes are discussed.

Background

The Foundation Phase in Wales encompasses the developmental needs of children between the ages of three and seven. The curriculum is planned as a progressive framework over four years that emphasizes practitioner

involvement in children's play during first-hand experiential activities. The Foundation Phase Framework was originally intended to become statutory between 2008 and 2010 (DCELLS, 2008a). However, these dates were amended, resulting in a more gradual nationwide rollout. The Foundation Phase has now been implemented in nursery settings and reception classes (2008 and 2009 respectively). 1 September 2010 sees Year One implementation, with Year Two classes scheduled to begin in September 2011. The Foundation Phase is underpinned by a Skills Framework, which identifies *thinking* as one of the four essential skills to be addressed (DCELLS, 2008b).

Several different theoretical approaches to the teaching of thinking in schools have been identified (see McGuinness, 2005, for a summary). Despite theoretical differences, several projects have demonstrated improved learning, for example: Philosophy for Children (P4C) (Lipman, 1991; Trickey and Topping, 2004), Cognitive Acceleration in Science Education (Adey and Shayer, 1994; Adey et al., 2002), The Mathematical Thinking Skills Project (Tanner and Jones, 2000). Significantly, these interventions all included metacognition as an aspect of their pedagogy.

Metacognition

The development of metacognition is of major significance for learning – meta-studies of interventions based on metacognition report improved learning with large effect sizes (Haller et al., 1988; Hattie et al., 1996). However, most of these studies involved older children and there has been some debate about the extent to which very young children are capable of metacognitive thinking or benefitting from interventions based on the development of metacognition (Georghiades, 2004).

At the heart of the issue is often the ill-defined nature of the term, which covers a range of skills and characteristics that are loosely associated with knowledge and control of the individual's cognitive processes (Flavell, 1976; Brown, 1987).

Under the broad heading of metacognition we place: (a) the awareness that individuals have of their own knowledge, their strengths and weaknesses, and their beliefs about themselves as learners; and (b) their ability to regulate their own actions in the application of that knowledge (Flavell, 1976; Brown, 1987; Tanner and Jones, 2000).

Metacognitive knowledge is often viewed as declarative knowledge about cognition, stored in long-term memory, whereas metacognitive skills or

strategies are procedural and associated with executive processes that are used for the 'active monitoring and consequent regulation and orchestration' of cognition (Flavell, 1976: 232). However, there is significant overlap and interaction. In informal learning situations based on play tasks or contexts, the ability of children to develop declarative knowledge of any learning that has occurred may be significant for their future development.

The metacognitive skills and strategies that learners choose to employ in order to explore, plan, monitor, regulate and evaluate progress are influenced by their metacognitive knowledge, including their attitudes and beliefs about self, the social situation or the task that was set or arose during play (Lester and Kroll, 1990; Bråten, 1991; Tanner and Jones, 2000; Efklides, 2006).

Metacognitive knowledge may be activated as a result of deliberate, conscious searching, or it may be activated unintentionally by cues in the context. When activated, it may influence the course of cognition without entering consciousness or it may give rise to a conscious metacognitive experience (Flavell, 1979). Metacognitive experiences are critical to learning. They can occur at any time before, during or after cognition and are often affective in character. They include: a sense of puzzlement, a feeling that you do not understand, a feeling that you might fail, or a decision to set new goals and abandon old ones (Flavell, 1979).

The extent to which very young children are capable of metacognition is contested. Metacognitive knowledge is often described as 'late developing' (Brown, 1987) and 'stateable' (Bråten, 1991) demanding an ability to articulate thinking. It is sometimes associated with reflected abstraction and formal operational thinking and associated adolescent development (Georghiades, 2004).

On the other hand, the metacognitive skills used to regulate learning are often not stateable and are often invoked implicitly without being brought to the level of conscious awareness required to report on to others (Brown, 1987; Bråten, 1991). Metacognitive skills are reported by Brown (1987) as being relatively age independent although often task and situation dependent. In contrast, a recent review of the literature, suggests that 'metacognitive skills emerge at the age of 8–10 years' (Veenman et al., 2006: 8). However, Whitebread et al. (2009) argue that this position is becoming 'increasingly untenable' as evidence grows of young children's ability to self-regulate.

Even children as young as three years old have awareness of self (Flavell, 1999) although it may be the case that this ability to think and act

independently is underestimated by practitioners. All active learning requires a degree of self-regulation (Brown, 1987). Self-regulation and the emergence of executive control functions in children below the age of six are reported in the literature (Rothbart et al., 2006). However, these skills may be implicit. Quite young children are capable of self-regulation but they are often unaware of the processes employed and find it difficult to answer questions like 'How do you know that . . .?' (Kuhn, 2000). It may be that such skills develop progressively from implicit to explicit form. However, for such skills to be utilized most productively in support of future learning conscious awareness may be required (Vygotsky, 1962). A key issue for this paper is the extent to which young children are consciously aware of their thinking processes.

The thinking skills intervention 'Let's Think' (based on Cognitive Acceleration in Science Education (CASE)) was targeted at 5- and 6-year-old pupils and included a focus on metacognition as one of its six 'pillars'. An effect size in favour of the intervention classes of between 0.47 (direct) and 0.43 (transfer) was reported (Adey et al., 2002). However, coding relating to metacognition recorded inferred internal processes based on behaviour rather than explicit statements which demonstrated conscious awareness by pupils. For example, the metacognitive skill of planning was inferred from the pupil statement 'We need to know which way to go round the table' (Larkin, 2000).

Studies that rely less on young children's abilities to articulate their thinking, but infer metacognition from behaviour tend to report them as more knowledgeable (Annevirta and Vauras, 2001; Whitebread et al., 2009). Perhaps language development may be limiting young children's ability to demonstrate their thinking in some studies. However, inferring metacognition from behaviour alone does seem to remove what we regard as an essential aspect of metacognition – explicit and conscious awareness of thinking. Perhaps what is required are more sensitive research strategies that assist young children to articulate their knowledge.

VSRD in the ITICT project

In the Interactive Teaching and ICT (ITICT) project (Kennewell et al., 2009) one part of the research design involved lessons being video-recorded. The DVD was then given to the teacher who watched it and selected episodes that highlighted key aspects of their teaching that were to

be discussed with a researcher the next week. Following on from VSRD with the teacher, the same episodes then formed a stimulus for discussion with a focus group of pupils from the lesson, for triangulation purposes and to explore children's thinking about their learning.

Although VSRD proved to be a useful technique for exploring older pupils' metacognitive awareness, little evidence was found indicating that pupils in years one and two (five to seven years of age) had explicit metacognitive knowledge of their learning. Pupils often seemed unaware of what they had learned or how they had learned it and struggled to describe their thinking. However some of the more advanced pupils demonstrated precursors to metacognition and were able to pause and reflect on their learning when prompted, in a few cases offering explicit explanations of their thinking (Tanner and Jones, 2007).

However, the restricted responses of the pupils to video-clips selected by teachers may have been a limitation of the way the VSRD was employed. When working with children aged three to five, Whitebread et al., 2007 report that metacognitive behaviours occur most frequently during activities initiated by the children, working in pairs or small groups, unsupervized by adults, involving extensive collaboration and talk. On reflection we speculated that asking pupils to select learning episodes for themselves might have encouraged them to reflect more deeply on the teaching and learning process and thus more clearly demonstrate their metacognitive abilities (Tanner and Jones, 2007).

Methodology

In this project, we intended to explore whether giving children working in small groups the initiative to identify learning episodes for themselves, would assist them to reflect more deeply on their thinking. In turn we hoped that this would help them to reveal any metacognitive activity to the researchers. The pupils themselves were thus asked to be the 'film directors' and required to select which classroom episodes to record.

An initial pilot with year two pupils aged six to seven years indicated that pupils could grasp the technicalities of using video cameras and discuss the reasons for their choice of video clip.

Two schools were selected for the main study through local contacts. Both schools were small community schools situated in areas of economic and social disadvantage. The percentages of children entitled to free school meals were well above local and national averages.

Both schools were focusing on developing their teaching of thinking, and staff had recently attended courses on the teaching of thinking skills. In both schools, a mixed year one and two class (pupils aged five to seven years) was selected as the study group. There were sixteen pupils in one class and twenty in the other.

Two researchers spent a day in each school. One researcher took responsibility for overseeing the technical equipment, recording interviews with pupils and staff and taking field notes. The other researcher led the briefings, interviews and reflective discussions.

The usual ethical procedures were followed and the research data consisted of the transcribed, recorded interviews rather than the video episodes. The video was not used as part of the research data as we were not attempting to infer metacognition from observed behaviour, but rather to use the video to stimulate children to articulate their own understanding of thinking processes.

Groups of four pupils at a time were taken to a quiet area; the discussions were recorded and field notes taken. The groups were selected by the teacher and were the same groupings in which the pupils normally worked. The research process began with some scene setting questions to act as an 'advance organisers' (Ausubel, 1968) to focus the pupils on their understanding of 'thinking'. For example:

> 'We are really interested in what you know about thinking.'
> 'What thinking words do you know?'
> 'When do you do your best thinking?'

Pupils were then set the task of videoing short episodes which would show 'good thinking' in their classrooms. The clips would be used to explain 'good thinking' to other pupils in the class. As a motivator for the activity, at the end of the day the 'best' clips would be shown to the whole class.

Each pair of pupils was given a camera and shown how to use it. In order to help them be selective, each pupil was limited to videoing two clips, each of no more than one minute. Pupils then returned to the classroom and videoed freely. This phase was expected to last between five and ten minutes. Pupils who returned to the researchers very quickly were asked if they had got 'really good examples of good thinking' or whether they needed to video further. We hoped that by offering initiative to children working in small groups they would be able to focus more closely on the thinking processes of other children (cf. Whitebread et al., 2007).

Each pair of pupils in turn then showed their videos to each other and the researchers (four clips in total). They were probed as to why they had chosen to video each episode. At the end of the discussion, each pupil was asked to choose one 'best clip' which they thought best illustrated 'thinking'. This strategy intended to set up a dialogue in which children would be encouraged to articulate the reasons behind their decisions to each other. As researchers we wished to explore the extent to which pupils could explicitly justify their views and gain insight into their awareness of their thought processes.

This was then taken a step further: both pairs of pupils watched all the selected 'best clips' (maximum of four) and discussed as a group of four why each clip might represent good thinking. Finally, the group selected one 'very best clip' to be shown at the end of the day to their teacher and the whole class. Again, the strategy aimed to create a dialogue in which pupils would be encouraged to articulate their thinking to each other and to the researchers.

The day ended with the whole class watching the 'very best clips' projected onto a big screen and being asked to comment on what sorts of thinking they could observe in the clips. All discussions and interviews were audio-recorded and transcribed.

Results

The children enjoyed using the cameras and were enthusiastic about video-recording their peers. They took the task of selecting the episodes to video seriously. The time limit of one minute and the knowledge that clips would be compared and one chosen from the group encouraged them to consider their selection carefully. Although some pupils targeted their friends, it was common to see a pupil standing thoughtfully scanning the class before selecting what to video.

Individual pupils always claimed to have had a reason for their selection, although these reasons were not always clearly articulated at first. Having to explain to their partner and the researcher helped, but in some cases reasons remained implicit. Reasons for selections included references to physical gesture, concentration, doing hard work (often mathematics) and being stuck.

The small group discussions about which were the 'best clips' to choose revealed understandings about thinking that were followed up by the

researcher during the dialogue. The discussions included pupils' comments about: what thinking looks like, the nature of thinking, and strategies to support thinking. These are discussed below and illustrated by extracts from the transcribed dialogues.

Discussing what thinking looks like:

Example one

R = researcher, P = pupil

R Why did you choose to film this?
P Because when she was doing the top, she was thinking what colour to do the top.
R How do you know she was thinking?
P Because I saw her, putting her eyes up a bit.
R Putting her eyes up a bit. When they go up what do you think her eyes are doing?
P It makes people think.

Example two

R How do you know these people were thinking?
P Because they were thinking very hard. They were writing instead of looking at the camera. They had a finger here (points at head).

Several pupils commented about physical gestures associated with thinking, such as fingers in mouth, looking upwards, hands on head, etc. This might be encouraged by the need to video-record action, but Walsh et al. (undated) would suggest that use of physical gestures is an indicator of higher order thinking skills and the children here are indicating that they are able to interpret such gestures appropriately. Other children mentioned children working very fast, being very quiet, not looking at the camera, as things they looked for when selecting episodes to video-record.

The nature of thinking

Example three

R Can you ever talk and think at the same time?
P Never!
R What if you don't know the answer and you are talking to your friend, can you be thinking then?
P No, impossible!
R Why is it impossible?
P Because you can't think at the same time when you're talking. You think and think when you aren't talking.

R What does talking do to stop you thinking?
P It just stops you, it disturbs you.

The child is demonstrating a clear awareness that sometimes thinking requires sustained individual concentration and is aware that the talking of others can disturb this process for them. We take this as an indication of some awareness of their own thinking processes which might be considered a form of metacognitive knowledge.

Discussing strategies.

Some children were aware of occasions when they had made decisions controlling the thinking process and talked about stopping to decide what to do or putting on a thinking hat (de Bono, 2000).

Example four

R When are you doing thinking?
P When you read a book, and hard words.
R So what do you have to think about if it's a hard word then?
P Break it up first, one half first then the other.

These children are articulating a strategy that can be employed when meeting a difficulty in reading. Although this strategy will have been taught in school directly, it is an example of conscious control of the thinking process – an executive control function. It is significant also that the child introduced the context and the strategy in response to an open prompt, demonstrating an explicit awareness of their own thinking processes.

Example five

R If you are doing something in the classroom and you get a bit stuck, is there anything that can help you think a little bit better?
P1 Ask the teacher.
R So you ask the teacher, is there anything else?
P2 Do it with your hands. Add up.
R So you can use your fingers to help you. That's a really good idea.
P2 Use the number line.
R Do you use it all the time.
P1 Some of the time.
R So when do you decide to use it?
P2 When you're doing maths. When you're doing 13 – 11.

The children are articulating three different strategies that can be employed when 'stuck'. Being stuck is an example of a metacognitive experience that can lead to learning or failure.

Although 'fingers' and 'number lines' are cognitive tools, the pupils are demonstrating a conscious awareness that these might be useful tools to use when they are 'stuck'. More than this, pupil two was able to generate a specific problem for which the number line would be a useful thinking tool. We infer that the example 13 – 11 was selected because it involved numbers bigger than ten and thus went beyond calculations that could be done on fingers. Another example of conscious awareness of strategy choice is offered in example six

Example six

R Have you done any thinking today?
P Thinking with hard stuff in maths and English.
R What stuff is hard then, that you've got to think about?
P Giving the answer.
R So what helps you give the answer then?
P We get some cups and we turn them upside down and we count them. We put them all out and add them and count them.
R So how would you know – how would you decide when you need them?
P When we have got hard stuff and we haven't got enough fingers.

Example seven

P When I get stuck I get some soft white cups to help me.
R How do they help you? What kind of things do you do with them?
P You put them on the table and you take some away and that helps you think.

Sometimes if you haven't really got the cups, you have to think that you have the cups.

In example six the child is able to articulate a strategy involving a physical representation and when it would be appropriate to use it. In example seven the child clearly recognizes that the use of the physical representation helps them to think, but then goes one stage further and is able to articulate that imagining the cups helps them to think about the problem. This might be taken as an example of stateable metacognitive knowledge of the child's own thought processes.

At the end of the day the class enjoyed seeing the 'best clips' projected on to a big screen. The discussions in the whole class plenaries were led by the teachers who used them as teaching opportunities. Although they are not included as a part of the research data for this paper, the plenaries provided a useful motivator when pupils were selecting episodes to record.

Conclusion

Allowing children control over the selection of clips for VSRD and to negotiate with other pupils in discussion allowed greater access to their thinking processes than VSRD based on teacher selected clips. It also demonstrated that when challenged appropriately to discuss thinking, even quite young children are able to demonstrate explicit and conscious awareness of their thinking. Using pupils as 'directors' helped them to focus on the thinking of other pupils and hence to reflect on their own thinking.

Although the use of video may have encouraged a focus on overt features and gesture, the pupils demonstrated awareness of the physical signs of thinking in others. They appreciated and could recognize signs of quiet concentration in others and their own needs to pause and reflect.

Children in these two case study schools were able to recognize the metacognitive experience of being stuck and were able to articulate sensible strategies which would lead them forwards. There is evidence here of young children being consciously aware of strategies to employ and when to employ them. They were able to articulate this knowledge.

In this paper we have distinguished between executive control skills which are applied unconsciously in context and those of which the child has conscious awareness. We have suggested that, for metacognitive skills to be utilized most productively in support of future learning, conscious awareness may be required (cf. Vygotsky, 1962).

The results of this small case study are in line with Rothbart et al. (2006) and Whitebread et al. (2009) in that we have evidence of conscious and explicit knowledge of executive control functions in young children. Interestingly we found that the methodology employed in this project encouraged children to articulate their knowledge of some of their metacognitive skills rather than relying on researchers inferring metacognition from behaviour.

The extent to which children can articulate their thinking about thinking is clearly dependent upon their language development. However, it is also dependent on the culture of the classroom and the extent to which children are expected to think and talk about their thinking. It may be significant that both of the case study schools had been involved in thinking skills projects and we make no claim that they are a representative sample.

We would also speculate that involvement in this project might have been a learning experience for the children concerned and that by intervening in the way that we did, we encouraged them to reflect on their own thinking processes.

Much of the debate about the development of metacognition depends on the precise definition of a somewhat slippery and ill defined term, however we would claim that in these case studies we have evidence of young children demonstrating stateable knowledge of metacognitive skills and showing emergent metacognitive knowledge of their own thinking processes.

This paper does not claim that all children in the Foundation Phase are able currently to exhibit such metacognitive skills and emergent metacognitive knowledge, but in many schools children are not challenged to work at this level. However, the fact that *some* young children exhibit such capabilities in our case studies suggests that not all aspects of metacognition are late developing.

Clearly this was a small scale study based on two case study schools and makes no claims to generalization. However the findings suggest that further research is merited into how best to help more young children develop their metacognitive knowledge and skills.

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