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Self-regulation and metacognition in young children's self-initiated play and Reflective Dialogue

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This paper looks at ways in which a group of children aged three–four years exhibited evidence of self-regulation and metacognition. Videotaped episodes of children's activities and audiotaped dialogues between children and practitioners about the activities were analysed using an observational framework. The data here show children of three and four displaying extensive evidence of metacognitive and self-regulatory behaviour, with similar mean levels of frequency across both activities and dialogues. However, whilst the majority of evidence from the activities was of metacognitive regulation and skilfulness, that from the dialogues showed more evidence of metacognitive knowledge. It is also suggested that different social contexts may influence children's opportunities to develop and display self-regulation. The use of video data and opportunities for young children to reflect on their activities are suggested as valuable tools for research and pedagogical purposes, and as an effective means of eliciting young children's perspectives on their lives.

Keywords: self-regulation; metacognition; young children; play; dialogue

Introduction

This paper presents findings from Phase 4 of the Froebel Research Fellowship Project 'The Voice of the Child: Ownership and Autonomy in Early Learning' (Fumoto and Robson 2006; Robson 2006, 2009; Robson and Fumoto 2009; Robson and Hargreaves 2005). In the current phase, the focus is on investigation of the perspectives of children, parents and practitioners about the children's experiences. In particular, the ways in which young children's thinking is both displayed and developed during the course of their everyday activities is explored. The paper looks at the ways in which a group of children aged three–four years, in three early childhood settings in England, exhibited extensive evidence of self-regulation and metacognition in their self-directed activities, and in their discussions about these activities. In particular, it considers the ways in which engagement in self-directed activity, and later explicit reflection upon this, may afford children opportunities to display self-regulation and metacognition in different, but complementary ways, and support distinct aspects of their development.

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Self-regulation and metacognition

Self-regulation and metacognition are complex and multifaceted concepts, marked still by inconsistencies in their conceptualisation, although they are recognised as having a 'central role in influencing learning and achievement in school and beyond' (Boekaerts and Cascallar 2006, 199). Views differ about the relationship of one to the other, in particular whether self-regulation is subordinate or superordinate to metacognition (Veenman, Van Hout-Walters, and Afflerbach 2006). The most prominent current theoretical position on self-regulation, and that adopted here, is drawn from a social cognitive perspective, influenced by Vygotsky's (1978, 1986) conception of a move from 'other' to self-regulation. In this, affective elements such as motivation and social regulation sit alongside cognition as component parts of self-regulation. Pintrich, for example, defines the process of self-regulated learning as the setting of goals by learners who 'then attempt to monitor, regulate and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment' (2000, 453). Thus, there is an interdependent relationship between the social context and an individual's self-regulation.

Metacognition derives from the ideas of Flavell (1979), who identifies three components: first, the self and others as learners; second, tasks and goals and recognition that different tasks make different types of cognitive demand; and third, strategies to be used to solve identified problems and meet goals. Importantly, however, a distinction is drawn between knowledge, in particular declarative knowledge, for example about oneself as a learner, and skills, or the procedural knowledge needed for regulating problem-solving. The former can be correct or incorrect (we may have a realistic or unrealistic view about ourselves as learners, for example), whereas the latter embodies an implicit feedback mechanism: if the strategies we employ, or our understanding of the task, fails, then things go wrong (Veenman, Van Hout-Walters, and Afflerbach 2006). Thus, metacognition is concerned with both knowledge and regulation of cognition.

At the same time, Flavell's (1979) assertion that metacognitive experiences can be both cognitive and affective perhaps reflects the difficulties inherent in any attempts to rigidly boundary thinking and learning as cognitive *or* social *or* emotional. Instead, it is the relationships between all of these aspects which contribute to young children's developing knowledge about, and ability to consciously use, their own thinking. Bronson (2000) emphasises the inter-relationship of emotional, social and cognitive aspects in children's metacognitive experience. She suggests, for example, that motivation and self-regulation are inseparable in most situations, particularly for young children.

Flavell (1977) sees the development of metacognition as a centrally significant cognitive-developmental hallmark of early childhood. Veenman, Van Hout-Walters, and Afflerbach (2006) nonetheless, conclude that the view that metacognition does not begin to emerge until around the age of eight years is still widely accepted. However, as Whitebread et al. (2007) show, the metacognitive abilities of younger children may have been severely under-estimated, particularly where this has been based on children's self-report and laboratory-based studies. In contrast, in naturally occurring social contexts which have meaning and purpose for children, they show evidence of self-regulation and metacognition at a much earlier age. Children from as young as 18 months may spontaneously use error-correction strategies in solving

problems (DeLoache, Sugarman, and Brown 1985); have been shown at age three to be capable of monitoring their problem-solving behaviour; and, at four, to use strategies and metacognitive processing in puzzle tasks (Sperling, Walls, and Hill 2000). In educational settings, Perry et al. conclude that 'young children can and do engage in SRL (self-regulated learning) in classrooms where they have opportunities to engage in complex open-ended activities, make choices that have an impact on their learning, control challenge, and evaluate themselves and others' (2002, 14).

The context for the research presented here is young children's self-initiated activities, in particular their play, identified by Vygotsky (1978) as significant in the move from other- to self-regulation. Alongside play, Vygotsky (1986) views language, and in particular dialogue, as a key psychological tool for the development of young children's self-regulation, and as a critical way for children to both express and develop their thoughts. Pramling (1988) demonstrates how explicit talk about learning and thinking may help to make young children more consciously aware of their thinking, and be a key contributor to their metacognitive understanding, a finding supported by participants in an earlier phase of the research discussed here (Robson and Hargreaves 2005). For Froebel, language 'is the expression of the human mind' (1888, 212), and a way of representing both inner and outer worlds. Morgan (2007), however, in an analysis of lesson observations of children aged three–seven years, concludes that the children had few opportunities to talk about how they learnt, or to reflect on their thinking, a conclusion supported by Woodhead and Faulkner (2008).

The project

The research described here forms part of the Froebel Research Fellowship Project 'The Voice of the Child: Ownership and Autonomy in Early Learning'. The project is underpinned by a belief that young children are competent social actors, with rights to be listened to and respected, that they can, and should, be active research participants, and that their opportunities for involvement in decision-making have the potential for impacting positively on their identities, well-being and competence (MacNaughton, Hughes, and Smith 2007). At the same time, we recognise that such adult listening is not a right, and that children's rights to privacy are also vital (Clark and Moss 2001). These, and other issues, are looked at in more detail in a companion paper (Robson 2009).

This paper focuses particularly on the children's understandings about their experiences, and addresses the question: What are the children's perspectives on their activities in early childhood settings, and how do they reflect upon these? Thus, the intention is to investigate children's own ideas about their activities, and their conceptions of themselves as learners (metacognitive knowledge) including the strategies they use (self-regulatory behaviour). The theoretical framework draws on post-Vygotskian sociocultural theory and self-determination theory (Deci and Ryan 2002; Vygotsky 1978), and rests upon a number of underlying assumptions. First, that learning and development are social processes, with Vygotsky's (1978) perspective on the move from other- to self-regulation being significant here. Second, young children are capable of displaying metacognitive and self-regulatory behaviour, particularly in contexts which are meaningful for them. Third, self-initiated activity may be particularly helpful for supporting, observing and gathering evidence of the development of young children's self-regulation and metacognition

(Whitebread et al. 2007). Fourth, that the most effective self-regulated learning may be promoted by ensuring that children can make their own choices, control level of challenge in tasks and evaluate both themselves and others (Perry et al. 2002).

Method

Participants

Participants in the study were 12 children (five girls and seven boys aged three years 10 months to four years 10 months, mean age four years three months); and six practitioners who each acted as a key person [defined in the English *Statutory Framework for the Early Years Foundation Stage* as 'a member of staff assigned to an individual child to support their development and act as the key point of contact with that child's parents' (DfES 2007, 52)]. They came from three settings in London, England: a children's centre, a foundation stage unit in a primary school and a private workplace nursery. The settings were chosen because of the experience and willingness of the practitioner participants, and also to reflect the diversity of provision available for this age range (English Foundation Stage, 3–5 years). However, no claims are made that such a small opportunity sample is in any way representative of provision in England.

Procedures and research tools

Data for this project were collected over a period of a year, in order to support the development of relationships between researchers and participants. Self-report data have been commonly used to assess self-regulated learning, because of their efficiency and their ability to capture participants' perceptions of how they regulate their learning. Such data may not, however, provide reliable indicators of the tactics learners actually use while studying, and this may be particularly so for young children (Perry and Winne 2006). Instead, a combination of instruments is suggested, which supports the capture of data about what children think, feel and do (Boekaerts and Cascallar 2006). With this in mind, two types of data were collected: videotaped episodes of children's self-initiated play activities, which provide contextualised evidence of what children actually do (Perry and Winne 2006), and audiotaped discussions between individual children and their key person about the videotaped play activities (referred to here as Reflective Dialogues or RDs), which have the potential to illuminate aspects of self-regulation and metacognition not readily observable (Perry et al. 2002). RD is more commonly seen as a tool for reflection with adults, but in research with children it provides a context for really listening to their perspectives, and can be seen as a tool which adds to the range of approaches developed in recent years which suit young children's 'competence, knowledge, interest and context' (Schiller and Einarsdottir 2009, 125). As such, both the videotaped episodes and the RDs function as semiotic tools (Vygotsky 1978) in support of young children's thinking.

The videotapes thus provide contexts for talk which have meaning for the children and which acknowledge them as experts in their own lives. Forman (1999) suggests that one of the benefits of using video data is that it may act as a 'tool of the mind', allowing children to 'download' details of their actions to the video itself as part of its replaying, freeing their minds to think about what the actions themselves

mean. He also suggests a phenomenon of particular benefit in the context of a project about young children's thinking: 'knowledge that I was recording gave the children a reason to consider what in the classroom or in their own play was interesting. It turns out that thinking about what is interesting requires rather high-level thinking' (Forman 1999, 5).

The approach to production of data was for a researcher to record episodes of children's play using a hand-held camcorder, with which the children had already had opportunities to play and experiment themselves. These episodes were all child-initiated activities, demonstrated by Whitebread et al. (2007) as particularly rich opportunities for finding evidence of young children's metacognition and self-regulated learning. Episodes were then coded and analysed using the Cambridge Independent Learning (C.Ind.Le) framework (Whitebread et al. 2007, 2009). This framework builds on the work of a range of researchers and sets out three main areas of cognitive self-regulation. The first is metacognitive knowledge, specifically the individual's knowledge about personal, task and strategy variables affecting their cognitive performance. The second is metacognitive regulation, the cognitive processes taking place during activities, including planning, monitoring, control and evaluation. The third is emotional and motivational regulation, and the ways in which the learner monitors and controls emotions and motivational states during tasks (Whitebread et al. 2007, 2009).

On the basis of the evidence of self-regulation and metacognition displayed in the video episodes, a number were selected for discussion between each child and his or her key person, in RDs. The RDs were conducted in the setting soon after the activity itself to support recall. However, it is interesting to note that on occasions where this was not possible, for example in the case of one boy who was away for two weeks with chickenpox, the children's recall proved strong. This may have been assisted by the replaying of the video, as suggested by Forman (1999), but it also provided evidence of young children's competence and in particular their ability to recall past events and think abstractly.

The RDs were recorded on digital recorders, using a semi-structured interview schedule, which included possible questions such as 'Did you have an idea about what you wanted to do?', 'are you pleased with what you did?', 'what do you think was the best idea you had?' and 'do you get ideas from other people?' However, the importance of focusing on the child's commentary on the action in the video was emphasised, with the intention of eliciting children's reflections on what they did, and what they had thought about, rather than recounting the activity itself. Such a focus was important from the perspective of data collection, but, as Pramling (1988) suggests, may also be a valuable pedagogic tool for the development of metacognition and self-regulated learning in young children. The resulting data were coded and analysed using the C.Ind.Le framework (Whitebread et al. 2007, 2009).

Results

The data show the children in this sample displaying extensive evidence of metacognitive and self-regulatory behaviour, in their activities and later in the RDs. Figure 1 shows indicative examples of verbal and non-verbal behaviours drawn from the data, using the the C.Ind.Le framework (Whitebread et al. 2007, 2009).

Areas of self-regulation and metacognition with categories	**Example from activities**	**Example from Reflective Dialogues**
Metacognitive knowledge		
Persons [a]*A verbalisation demonstrating the explicit expression of one's knowledge in relation to cognition or people as cognitive processors. It might include knowledge about cognition in relation to self, others or universals.*	'I know why they're spiky. They're spiky because they don't want the animals to eat their leaves'.	'I saw C doing it so it made me have an idea so I told J'.
Tasks *A verbalisation demonstrating the explicit expression of one's own long-term memory knowledge in relation to elements of the task.*	(turning over logs) 'There must be a little worm here!'	'I asked H if we needed string, yeah, but H said no'.
Strategies *A verbalisation demonstrating the explicit expression of one's own knowledge in relation to strategies used or performing a cognitive task, where a strategy is a cognitive or behavioural activity that is employed so as to enhance performance or achieve a goal.*	'We need to bend it this way'	'Because it might have fall on my head if I was doing...'
Metacognitive regulation		
Planning *Any verbalisation or behaviour related to the selection of procedures necessary for performing the task, individually or with others.*	R to A: 'You can't speak like a big girl cause you are the little baby'.	'Anna decided that'.
Monitoring *Any verbalisation or behaviour related to the on-going task assessment of the quality of task performance (of self or others) and the degree to which performance is progressing towards a desired goal.*	'That doesn't work that one'.	'When I want them to come to me they can't listen because when they are too busy then they can't hear what I'm saying'.
Control *Any verbalisation or behaviour related to a change in the way a task had been conducted (by self or others), as a result of cognitive monitoring.*	A places a block that causes the structure to wobble. J stands and moves chair and himself out of way.	Gestures with hands to accompany explanation of action in video.
Evaluation *Any verbalisation or behaviour related to reviewing task performance and evaluating the quality of performance (by self or others).*	D stands logs upright, looks at log circle: 'They're all back up. It's all done now.'	'He's too big and he's going to fall over on me'.
Emotional and motivational regulation		
Monitoring *Any verbalisation or behaviour related to the assessment of current emotional and motivational experiences regarding the task.*	The planks and chair topple over, J & A look embarrassed.	'I didn't like it when they sweeped all the sand'.
Control *Any verbalisation or behaviour related to the regulation of one's emotional and motivational experiences while on task.*	L puts scoop down, looks at camera then her neighbour. A boy stands next to her, she resumes filling pot with scoop. J (practitioner) approaches from behind, she looks up as he approaches and resumes filling.	'That's me trying to do it'.

Figure 1. Examples of self-regulation and metacognition in activities and Reflective Dialogues.
Note: [a]Operational definitions in italics drawn from Whitebread et al. (2009).

Data on areas of self-regulatory and metacognitive behaviour and frequency of occurrence are presented here. A sample of 12 activities and corresponding RDs, representing all of the participant children, and a range of contexts both indoor and outdoor including free play, pretence, construction and sand and water play, is analysed.

Table 1. Areas of self-regulatory and metacognitive behaviour across a sample of 12 episodes of children's self-chosen play activities and accompanying Reflective Dialogues.

Areas of self-regulation and metacognition with categories		Activities (number of units[a] and percentages)		Reflective Dialogues (number of units and percentages)	
Metacognitive knowledge	Persons	4	11 (9%)	46	88 (51%)
	Tasks	1		17	
	Strategies	6		25	
Metacognitive regulation	Planning	49	90 (74%)	33	47 (27%)
	Monitoring	23		8	
	Control	15		4	
	Evaluation	3		2	
Emotional and motivational regulation	Monitoring	7	20 (17%)	32	35 (20%)
	Control	13		3	
Total		121		171	

Note: [a]Defined as a conversational turn, action or gesture.

Areas of self-regulatory and metacognitive behaviour

Table 1 shows the total number of units (defined as a conversational turn, action or gesture) of self-regulatory and metacognitive behaviour for the sample, subdivided into the three areas of knowledge, regulation and emotional and motivational regulation. During the activities themselves, the predominant form of self-regulatory behaviour was metacognitive regulation, accounting for nearly three quarters (74%) of all units. Subdivision into the categories within this area shows that the vast majority of these were planning and monitoring actions or comments, as children negotiated with one another and directed the play. By contrast, metacognitive regulation only accounts for 27% of units in the RDs. Instead, the most frequent evidence from the RDs were expressions of metacognitive knowledge – over half (51%) of all units, in particular children's comments or actions about themselves or another child. The same area in the original activities only accounts for 9% of the units.

Emotional and motivational regulation accounts for 17% of all units in the activities, and rises to 20% of units in the RDs. Here, the major shift is from expressions of control in the activities to monitoring comments in the RDs, as the children comment on their own, and others' feelings. The relationship of affective aspects of self-regulation and metacognition to cognitive aspects is complex and reciprocal (LeDoux 1998), and deserves greater consideration than is possible within the scope of this current paper. However, it is worth observing that, during the course of the activities, children in this sample were almost twice as likely to express emotional and motivational regulation as they were to make a comment which demonstrated their metacognitive knowledge. Dunn (2005) emphasises the importance of young children's talk about emotions for their later understanding of, and ability to talk about, cognitive states.

Frequency

As set out in Table 2, whilst the total frequencies of units for the activities (121) and RDs (171) differ, the RDs are generally longer than the activities themselves. As a

Table 2. The sample and frequency of occurrence of self-regulatory and metacognitive behaviour.

Sample	Number of units	Mean duration of episode	Mean frequency of occurrence
12 activities	121	5 min 40 s (range 3–7 min 35 s)	Average 1 unit per 34 s (range 19–75 s)
12 Reflective Dialogues (RDs)	171	8 min 11 s (range 5–12 min 52 s)	Average 1 unit per 34 s (range 19–45 s)

result, when adjusted for time, the frequency is similar, with an average of 1 unit every 34 s in both cases. Within this overall picture of frequency, however, there are some interesting differences. Some children showed much more evidence of self-regulation and metacognition than others (range in activities: between every 19 and every 75 s, range in RDs: between every 19 and every 45 s), a phenomenon not related to age. However, sample size and the narrowness of the one-year age range means that these aspects require further research.

In a consideration of frequency, two particular types of social context merit further examination:

1. *Play with a dominant other child – an example of other regulation?*

In one setting, three children were videoed together, in an episode of pretend play involving 'Father Christmas' and two reindeers. Individual RDs were then carried out between each child and their key person.

The data in Table 3 show that Joe scored twice as many units of metacognitive behaviour during the activity than either Charlie or Anna. Significantly, all of his was concerned with planning, monitoring and controlling the activity. An excerpt from the transcript illustrates the controlling role of Joe in the play, particularly in planning and monitoring its progression:

> Joe: We have to get back on the train ride. We have to go now (A goes back to kneeling in front of J, C initially follows then runs back to put another block on the structure) We have to get back to Lapland now – come on my creatures, go back to Lapland.
>
> Charlie: Okay (runs back and kneels next to A).
>
> Anna: (looking at J) Going home?
>
> Joe: Yes, cause Lapland's home. We've given all our presents away. No, we're not here yet.
>
> Anna: We're here, we're here.
>
> Joe: Come on, back to Lapland (A & C go back to the ground).
>
> Charlie: We're ready.
>
> Joe: Not yet, you have to go.

Charlie and Anna exhibited considerably more evidence of metacognitive behaviour in the RDs than in the activity itself. For Charlie this was twice as much, for Anna it was over three times. Other episodes show a more even relationship between players,

Table 3. Frequency of occurrence of self-regulatory and metacognitive behaviour for three children in a shared episode of pretend play and accompanying Reflective Dialogues.

Name	Activity		Reflective Dialogue	
	Duration	Frequency of behaviour	Duration	Frequency of behaviour
Joe	7 min 30 s	12 units (average every 38 s)	7 min 58 s	11 units (average every 43 s)
Charlie	7 min 30 s	7 units (average every 64 s)	7 min 53 s	15 units (average every 32 s)
Anna	7 min 30 s	6 units (average every 75 s)	7 min 57 s	23 units (average every 21 s)

as, for example, in this extract from Sapphire and Amanda, also engaged in pretend play, with dolls:

Sapphire: That's your bib and this one is a baby's bib.

Amanda: You know what, I don't have a baby.

Sapphire: No, you are the little baby and I am your mummy and this is your little sister. You are the big baby and this is your little sister.

Amanda: (crouching down) Pretend I'm the little two year old baby. (S nods, A puts hand on S's arm).

Sapphire: (smiling) No, you say goo goo.

Amanda: But I say baby words.

Sapphire: This is your little sister (folds up bib and puts it in box, beside doll).

Amanda: (talking in baby voice) Bed, here is bed (picks up foam mattress).

2. *Adult involvement*

The focus on children's self-directed activities in this project meant that adult involvement was highly variable. However, when adults did get involved, the occurrence of metacognitive behaviour was similar across activity and RD, with practitioners often engaging with children in the joint construction of understanding, as in this excerpt from an RD between Tom and Jenny (practitioner), as they watch a video of Tom riding a trike:

Jenny: Oh no, what's happened to it now? *(C7 laughs)* It's got stuck hasn't it?

Tom: That wouldn't . . . that be . . . *(laughs)* Guess what I'm doing?

Jenny: I don't know what <u>are</u> you doing there?

Tom: I'm doing need some help.

Jenny: You need some help? Because it's got stuck in that . . . in the little . . . the raised . . . the garden bit? I'd love to know what you're doing with that steering wheel, because you keep putting it over your face. Oh! *(Tom laughs)* It fell over. Why do you think that happened?

Tom: *(Laughing)* That was funny!

Jenny: It was . . . <u>oh</u>, it went over <u>again</u>! *(Tom laughs)* Maybe it was because it's . . . it's not balanced wasn't it? Because it's got one wheel over the edge of the bricks there, so when you and James stood up it fell over because it wasn't balanced properly. I wonder

why it's really hard to pedal the bike at one end of the garden [but it's easy the other end?

Tom: [Well when there's nothing (on there) I can ride it faster.

Jenny: Yeah at that end when there's nothing wrong you can ride it fast can't you?

However, in one setting, episodes with two children, both with the same practitioner, showed considerable difference between activity and RD, and suggest the value of looking more closely at the roles of adults. Both episodes took place outdoors, on different days. As Table 4 shows, both Leia and Harun displayed much higher evidence of self-regulation and metacognition during the activities themselves than in the RDs afterwards.

An extract from the episode with Harun shows James, the practitioner, engaging in joint problem solving (Bronson 2000) and modelling metacognitive strategies such as identifying 'what you don't know', generating questions and thinking aloud, advocated by Papaleontiou-Louca (2003):

In the herb garden:

James (practitioner): That one's called Sage.

Harun follows J's actions closely with his eyes, J holds the Sage out to H, H rubs the leaf, puts his thumb and forefinger to his nose and sniffs. He smiles broadly.

Harun: (pointing to spiked plant) Yes, but why is this spiky?

James: This is Rosemary. I don't know why it's spiky. It's just some leaves are spiky and some leaves are broad, aren't they, like the leaves of the trees.

Harun: But I think, I, I, I know. I know why they're spiky. They're spiky because they don't want the animals to eat their leaves (looking at J).

James: Oh, they don't want . . . you mean like this one here? Look, this is really spiky, that'd hurt if you try and touch it. That's called Holly. So I think you're right (H nods), maybe some leaves are spiky because they don't want the animals to eat them.

Discussion

The video observations and RDs show the children here exhibiting extensive self-regulation and metacognition, effectively challenging the commonly held view that, at aged three–four years, such abilities would not yet have emerged (Veenman, Hout-Walters, and Afflerbach 2006).

Table 4. Frequency of occurrence of self-regulatory and metacognitive behaviour in two children with their key person, in activities and accompanying Reflective Dialogues.

	Activity		Reflective Dialogue	
Name	Duration	Frequency of behaviour	Duration	Frequency of behaviour
Leia	5 min	16 units (average every 19 s)	6 min 42 s	9 units (average every 45 s)
Harun	3 min	7 units (average every 28 s)	9 min 33 s	14 units (average every 41 s)

Areas of self-regulatory and metacognitive behaviour

Looking at the areas of self-regulatory and metacognitive behaviour displayed by the children in this sample, it is valuable to consider the shift from metacognitive regulation during the activities to metacognitive knowledge in the RDs, as set out in Table 1. A number of factors may account for this. First, the need to communicate and negotiate with others *in* play about the direction of the play may support greater likelihood of evidence of the kinds of procedural knowledge concerning planning, monitoring and controlling implicit in metacognitive regulation, characterised by Veenman and Spaans (2005) as metacognitive skilfulness. The players themselves may be intuitively aware of the need to support continuation of the play, and focus on the communication of plans and ideas to drive the play forward. Metacognitive regulation post hoc may also serve less purpose. Second, Whitebread et al. (2007) found that when adults are engaged in activities with children, they may tend to stimulate the children to reflect on and articulate what they *know* about their own learning more frequently. A similar phenomenon may also be occurring here in relation to the RDs, where an adult is inevitably present. Third, it may be that the RDs afford time and opportunities for reflection on knowledge, and expressions of declarative knowledge, that are not as readily available during the activity itself. Forman's (1999) emphasis on the role of video in 'downloading' action and, as a consequence, giving children space for thinking may be important in this context.

Frequency

Analysis of the frequency data shows that levels are similar for both the activities themselves and the post hoc RDs between child and key person. This suggests that use of such dialogues may be as helpful as engaging in the activity itself for supporting the development of self-regulation and metacognition, and points to the value of more widespread use of such a strategy in early years' settings.

However, the data suggest that different social contexts may have very different impacts on young children's opportunities to display, and potentially develop, self-regulation and metacognition. This may be particularly significant if, as Boekaerts and Cascallar (2006) assert, children's interactions with their peers and teachers play a crucial role in the development of their self-regulatory skills.

The data-set out in Table 3 illustrates this. Joe, Anna and Charlie are close friends, and often choose to play together. Whitebread et al. (2007) observe that, in their research, metacognitive regulation was more evident when children were in pairs, groups or the whole class than when working individually. They also highlight greater incidence of both shared and other regulation in self-directed groups without adult supervision than in groups with an adult. However, they give no indication whether the effects were similar for all children in a group, and the data presented here provide illustration that playing in a group may not be similarly advantageous for all participants.

To an observer of the activity, the full extent of Anna and Charlie's competence could potentially have remained hidden. Reflection with their key person in the RD effectively created a space for Anna and Charlie to show their thinking in a way that the activity itself did not. This hypothesis is supported by the evidence of another activity and RD with Anna, where she showed a more equal balance between the

activity and the RD. A number of points arise from this. First, play in friendship groups may be unequal in its impact and advantages for individual members of the group, and careful observation by practitioners may be needed to ameliorate the potentially negative impact on some children. Second, use of RDs may provide children with opportunities to display and develop their self-regulation and metacognition in ways that engagement in the activity itself may not. This point may be particularly significant in the case of solitary play: where children are playing alone, often silently, it may be more difficult for observers to infer metacognitive activity, with the RD providing an important space for children's thinking and reflections.

The second context worthy of examination concerns episodes involving interactions between an adult and a child or children. In many instances, the self-directed nature of the activities meant that adult involvement was either fleeting or non-existent. However, adults did also become involved in activities, either because children actively involved them (as in one episode in which a boy initiated a game where he tied a teacher up with a rope) or because they got drawn in. Such episodes showed the fine line there can be between directive and non-directive adult involvement. The data presented in Table 4 show both Leia and Harun very involved with James, the practitioner, during the activity, and displaying much more evidence of metacognition and self-regulation during the activity than later in the RD. The practitioner in question is very experienced, and regarded by colleagues as skilful and supportive in his interactions with children.

The example raises a number of questions. Are the activity episodes between Leia and Harun and James examples of what Siraj-Blatchford et al. (2002) refer to as sustained shared thinking on the part of a skilful adult, who is scaffolding the children's understanding, and thus possibly more facilitatory of self-regulated learning? Does this practitioner take up a particularly prominent role in the RDs, leaving less space for the children's reflections than they are able to find in the activities themselves? Are some children just more interested in the action of the activity than in talking about it? Whitebread et al. (2007) suggest that, when adults work with children, they tend to take on more of the regulatory role, whilst at the same time stimulating the children's reflections on their own knowledge. Interestingly, this tendency is not strongly reflected in the case of either Leia or Harun: whilst both offer more evidence of self-regulation in the activities themselves than in the RDs, this is weighted towards metacognitive regulation. Both also show more evidence of emotional and motivational regulation during the activities than in the RDs, an atypical response in this sample. Taken together, this suggests that the particular interaction styles of adults may play an important part in the children's opportunities to develop and display self-regulation.

Conclusion

The evidence from the data presented here show that children in this age group demonstrate a wide range of areas of metacognitive and self-regulatory behaviour, both when engaged in activities and also when later reflecting upon what they have done.

Whilst the frequencies of self-regulatory and metacognitive behaviour during an activity and in later reflection are, in most instances, similar, there may be very important differences in the kinds of behaviour they support. In particular, there may be a shift from a preoccupation with metacognitive skilfulness and planning and

monitoring the activity in the course of the play, towards more emphasis on displaying metacognitive knowledge in the children's later reflection upon it. This may be particularly valuable for young children's development if, as Flavell (1977) and others suggest, all of these different aspects of behaviour are important for supporting and developing metacognitive and self-regulatory understanding. For practitioners, this may be especially significant: knowing about their own and others' learning, knowing about and being able to remember tasks, approaches and strategies, and being able to talk about these with others, are important areas for development in young children. In addition, the use of multiple research instruments supports Boekaerts and Cascallar's (2006) argument that no one single instrument is sufficient to capture all aspects of children's developing self-regulation and metacognition.

This, in turn, has very practical consequences, and supports more extensive use of strategies such as video recording and RDs by practitioners working with young children, as well as for research purposes. Video data provide a context for interaction and shared reflection between the researcher, the child and the video episode, and is particularly supportive of participatory research which seeks to elicit children's own perspectives on their lives. However, it also provides a context for interaction between practitioners, children and video episode, for pedagogical purposes, acting as a valuable support and stimulus for the development of young children's thinking and learning, and helping to ensure that young children's voices are listened to and respected, and that their perspectives impact on their experiences in early childhood settings.

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