

READING A FICTIONAL STORYBOOK IN A PRIMARY SCIENCE LESSON: NARRATIVE REASONS AND SCIENTIFIC REASONS

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ABSTRACT: This communication fits into the theoretical framework of scientific literacy, which acknowledges argumentation and narrative as a core of ‘epistemic practice’ of science class. In this paper we propose to study the extent to which a collective discussion about the interpretation of a ‘realistic fiction’ storybook in science lesson can be a way to engage young pupils in argumentation. We show that the quality of the directed interaction comes from the form of the teacher’s interventions and that the identification of the relevant narrative data embedded in the story allows the pupils to mobilize scientific reasons in order to interpret it.

KEYWORDS: Storybooks, scientific literacy, primary school, reasoning, narrative

OBJECTIVES:

1. Analyse to what extent the interpretation of a ‘realistic fiction’ storybook in science lesson can be an effective stimulus to engage young pupils in argumentation
2. Explore the nature of the interaction and the content of the pupils’ arguments.

THEORETICAL FRAMEWORK

The goal of science education must be not only mastery scientific concepts but also learning how to engage in scientific discourse (Kuhn, 2010). Matching between the reading and writing of learning texts is a necessary condition for scientific conceptualisation. The narrative and the argumentative form represent an important component of scientific literacy in the sense that each one develops a form of rationality. Aduriz-Bravo (2014) talks about “logical rationality” and a “narrative rationality”. Argumentation (Erduran & Jimenez-Aleixandre, 2007) and narrative (Avraamidou and Osborne, 2009) are as a core of ‘epistemic practice’ of science in class. Narrative is an effective teaching tool (Bruner, 1986) because it places concepts in acceptable, easily, assimilable and memorable form (Strube, 1994). The narrative reflects the way the human mind orders experience. By domesticating the unexpected and the extraordinary, by bringing together the disparate and the fragmentary, stories give shape and meaning to the world around us (Bruner, 2002). Story provides structural guidance both for students and

teachers and allows young pupils to question scientific phenomena (Bruguière et Triquet, 2012). However, narrative constitutes a major obstacle to the construction of scientific explanations at primary school (Viennot, 1996). Learning to reason is also determined by learning how to construct arguments which link evidence with ideas and theories (Wellington & Osborne, 2001). The argumentation is the process of evaluation and justification of claims (Naylor et al., 2007). Argumentation is implemented in practice through debate or discussion. Such situations are dialogical, in which two or more individuals assert conflicting claims to knowledge based on reason (Naylor et al., 2007), but if narrative skills are more or less intuitive, pupils need to learn to develop the skills of argumentation. Among the different strategies for promoting argumentation, those which are addressed in primary school, often offer a situation based on two characters who disagree about their scientific understanding (e.g. Naylor et al., 2007; Simon et al., 2008). We propose here another strategy for the development of argumentation based on 'realistic fiction' storybooks (Bruguière et Triquet, 2012) in which the particularity is that the narrative provides a fictional world based on a real world with its own rules and logics. More precisely these specific 'realistic fiction' storybooks present dialogues that express conflict between the characters, but the scientific nature of the conflict is not explained. The reader has to infer the scientific problem underlying the conflict in order to understand the entire significance of the story. In this exploratory study we aimed to analyse the way in which an interpretative discussion of a 'realistic fiction' storybook could generate argumentation or not.

METHODOLOGY

This study took place in one class of the second year of a French urban state primary school (pupils from 6 to 7 years; N= 25). The female teacher had been involved in our collaborative research for two years. The 'realistic fiction' storybook selected was *Tadpole's promise* (Willis & Ross, 2003). This picture book tells the imaginary love story between a caterpillar and a tadpole based on an impossible promise to never change because they were ignorant of their inevitable biological development. We consider here a collaborative discussion (23 min) in the whole class about the interpretation of the end of the story (the devouring of the butterfly by the frog). This discussion took place after the book had been read. The teacher posed different questions to the pupils to engage the pupils to elicit their understanding of the narrative. The data were obtained from the transcript. The sequences (Kebrit-Orecchioni, 1990) were identified, numbered (N turn of speaks = 132), coded and analysed by considering: i/the linguistic marking (the links used to connect an assertion with a support), ii/the construction of the argumentation (the links between the interventions) and iii/the nature of the arguments (narrative or scientific reasons). The issue of this work is to analyse the nature of the exchanges (Mercer et al, 1999) between the teacher and the pupils and the content of each turn to speak.

RESULTS AND DISCUSSION

Our preliminary results focus on two extracts of discussion where the children develop an argument.

Results 1: the nature of the exchanges

The exchanges, which are initiated by a question of the teacher, were between 5 and 10 turns. The pupils engaged in a dialogue more with the teacher than with the other pupils. The teacher was the most dominant voice and controlled its direction but asked the all class and selected the respondents. However, the pupils took account of the peers' comments in their reply (T97: 'I agree with Emilie

because...). In both extracts an argument is developed across a set of children's interventions. Their assertions share the same position which is supported by different type of reasons and justifications. These conversations refer to an 'exploratory talk' (Mercer et al, 1999) where the children engage critically but constructively with each other's idea.

Results 2: The content of the turn to speak

The teacher encouraged in further discussion by rephrasing the pupils' answers (e.i T30) or referring to the terms used by the pupils (e.i T97) before asking another question such as '*how can we be certain*' (T28) or '*is it possible that?*' (T93). The claims of the pupils are in the same mode (T92, T97). Often, the pupils used the connector '*because*', it is a part of a 'good argument' (Mercer et al, 1999). The pupils are able to refer to data identified in the story (text and pictures) like '*my beautiful black pearl*' (T29). In Extract 1, the pupils provide justifications given by the narrative, picked out from the text (the use of the same nickname at the beginning and the end of the story, T29) or the pictures (the permanence of the colours, '*because the caterpillar is fat and multicoloured*' T 31).

Extract 1
(Sequence 1): discussion in whole class

<i>Turn to speak</i>	<i>Teacher</i>	<i>Pupils</i>
28	how can we be certain that the butterfly is indeed the caterpillar of the beginning	
29		Emilie (G): because we know that at the beginning of the story the caterpillar calls the tadpole "my beautiful black pearl" and then/ it says it again in the book
30	so / it is because it uses the same nickname. Would there be another element which allows us to say that the butterfly is the caterpillar of the beginning	
31		Enzo (B): because the caterpillar is fat and multicoloured
32	oh well / for the colours all right/ we have the same colours as at the beginning thus that can be an element, there is the nickname/ then the colours	

However, in Extract 2, certain pupils justify their claims by referring to scientific reasons. They interpret the narrative claim 'the frog can eat the butterfly' not only in terms of a narrative reason like Milo '*the frog hasn't recognized the caterpillar*' (T94) but also by providing a scientific reason like Emilie '*because the butterfly is an insect and frogs eat insects*' (T95). Two scientific conditions allowing the frog to eat the butterfly are well identified. Firstly, the animals live in the same environment, expressed by Nawel in a narrative way '*later they arrange to meet*' (T90) and reformulated further by Milo (T92) by explaining that this was impossible at the beginning of the story because one animal could not be in the other animal's environment, because it would risk losing its life. Secondly, it is the diet of the animals expressed by Emilie (T95) and agreed by Neila (T97).

Extract 2
(Sequence 3): discussion in whole class

<i>Turn to speak</i>	<i>Teacher</i>	<i>Pupils</i>
89	before the tadpole and the caterpillar were in love // Now how you would describe their relation as frog and butterfly	
90		Nawel (G): before / at the beginning, the tadpole was under the water // later they arrange to meet / and at the end / the frog does not realize that it has eaten "its rainbow"
91	could the tadpole have eaten the caterpillar before	
92		Milo (B): well / no, it isn't possible / because if the caterpillar falls in water / it will die and if the tadpole comes out of water / it will die
93	and thus, it is possible that the frog eats the butterfly	
94		Milo (B): yes / they are still in love but the frog hasn't recognized the caterpillar // thus it has eaten it
95		Emilie (G): in fact / it is logical that the frog eats the butterfly because the butterfly is an insect and frogs eat insects
96	so / for you / this end of the story is logical	
97		Neila (G): I agree a little with Émilie because butterflies are insects but if it had known that it was the caterpillar which had transformed itself / I'd say that it wouldn't have eaten it

CONCLUSION

The interpretation in whole class of the 'realistic fiction' storybook '*tadpole's promise*, can be a way to engage pupils in argumentation. The quality of this directed interaction comes from the form of the teacher's interventions. She didn't evaluate the utterances of the pupils but invites the pupils to further justification by using the words or the idea provided by the pupils. The identification of the relevant narrative data embedded in the pictures and the text allow the pupils to mobilize scientific reasons in order to interpret the story. This interpretative reading based on a realistic fiction storybook, offers a meaningful activity to develop an argumentation based on the potency of the narrative. Further studies on reading situations are necessary to better understand the relationship between narrative and scientific arguments and the kind of exploratory talk which initiates the passage from narrative reasons to scientific reasons.

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