Characterizing teaching effectiveness in the Joint Action Theory in Didactics: an exploratory study in primary school

Gérard Sensevy
Published online: 30 Jul 2014.

To cite this article: Gérard Sensevy (2014) Characterizing teaching effectiveness in the Joint Action Theory in Didactics: an exploratory study in primary school, Journal of Curriculum Studies, 46:5, 577-610, DOI: 10.1080/00220272.2014.931466

To link to this article: http://dx.doi.org/10.1080/00220272.2014.931466

Taylor & Francis makes every effort to ensure the accuracy of all the information (the “Content”) contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at http://www.tandfonline.com/page/terms-and-conditions
Characterizing teaching effectiveness in the Joint Action Theory in Didactics: an exploratory study in primary school

GÉRARD SENSEVY

This paper presents an exploratory study of two consecutive reading sessions conducted in primary school by two different teachers. Our purpose is twofold. From a theoretical viewpoint, we propose a tentative set of conditions of teaching effectiveness by relying on the Joint Action Theory in Didactics. From a methodological viewpoint, drawing on a conjectural paradigm, we attempt to articulate various types of analysis (didactic analyses, speech analyses, statistic analyses), in order to test the putative conditions. We consider two generic factors in teachers’ effectiveness: how they manage to expose students to the core meanings of the relevant content; and how they maintain a relevant dialectic between uncertainty and certainty in the argumentation process in order to increase the deliberative quality of the constructed certainty.

Keywords: didactics; teaching effectiveness; methodology of analysis; practice analysis

Introduction

In this article, we present certain aspects of an exploratory study relating to two consecutive reading sessions conducted in first grade by two different teachers. This study has two overlapping goals. From a theoretical viewpoint, we propose a tentative set of categories aimed at characterizing the effectiveness of teaching practices. From a methodological viewpoint, drawing on a conjectural paradigm, we attempt to articulate various types of analyses to provide clues about the specific effectiveness of the studied teaching practices against the background of our proposed set of categories.

After specifying the general context of the article, we sketch a theoretical framework intended to structure a blueprint relating to the conditions of teaching effectiveness, and we give the background of our methodological stance.

Gérard Sensevy is a professor of Educational Sciences in the Brittany Institute of Education, University of Western Brittany, 153, rue Saint-Malo, Rennes 35520, France; e-mail: gerard.sensevy@bretagne.iufm.fr. The main focus of his research consists of studying teaching and learning processes, and their relationship. In his current work, he develops a Joint Action Theory in Didactics, in which he notably tries to link Didactics to other disciplines in Social Sciences (Cognitive Sciences, Philosophy, Anthropology, Sociology, Psychology, Linguistics and History). He is the co-editor of the Journal Education & Didactique and co-director of the Series Paideia (Presses Universitaires de Rennes). http://cread.espe-bretagne.fr/spip.php?article521.

© 2014 Taylor & Francis
We then provide a didactic analysis of the conducted sessions. Subsequently, we identify a number of factors drawn from a statistical analysis of the teachers’ and students’ discourse which enable us to confirm certain aspects of the didactic analysis. We then propose operational hypotheses relating to the issue of effectiveness based on the previously identified characteristics. We test these hypotheses using the data from the students’ learning results (their effective improvement, in each class, between a pre-test and a post-test conducted on either side of the sessions). These results are then viewed in the light of the progress results for the students over the year. Finally, we return to our two main objectives, the theoretical one (the tentative set of conditions of teaching effectiveness) and the methodological one (the articulation of various types of analysis grounded on a conjectural paradigm), in order to propose a summary of the results relating to each of these objectives and to identify avenues for future research.

The context of the study

The general research conducted in first-grade classrooms

The corpus that we study here is taken from research conducted over a period of two years which focused on the characterization of teaching practices and the assessment of the effects of these practices on students’ learning in both reading and mathematics, at first grade (first year of the elementary school, students were 6–7 years old).

In France, the first year of the elementary school is mainly devoted to the learning of reading, but in a way in which the national official curriculum emphasized the necessity of developing a deep understanding of the content being read.

Within this framework, the two teachers whose work we study in this article were observed seven times over a period of two years (the sessions were filmed on video and transcribed and the principal components of their epistemic and transactional structure analysed) and the progress of their students was assessed over each full-year period.

Description of the study

This part of the study involved five teachers. The teachers T1 and T2, whose practice we study in this paper, were both involved in this group. During an initial phase, these teachers produced the common framework for the reading activity as follows: two consecutive lessons based on a shared narrative text that was accompanied by illustrations and contained two ‘compulsory passages’: a starting-point based on work relating to the title of the text; and a period of ‘written production’. When the general structure of this learning sequence was designed, the teachers group’s common goal was the students’ understanding of the main features of the text. The two teachers studied in this paper thus shared the same general intention, focusing on reading comprehension. This kind of intention can
be understood in part against the background of the national curriculum emphasis on ‘reading with understanding’. It is worth noting that the didactic responsibility in these lessons was entirely the teachers’. The research team did not provide any ideas or advice about the learning/teaching process in itself. Consequently, this research was not carried on in a design-based research paradigm (where collaboration between teachers and researchers can be at the core of the designing process), but rather in a specific experimental paradigm. We will briefly address this point in the discussion.

The research team produced the text (‘Fier de l’Aile’, ‘Proud of Wing’ in English) from the book of the same name by Heine (1978), which they slightly simplified.

In the light of the basic phonological and lexical knowledge required for the understanding of this text, the research team constructed a written pre-test (six questions). These questions were also designed to test the basic grammatical knowledge required to answer the questions. The pre-test was designed as follows.

For question 1, students had to link the image of an animal and the corresponding word (bear, eagle, hare, bear, rat, ram, cow, crow). The purpose of this question was to test the student’s lexical and phonological knowledge relating to the specific animal vocabulary of the studied text. Question 2 focused on closure tests, in which students had to complete a sentence borrowed from Fier de l’Aile by arranging three given words from the text in the closure slots or by choosing one word from three or four. In question 3, students had to read alone and arrange in the right order the following sentence (borrowed from the same text): crow/of the world/ I really was/the stronger. In question 5, the students had to write a sentence characterizing an animal (referred to in the studied text) by using three elements (e.g. ‘black wings’ or ‘for legs’). The purpose of these three questions (2, 3 and 5) was to test students’ basic comprehension of the text and their basic grammatical knowledge.

Questions 4 and 6 were graphophonological questions. In question 4, the students had to underline the letters that made the phonem [a ˜]i na given word within a studied text sentence. In question 6, the students had to choose the ‘right’ word from five given words differing only by a phonem (i.e. underlining each occurrence of monde (world) among bonde (outlet), monde, sonde (probe), monde, ronde (round)).

The first six questions of the post-test were of the same type as the first six questions of the pre-test. In addition, the post-test included five more questions intended to probe the students’ comprehension of the text more deeply. We will describe these questions further. The written pre-test and post-test passes (not communicated to the teachers) were administrated by members of the research team. All the students of each class passed both tests.

The study reported in this article related to two of the teachers involved in the research who are referred to as T1 and T2 in the following. Each of them worked in a different school. The two schools are both situated in urban districts, with comparable socio-economic status.
T1 is a woman who has been teaching for about 15 years. She is a teacher trainer. T2 is a man who has been teaching for five years. He passed his teacher training examination the year following the present research. Their colleagues and the institutional hierarchy consider both of them as qualified teachers.

In our research, we have had interviews with each of these teachers. The first type referred to general interviews at the beginning and the end of the school year in order to gain a certain understanding of their general professional conceptions. The second type occurred at the beginning and the end of each session, so that we apprehend teachers’ anticipation of the session and the way they analyse the enacted lesson.

However, in this paper, we did not take into consideration such materials, which might have given us some hints about the teachers’ professional narratives (Goodson, Moore, & Hargreaves, 2006), notably their practical epistemology and their relationship to the official reading curriculum. This kind of inquiry would be beyond the scope of this paper, given that the provided information did not seem to lead us to redefine our set of conditions of teaching effectiveness.

**Conceptual framework**

*The theoretical goal of the research: designing a set of teaching effectiveness conditions*

This study is grounded in the French didactics approach (Brousseau, 1997; Chevallard, 2007). Within this approach, a specific theoretical framework has been developed, the Joint Action Theory in Didactics (Ligozat, 2011; Sensevy, 2011a, 2011b, 2012; Sensevy, Mercier, Schubauer-Leoni, Ligozat, & Perrot, 2005; Sensevy, Tiberghien, Santini, Laubé, & Griggs, 2008; Tiberghien & Malkoun, 2009; Venturini & Amade-Escot, 2013). This theory rests on a core of background assumptions that we summarize as follows.

1. We generally define *didactic* action as any action in which someone teaches and someone learns. Didactic action can be described as unfolding in a didactic system, which is an undividable system composed of three subsystems: the teacher, the student and the piece of knowledge at stake.

2. Didactic action is a joint action, in that one cannot understand the teacher’s action without understanding its relation to the student’s action (and vice versa), and without understanding the nature and the structure of the piece of knowledge that is the very object of the joint action. In this perspective, we consider didactic joint action as a social act, in Mead’s sense (Mead, 1967), where certain features of a participant’s conduct are treated as ‘stimuli’ by his/her partners, a social act whose content is epistemic.
We develop a Joint Action Theory in Didactics (JATD) within the general paradigm of joint action (Galantucci & Sebanz, 2009; Sebanz, Bekkering, & Knoblich, 2006). In this general paradigm, as Galantucci and Sebanz (2009, p. 256) argue, joint action analyses ‘take a social perspective on cognition’, and it is possible to ‘make progress in understanding cognition by considering the immediate social context within which it occurs’. Within this paradigm, the didactic action is a strongly institutionalized joint action. Contrary to casual conversations or current dialogues, it has an overarching goal, that of instructing students. This instruction refers to both general education and the precise acquisition of skills related to specific pieces of knowledge. The second particular feature of the didactic action is that it is an asymmetrical action, based on a transactional object, the knowledge at stake. The asymmetry of the didactic relationship is grounded on the fact that the teacher’s and the student’s relations to knowledge are different.

(3) In this context, the true specificity of didactic action lies in the fact that the teacher in what we call the didactic game wins if and only if the student wins, i.e. learns. Thus, teaching is a cooperative and conditional activity. In order to be sure that the student has built a first-hand relationship to the content at stake, the teacher cannot express directly the core meaning she/he intends to teach. We term this property of the didactic relationship reticence. The teacher must act in an indirect way, even in the most “direct” teaching. She/he cannot tell the student all she knows, if she intends to enable the student to act on her own. At the same time, the teacher must express some particular meanings in order to enable the student to act on her own.

These contentions are not normative ones, but grammatical ones, grounded on the logic of the practice. They refer to any didactic activity, whatever it is, based on a ‘constructivist’ or on a ‘direct instruction’ stance. In that way, all teaching practices are characterized by an expression-reticence dialectics.

(4) The JATD has to be thought of as a specific part of a more general educational research process, in that we may hypothesize it shares some of its core assumptions with other research traditions, for example, the German Research Tradition of Didaktik (Hopmann, 2007; Meyer, 2012; Westbury, Hopmann, & Riquarts, 2000). In that way, the difference between matter and meaning, as underlined by Hopmann (2007), is a crucial one for the JATD, which may assume the following statement: ‘meaning is what emerges when the content is enacted in a classroom based on the methodological decisions of a teacher’ in that a ‘parameter of good teaching is not the degree to which the students master the content as delineated in the curriculum, but rather the question if and how the educative substance … became open in their
individual meeting with the content in the given teaching process’ (Hopmann, 2007, p. 117). The reflection we propose in this paper, relating to the ‘effectiveness of teaching practices’, may be understood through such a conception of a dynamic relationship between meaning and matter, which is deeply involved in what we call ‘a first-hand relationship to the content at stake’.

In the same way, our focus on this ‘first-hand relationship to the content at stake’ lead us to share some of the bakhtinian theoretical assumptions of Skidmore’s work (Skidmore, 2000, 2006, 2012), presenting a ‘dialogical pedagogy’ devoted ‘to the goal of enhancing pupil’s autonomous abilities to engage in literate thinking’ (Skidmore, 2000, p. 292). In a similar perspective, the JATD shares many of its wittegensteinian assumptions with the Practical Epistemology Analysis (Wickman, 2004, 2012; Wickman & Östman, 2002).

There are many other meeting points between different research traditions that would be important to underline and work out, and Hudson and Meyer’s book (Beyond fragmentation: Didactics, Learning and Teaching in Europe) provide us with a good deal of such opportunities for the European Countries (Hudson & Meyer, 2011). It is one of our goals, in this paper, to contribute to a thorough discussion between different trends of research, in order to develop future cooperation.

(5) Elaborating on the general assumptions above, we propose, within the JATD framework a system of conditions relating to the effectiveness of teaching practices.

We argue that in order to achieve better teaching effectiveness, the teacher has to enable students to understand the core meanings expressing the piece of knowledge at stake. Of the conditions which favour this purpose, we highlight the following.

(a) Encountering the problem: an actual student’s encounter with the problem that the piece of knowledge allows them to deal with;

(b) Articulating reasons: an actual student’s epistemic activity, which enables her to articulate reasons for the justification of her epistemic beliefs in a classroom discussion;

(c) Practising the knowledge language-game: an actual student’s practice of the language-game specific to the piece of knowledge at stake, which means mastering both linguistic forms and semiotic systems;

(d) Identifying the piece of knowledge at stake: an actual student’s work to identify the learnt piece of knowledge, its main features and the way in which it allows to solve the problem it addresses.

This set of four interrelated conditions has to be seen as initial background against which the following analyses may be understood. It is consistent with previous research, most notably in that it relates the quality of students’ argumentation to their content knowledge (Erduran & Jiménez-Alexandre, 2008). As Von Aufschnaiter, Erduran, Osborne, and
Simon (2006, p. 101) argue: ‘developing argumentation in the classroom’ allows us ‘to consider the nature and extent of students’ content-specific experiences and knowledge prior to asking them to engage in argumentation’. The authors do not refer to a sequential process (first the knowledge, then the argumentation) but to ‘the interrelationship between the content and process of an argument’ (p. 128).

These kind of analyses in science education research is consistent with literature on text interpretation (Fish, 1982), and particularly with research on comprehension process (Kintsch & Rawson, 2005; Perfetti, Landi, & Oakhill, 2005), which emphasizes the mastering of specific language-games grounded in a situation model related to the studied text, whether at the meso-textual level (work on inferences, anaphora or substitutions, on the one hand; and the concept of individual perspective, characters, etc., on the other) or at the macro-textual level (particularly in terms of intertextual work).

Nevertheless, even if this set of interrelated conditions of effectiveness is compatible with and grounded on previous research in various fields, we argue that it is aimed at reaching a generic perspective, which has, in turn, to be specified though different subject-matters.

In our analyses, we gradually nurture this generic system by applying it to empirical data and refining it with other categories, and we will return to it in the final section of this paper.

(6) The joint didactic action of the teacher and the students shapes the piece of knowledge at stake in what we term a transactional process. We use the word transaction in Dewey and Bentley’s sense (Dewey & Bentley, 1949, p. 137), and as it has been developed in recent works (Clancey, 2011; Cobb, 2011). As Clancey (2011, p. 252) put it: ‘A simplified notion of interaction would place an object or person in an environment called ‘the situation’; the interaction or transactional perspective emphasizes that situations are continuously conceived and physically changed by actors within their experiences’. As we will see in our analyses, we argue that the didactic joint action engages the students in a meaning-making process that enables them to progressively appropriate the knowledge at stake by changing the epistemic meanings of the situation, which enables them to solve the problem they face. From a methodological viewpoint, it is therefore necessary to document how meanings come to be shared (or not) in the didactic process. This is the main goal of our didactic analysis.4

*The methodological goal of the research: articulating various types of analysis*

We produce in this paper various types of analyses: didactic analysis, statistical speech analysis, pre-test/post-test statistical analysis and regression analysis. In doing so, we enact what one may consider as a clinical paradigm
Aspects of didactic analysis

The possibility of comparison

We term the teaching practices we study ‘didactic exemplars’ in that they seem to be paradigmatic in both ways.

First, we think they illustrate ideal-typical ways of monitoring the teaching process, as we will see in the following.

Second, we argue that they are typical of the general teaching practice (especially teaching reading practices) of the two teachers whom we followed throughout the research process (two years) and who adopted their usual method of teaching as regards the main criterion of the building of certainty in the classroom. Yet, it is not possible to draw definitive conclusions, even though we analysed each of the seven sessions we attended with reference to their epistemic and transactional structure. This is one of the reasons why we consider our study as exploratory. It provides some tools and a general approach, both conceptual and methodological, to enable better understanding of the effects of teaching. This general approach, however, needs to be improved in many areas, particularly regarding the representativeness of a certain teaching session enacted by a teacher according to their general teaching system. We will come back on this point in the second part of the discussion.

Summary view and general analysis of the session

We first of all provide a description of the studied sessions before moving on to episodes which are of significance for the reported research. A summary of the text studied in the participating classes is presented in the paragraph titled ‘Elements in the Epistemic Analysis’. The term ‘unit’, in the following means the group of two sessions conducted by T1 (first unit) and T2 (second unit). In both classes, these units occurred in March.

(Foucault, 1989) or a conjectural paradigm (Ginzburg, 1989), that has been developed through the French tradition for classroom analysis, notably within a comparative approach in didactics (Leutenegger, 2009; Schubauer-Leoni, Leutenegger, & Forget, 2007). The main characteristic of such a paradigm lies in the fact that it relies on the identification of a configuration of indices. Each kind of analysis stands for a ‘provider of clues’, so that the whole set of consistent clues can be articulated in what Foucault (1989, p. 123) called a constellation, from which the researcher can make an interpretation. In this clinical-conjectural paradigm, one has to identify fruitful examples of practices in order to raise them to the status of cases, as exemplars (Kuhn, 1979, Hacking, 2012). As we will argue, the teaching practices we scrutinize in this paper could be instituted as didactic exemplars on the basis of the different kinds of analysis we provide.
Description of the first unit (T1)

T1 teaches in a first-grade class with 22 students.

**Session 1 T1**

<table>
<thead>
<tr>
<th>Time min</th>
<th>Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–3</td>
<td>1.1 Introduction</td>
</tr>
<tr>
<td>3–19</td>
<td>1.2 Study of the title of the text, production of hypotheses</td>
</tr>
<tr>
<td>20–33</td>
<td>1.3 Individual reading of the story</td>
</tr>
<tr>
<td>33–47</td>
<td>1.4 Group reading aloud of the text, comparison of the hypotheses with this reading</td>
</tr>
<tr>
<td>47–64</td>
<td>1.5 Production of a written text as a comment on the pictures</td>
</tr>
</tbody>
</table>

**Session 2 T1**

<table>
<thead>
<tr>
<th>Time min</th>
<th>Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4</td>
<td>2.1 Return to the text read the day before</td>
</tr>
<tr>
<td>4–12</td>
<td>2.2 Return to the two pictures which had been commented on</td>
</tr>
<tr>
<td>12–32</td>
<td>2.3 Group reading aloud of the text</td>
</tr>
<tr>
<td>32–66</td>
<td>2.4 Exercises involving responses to questions about the text</td>
</tr>
</tbody>
</table>

Description of the second unit (T2)

T2 teaches in a CP class with 21 students.

**Session 1 T2**

<table>
<thead>
<tr>
<th>Temps min</th>
<th>Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4</td>
<td>1.1 Other discussion</td>
</tr>
<tr>
<td>4–12</td>
<td>1.2 Dictation of words isolated from the text</td>
</tr>
<tr>
<td>12–17</td>
<td>1.3 Study of the title</td>
</tr>
<tr>
<td>17–33</td>
<td>1.4 Group study of an initial section of the text, alternating between the illustrations and the text itself</td>
</tr>
<tr>
<td>33–52</td>
<td>Mathematical interlude</td>
</tr>
<tr>
<td>52–63</td>
<td>1.5 Group study of a second section of the text</td>
</tr>
<tr>
<td>63–75</td>
<td>1.6 Exercises involving responses to questions about the text</td>
</tr>
<tr>
<td>75–85</td>
<td>1.7 Production of a text</td>
</tr>
</tbody>
</table>

**Session 2 T2**

<table>
<thead>
<tr>
<th>Time min</th>
<th>Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–13</td>
<td>2.1 Differentiated rereading of the text by groups of four students</td>
</tr>
<tr>
<td>13–27</td>
<td>2.2 Dictation of words isolated from the text</td>
</tr>
<tr>
<td>27–32</td>
<td>2.3 Return to the text read the day before</td>
</tr>
<tr>
<td>32–53</td>
<td>2.4 Group study of the continuation of the text, alternating between the illustrations and the text itself</td>
</tr>
<tr>
<td>53–74</td>
<td>2.5 Production of a text</td>
</tr>
<tr>
<td>74–94</td>
<td>Mathematical interlude</td>
</tr>
<tr>
<td>94–101</td>
<td>2.6 Pooling of the written productions and comparison with the text</td>
</tr>
<tr>
<td>101–115</td>
<td>2.7 Group study of the continuation of the text, alternating between the illustrations and the text itself</td>
</tr>
</tbody>
</table>

Elements in the contrastive analysis

It is possible to identify the following common elements in these two sequences:
The teachers complied with the ‘contract’ and implemented the jointly developed framework (with a particular focus on the title and written production).

The actual study of the text

Actual study of the text means the direct reading and study of the text. For instance, phases 1.5 and 2.4 in Unit 1 were of course related to the text, but the students did not actually have to read the text in these phases. We, therefore, did not consider them as actual study of the text. Such study occupied approximately half of the classroom activity time: 51% in the case of T1 (67 min out of 130, phases 1.3, 1.4, 2.1, 2.3), 45% in the case of T2 (74 min out of 161, phases 1.3, 1.4; 1.5; 2.1, 2.3, 2.4, 2.7). The differences are not significant (chi-squared test, \( p = 0.157 \)).

This general description reveals relatively few teaching techniques based on the enhancement of comprehension processes. We can produce an initial broad-brush characterization of the two sequences: supervised reading aloud accompanied by the production of hypotheses in the case of T1 vs. alternating text reading and examination of illustrations in the case of T2.

Significant episodes

In this section, we present the typical elements practised by each of the studied teachers.

Elements in the epistemic analysis

We have attempted to identify how the structure and the meaning of the studied text guide the work of the teacher and the students. In our opinion, the text (‘Fier de l’Aile’) that was given to the teachers can be characterized on the basis of five core meanings for a student in CP (first-grade):

Fier de L’Aile is a crow; his mother wants him to be ‘the strongest in the world’ and encourages him to achieve this ambition. So, Fier de l’Aile beats all the animals he meets (including a cow) in order to show his strength. At one point in the text, he is left all alone because he has fought with all the other crows: he has no friends; in the light of the wise advice of an old crow, he fights against himself; at the end of the text, he has lots of friends because he prefers talking to fighting.

We shall attempt to understand how these meanings might or might not have been constructed in class.

Significant episodes in the first unit (T1)

Here, we present the elements that can be considered as characteristic of the entire sequence conducted by T1: the focus on the production of hypotheses relating to the text; the status of comprehension work in the class.
The first episode studied in T1’s class took place during phase 1.4 as presented in the summary tale above.

**Comparison of the hypotheses previously produced from the read material**

The hypotheses relating to the title of the story (‘Fier de l’Aile’ = ‘Proud of Wing’) produced by the students during phase 1.2 were noted on the board by the teacher. These included:

He’s proud of his wing. It’s pretty and he likes it a lot.
He’s lost a wing. And he’s proud that he’s kept one.

T1 asked the students to reconsider some of these hypotheses after the text had been read by one of the students (Kel):

---

<table>
<thead>
<tr>
<th>T1</th>
<th>… you’ve listened to what Kel has just read + [T1 reads the text on the sheet] me against me + the right wing against the left wing + then + how many wings does he have then?</th>
</tr>
</thead>
<tbody>
<tr>
<td>students</td>
<td>Two</td>
</tr>
<tr>
<td>T1</td>
<td>He still has both wings + then + what’s not right in what we’ve written? [T1 runs his finger through the list of hypotheses on the board]</td>
</tr>
<tr>
<td>students</td>
<td>The first</td>
</tr>
<tr>
<td>T1</td>
<td>So, the first one + he’s proud of his wing + it’s pretty and he likes it a lot + that one + why not that one?. ++ no + there was someone else just now there was someone who thought that maybe he only had one wing</td>
</tr>
<tr>
<td>students</td>
<td>it was Lis + Lis and Ant</td>
</tr>
<tr>
<td>T1</td>
<td>Well, try to find the sentence that says it + back then we wrote that he only has one wing [some students raise their hands] + Man?</td>
</tr>
<tr>
<td>Man</td>
<td>Below &lt;... ?&gt;</td>
</tr>
<tr>
<td>T1</td>
<td>Go on, read</td>
</tr>
<tr>
<td>Man</td>
<td>He’s + lost + a + wing.</td>
</tr>
<tr>
<td>T1</td>
<td>Yeah + go on</td>
</tr>
<tr>
<td>Man</td>
<td>He’s + proud that + he’s kept + one.</td>
</tr>
<tr>
<td>T1</td>
<td>So, that’s not right is it [P1 crosses out the hypothesis] + because the right wing against the left wing shows that he’s got both wings + he fights against himself with his two wings ++</td>
</tr>
</tbody>
</table>

---

As we can see, T1 gradually makes the students understand: (1) that they can retain the first hypothesis in the list on the board (turn 305 above); (2) that they have to reject the second hypothesis (turn 305–313).

This episode illustrates what we call a specific topogenetic division. In the theoretical frame exposed above, we argued that in order to enable the student to build a first-hand relationship to the core meanings they have to learn, the teacher has to be more or less reticent, i.e. tacit about some aspects of the piece of knowledge to teach. Topogenesis (Sensevy et al., 2005) can be seen as a theoretical category shaped to characterize the teacher’s reticence. It designates the division of responsibilities and roles between teachers and students in terms of their knowledge and abilities. It, therefore, designates a sharing of epistemic responsibilities. For
example, in analysing a didactic transaction, the researcher may acknowledge that all the epistemic content is provided by the teacher. We can, therefore, say that the teacher holds a high topogenetic position and the students a low topogenetic position. Conversely, if a student participates in the transaction by enacting some epistemic meanings, one can say that this student holds a high topogenetic position. It is worth noting that the teacher needs to accept a relatively low topogenetic position, at least temporarily, in order to enable the students to provide epistemic meanings to the didactic activity.

In the studied episode, T1 assumes a position of leadership by directly guiding the comparison between the read text and the sentences written on the board. In the light of what Kel reads, she shows that Fier de l’Aile does indeed have two wings (turns 301–302). In doing that, she identifies the problem herself and structures its solving process by taking this awareness as a basis for starting the search for a false hypothesis. When, in turn 304, a student designates the first hypothesis as a false one, she directly refutes this suggestion in turn 305, despite the ambiguity of the reference to a single wing, without giving or asking for reasons. She directly guides the search performed by the students (turn 305) by indicating the contrasting meaning herself and by referring to an event that occurred in the class (‘someone who thought’) rather than to the written text. She focuses this search on a reading of the hypotheses written on the board (turn 307). After Man (turns 310, 312) has read the sentence representing the incorrect sentence, she again validates this directly, and she herself gives the reasons that justify this validation (turn 313). In the transactional process, the students’ relationship to the piece of knowledge at stake (i.e. the text of ‘Fier de l’Aile’) is directly shaped by the teacher’s acts, relying on some shared habits of joint action.

In didactics, this system of joint habits of actions, which functions as a system of expectations between the teacher and the students, is called the *didactic contract* (Brousseau, 1997). The *milieu* (Brousseau, 1997) is the system of concrete and symbolic objects the students have to deal with in order to learn. In this case study, the milieu is a textual one. It is mainly constituted (1) by the hypotheses written on the board, (2) by the text ‘Fier de l’Aile’. As we demonstrated before, the students did not build a first-hand relationship to this textual milieu, as they would have done if they have made themselves capable of validating or refuting on their own the matching of the hypotheses with the text. In that way, this milieu is not directly worked out by the students, and a kind of vicious circle occurs. The teacher’s high topogenetic position prevents the students coping with the milieu (as they would have done if they had tried to understand which hypotheses matched the text better) and the students’ low topogenetic position obliges the teacher to occupy much of the epistemic/transactional space.

In our inquiry, this division of epistemic responsibilities appears to be emblematic of this teacher’s didactic management of reading activities. She does not hesitate to guide the student’s work in a clear way and confirm their productions without ambiguity. Nevertheless, she does not take
up all the didactic space: the students’ intellectual activity is both real and necessary. By referring to the set of conditions that we assume to be necessary to achieve effectiveness, however, we can underline that the encountering of the problem and the articulating of public reasons are under the teacher’s responsibility.

Reading aloud of the text during the second session

In the second session, reading aloud followed the same structure as in the previous session. The corrections produced by the teacher always related to the code. During the 20 minutes taken up by this period of reading, no teaching act applied to comprehension as such. The teacher used the opportunity offered by the class reading aloud to work on graphophonological relations and morphology. The topogenetic division was of the same type as that noted above: the teacher determinedly guided the activity, based on the students’ reading and in the light of the difficulties that they encountered. Our conclusion is that, by focusing on graphophonological concerns, she was leaving comprehension up to the students. The remainder of the session reinforced this interpretation. In effect, this phase was immediately followed by individual work on a sheet produced by the teacher. This exercise sheet, entitled ‘Comprehension exercises’ consisted of questions about the text that the students had to answer in writing. These questions were to be answered individually by the students without any intervention by the teacher. The meanings of the text were never discussed, or even mentioned, and the issue of comprehension was never addressed at either class level or in teacher–student interactions.

Generally speaking, the didactic analysis leads us to believe that during the two studied sessions conducted by T1, the five core meanings of the text as identified above received scarce attention. The last condition of our theoretical effectiveness framework (Identifying the piece of knowledge at stake) was not fulfilled in terms of essential comprehension of the text. Moreover, the lack of public discussion about the comprehension process hindered the achievement of the third condition (Practising the knowledge language-game).

Significant episodes in the second unit (T2)

We present three episodes that are characteristic of the entire sequence conducted by T2 and refer to two elements which are typical of this teacher’s practical approach: a level of management of uncertainty/certainty in the class, in particular including a form of physical involvement on the part of the students; the enactment of a deliberative stance in the class discussion.

The first episode took place during phase 1.5 of the first session.
Uncertainty and certainty

First of all, the teacher asked the students to think about the picture without the text. The students had just started a new page that reused the illustration on the cover (the crow puts his claw on the belly of the cow, one of the animals he has beaten).

We consider this episode to be a good illustration of this teacher’s didactic strategy: he keeps a low topogenetic profile even to the extent of accepting an incorrect public comment and then reproduces this incorrect description himself (turns 497, 499) with reference to two major aspects of the story relating to the identity of the character (a parrot instead of a crow) and the nature of the plot (the crow (parrot) and the cow are not friends). This low profile is accompanied by the establishment of a systematic reference to the written text: because the teacher is attempting to avoid influencing the students directly about the interpretation of the drawing, he is obliged to guide them toward the text, as a way to help them to decide. This constitutes a special case of a tension, which is fundamental to a teacher’s work. The Joint Action Theory in Didactics terms this tension the contract-milieu equilibrium (Sensevy & Forest, 2011). In this episode, the teacher’s monitoring of the situation illustrates the research of the contract-milieu equilibrium. In effect, at the beginning of the episode the students are not able to identify the illustration accurately as their present habits of action are not effective. To tackle this problem, the teacher could be tempted to take a high topogenetic position, to abandon his reticence, to express his expectations, and, in so doing, to institute a new contract directly by giving his own ‘right’ interpretation of the illustration. He prefers, however, to invite the students to go to the text, in order to cope with the milieu. From a theoretical viewpoint, this episode allows us to understand the epistemological status of the milieu. On one hand, one can argue that the milieu exists independently of the actors. In effect, ‘Fier de l’Aile is a literary text which refers to an organized system of meanings that must be acknowledged by the reader in
order to properly understand the text. These core meanings preexist to the joint action. For example, any 'skilled' reader will be convinced that Fier de l’Aile is a crow. In this respect, the literary text as a milieu constitutes a meaning-making system which one has to master to become a literate reader. On the other hand, one has to take into account that this system is a virtual one. As we can see in the studied episodes, the meaning of the text is progressively articulated through the joint action. The milieu is not found ‘ready-made’ in the text. It is built within what the Joint Action Theory in Didactics calls the mesogenesis process (Sensevy et al., 2005), i.e. a process which refers to the genesis of the milieu (meso). In T2 and his students’ joint action, in strong contrast with T1 and her students’ joint action, the milieu meanings are shaped by the didactic transactions, which continually change the epistemic situation.

The sentence corresponding to the problematic sentence was then read (To show my strength, I beat all the animals):

<table>
<thead>
<tr>
<th>Turn</th>
<th>Speaker</th>
<th>Utterance</th>
</tr>
</thead>
<tbody>
<tr>
<td>533</td>
<td>T2</td>
<td>Well read it again Au uh :: the sentence</td>
</tr>
<tr>
<td>534</td>
<td>T2</td>
<td>Well then Ben have they become friends the parrot and the cow?</td>
</tr>
<tr>
<td>535</td>
<td>Ben</td>
<td>Well nah</td>
</tr>
<tr>
<td>536</td>
<td>T2</td>
<td>Nah why?</td>
</tr>
<tr>
<td>537</td>
<td>Ben</td>
<td>Because he’s showing his strength to the cow</td>
</tr>
<tr>
<td>538</td>
<td>T2</td>
<td>He’s showing his strength to the cow what do you do to show your strength to a cow? +</td>
</tr>
<tr>
<td>539</td>
<td>Ben</td>
<td>You do like that [Ben mimes the action he’s talking about]</td>
</tr>
<tr>
<td>540</td>
<td>T2</td>
<td>You do like that [P2 imitates Ben] just watch out at playtime (00:57)/Mi</td>
</tr>
<tr>
<td>541</td>
<td>Mi</td>
<td>He turned it upside down</td>
</tr>
<tr>
<td>542</td>
<td>T2</td>
<td>He turned it upside down?</td>
</tr>
<tr>
<td>543</td>
<td>Students</td>
<td>Yes (laughing)</td>
</tr>
</tbody>
</table>

We assume that T2’s strategy is successful because Ben expresses his understanding of the ‘crow’s/parrot’s’ victorious gesture (turn 537). We can see, however, that the teacher always maintains a low topogenetic profile since he himself continues to reuse the term parrot to designate the crow in his dialogue with the students (turn 534).

In our opinion, one characteristic of this session consists of a certain method of maintaining uncertainty. Unlike the attitude adopted by T1, T2 does not immediately confirm the students’ suggestions and even reuses their incorrect vocabulary when accompanying their reasoning process. There is a specific topogenetic division: one of the key roles of T2 is to refer to the text (illustration or statements) as a milieu. We can see, however, that this low topogenetic profile in no way corresponds to a lack of epistemic activity. T2 intervenes a lot, and does so frequently, but not directly in relation to the students’ knowledge. With reference to the conditions of effectiveness we sketched earlier, one may say that the Encountering the problem condition is achieved. For the students, reading is a means to interpret the illustration accurately, a means to understand the nature of the relationship between the cow and the ‘parrot’.
In this interplay of certainty/uncertainty, we can also note (turn 538) the special position occupied by certain techniques of (group) physical simulation. When a meaning starts to become shared, T2 gets the students to physically enact certain of the states or relations present in the text. He captures students’ attention by asking them to embody these states and relations.

This raises the question of how this uncertainty may or may not persist in the class. To answer it, we can refer to a point later in the sequence which occurred during the second session (phase 2.4, final episode). Since the sequence’s own didactic time had moved on, T2 can abandon the uncertainty previously favoured by his low position. He directly asks the students about the identity of ‘Fier de l’Aile’ and then reminds them, after their correct response, of their earlier mistake. In this way, T2 provides support for this meaning, which becomes generally accepted. It is worth noting that the students, in response to the teacher, say ‘it was before, we did not know’. Such an answer may be seen as proving that the students have encountered the problem of identifying ‘Fier de l’Aile’ (first condition of effectiveness), and that they have really understood that it was a crow, thanks to the teacher’s institutionalization (fourth condition of effectiveness).

During the group study of the continuation of the text during the second session, the class discussed aspects of the text.

**Debate and deliberation**

The episode reveals the organization of a debate in which T2 deals with a mistake made by the student El (see turn 359 below).

<table>
<thead>
<tr>
<th>Turn</th>
<th>Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>359</td>
<td>T2 ... El has just told me that Fier de l’Aile is going to fight the old crow do you agree or don’t agree with her put up your hands [T2 snaps his fingers to indicate to the students to raise their hands] + Fr (00:49)</td>
</tr>
<tr>
<td>360</td>
<td>Fr Don’t agree</td>
</tr>
<tr>
<td>361</td>
<td>T2 Don’t agree why?</td>
</tr>
<tr>
<td>362</td>
<td>Fr &lt;...?&gt; [T2 while the teacher indicates that another student should speak]</td>
</tr>
<tr>
<td>363</td>
<td>student I agree</td>
</tr>
<tr>
<td>364</td>
<td>T2 Well we'll listen to Fr and then you can explain</td>
</tr>
<tr>
<td>365</td>
<td>Fr Because he said that &lt;...?&gt;</td>
</tr>
<tr>
<td>366</td>
<td>T2 The person you fight will be your friend is that it? Well Li</td>
</tr>
<tr>
<td>367</td>
<td>Li Don’t agree</td>
</tr>
<tr>
<td>368</td>
<td>T2 Why</td>
</tr>
<tr>
<td>369</td>
<td>Li Well he wants to have friends I think and uh he’s going to fight and ++</td>
</tr>
<tr>
<td>370</td>
<td>T2 Because to have friends you have to fight?</td>
</tr>
<tr>
<td>371</td>
<td>Li Yes</td>
</tr>
<tr>
<td>372</td>
<td>T2 Because to have friends you have to fight? Does anyone disagree with Li? + Go</td>
</tr>
<tr>
<td>373</td>
<td>Go I don’t agree</td>
</tr>
<tr>
<td>374</td>
<td>T2 Why? (00:50)</td>
</tr>
<tr>
<td>375</td>
<td>Go Because if you fight your friend he won’t be your friend any more</td>
</tr>
<tr>
<td>376</td>
<td>T2 Who’s your friend Li?</td>
</tr>
</tbody>
</table>

(Continued)
First of all, T2 organizes the space of the debate by calling for a show of hands (turn 359). He then asks Fr, a student who disagrees with El’s statement, to say what he thinks (turns 362, 365). T2 does not react. It is then the turn of Li, who agrees with El’s statement and therefore with the erroneous position, to speak (turns 367, 369). T2 asks Li to confirm her statement (turn 370) and then asks the whole class for their position (turn 372), still without adopting a position himself. Go then intervenes to try to refute Li’s claim (turns 373–375). The teacher then abandons his reserve by using the above-mentioned technique of anchoring the discussion in the student’s experience by means of role play (turn 378). Li replies in the negative and a student (not the teacher) then produces the logic of this response (turn 381). T2 is then able to ‘close the deal’ by giving El his opinion directly concerning the initial statement that caused the debate (turn 382): it should be remembered that this statement, which straddles all the utterances produced during the episode, replies to the utterance produced by El some 20 turns earlier. We can see that the teacher’s opinion is produced when the circumstances are appropriate and that the teacher does not agree to adopt a high topogenetic position until the debate has been expanded and largely resolved by the students themselves. We can, therefore, note the public aspect of the work on comprehension conducted in class by T2. The debate that we have just discussed gives the ‘public student group’ the responsibility for understanding the type of relation that exists between the old crow and Fier de l’Aile, i.e. one of the core meanings of the text. This core meaning stems from the text-centred transactions between the students themselves and the teacher in a low topogenetic position (most of the time). The students articulate reasons that justify their beliefs (third condition of effectiveness). We argue that this episode is a good example of a kind of dialectics between uncertainty, fostered by the teacher’s initially low topogenetic position, and the argumentative language-game the students are able to play thanks to the teacher’s monitoring. In the mesogenesis process, the meaning-making process unfolds from epistemic uncertainty to the rational analysis of the text.

**Significant episodes: a summary**

Looking back at and comparing the collection of data presented so far enables us to make the following provisional claims.

1. In T1’s class, the work on comprehension conducted during the two sessions is *private* in nature; it is work that each
student produces by him or herself. The only public focus is constructed around the code and the decoding mechanisms. One may hypothesize that the main features of the piece of knowledge at stake have not really been worked out by the teacher in the joint action.

(2) The topogenetic division instigated by T1 is based on the predominant role she plays in guiding the students’ activity, on the one hand, and in validating their behaviour and productions, on the other.

One may hypothesize that the students did not fully encounter the main comprehension problems, and have not really been asked to justify their claims rationally.

(3) In contrast, T2 chooses to accompany the students, a position which causes him to leave the class in a state of uncertainty concerning the core meanings of the text for a long time. We argue that the maintenance of this uncertainty has certain effects and consider that the students may have succeeded in progressing toward more robust meanings by themselves. Similarly, the work on the debate reveals a gradual process leading to the construction of epistemic certainty (Tiberghien, Cross, & Sensevy, in press) on the basis of the progressive development of rational argumentation. One has thus to acknowledge a productive dialectics between the ‘making of certainty’ and the unfolding of argumentative language-games. We assume that the passage from epistemic uncertainty to rational certainty is fostered by the argumentative language-games. Conversely, the epistemic uncertainty may both trigger and nurture the argumentative language-games. The concrete enactment of such a reciprocal relationship may be viewed as a warrant of the epistemic relevance of the didactic transactions.

We may still ask, however, whether this uncertainty had counterproductive effects on certain students.

Nevertheless, even though all the core meanings we have identified were not worked out in his sequence, we could argue that T2’s monitoring of the situation accurately meets the conditions of effectiveness, at least more convincingly than T1’s.

Overall, the above considerations suggest that the practices adopted by T2 should, all other things being equal, result in his students performing better on the comprehension questions in the post-test. The question, however, remains of the possible negative effects of this gradual construction of certainty, particularly for the less-achieving students. Before arriving at a precise definition of operational hypotheses and an examination of this question, we present certain aspects of the statistical discourse analysis produced in each class.
Aspects of the discourse analysis

The methodological perspective presented in this article has led us to examine the corpus of interactions in a different way. To do this, we made use of a discourse analysis software product,11 which enabled us to study the speech verbatim and characterize the distribution of speech in the discourse produced by the different speakers notably through the specific aspects of their speech. Although this type of analysis has no independent status, it may help either to reinforce or to weaken the analyses constructed in the previous section.

The distribution of speech acts in the class

The aim here is to obtain a quantitative analysis of the speech produced in each class in terms of speech turns across the entirety of the two sessions.

The analysis revealed minimal differences (49% of turns for T1 compared with 51% for her students; 47.2% for T2 compared with 52.8% for his students) which were not statistically significant. This distribution, however, tells us nothing about the effective ‘weight’ of the speech contributed by the teachers, on the one hand, and the students, on the other. To achieve an objective measurement of this weight, we can calculate the mean length of the utterances (each speech turn is considered as an utterance) in terms of the number of written signs for each ‘category’ of speaker (‘mean length’ in table 1).

Table 1. Mean length of utterances as a function of the speaker.

<table>
<thead>
<tr>
<th>Class speakers</th>
<th>Mean length of produced utterances</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 alone</td>
<td>16.66</td>
</tr>
<tr>
<td>T1’s students</td>
<td>5.85</td>
</tr>
<tr>
<td>T2 alone</td>
<td>13.16</td>
</tr>
<tr>
<td>T2’s students</td>
<td>5.06</td>
</tr>
</tbody>
</table>

Just as above, minimal differences were observed and were not significant. We can, therefore, conclude that the ways in which the two teachers managed the discourse did not differ significantly in terms of the overall distribution of speech in their classes.

Specific linguistic features in the teachers’ statements: certain elements

The automatic analysis of the corpus used by the teachers and their students across the entirety of the two classes reveals certain specific linguistic features. In particular, certain words or expressions are more characteristic of the speech of either T1 or T2: these are the words ‘You/We’ (On in French), ‘Why’, ‘How’, ‘You’ and ‘You think’. 
T1 used ‘You/We’ significantly less often in her speech than T2 did (chi-squared test, $p = 0.045$). T2 used the word ‘Why’ more than T1 even though this tendency did not reach significance ($p = 0.11$). T2 used the following words and expressions more often and did so at a very significant level: ‘How’ ($p = 0.001$); ‘You’ ($p = 0.008$); ‘You think’ ($p = 0.007$).

**Factor analysis of the correspondences**

In order to obtain a systemic indication of certain polarities in the speech of T1 and T2, we conducted a factor analysis to provide us with a more systemic understanding of the ‘quantitative’ specificities of their discourse (table 2).

Table 2. **Factor analysis constructed on the basis of the specific features of the teachers’ speech.**

<table>
<thead>
<tr>
<th>Positive contributions</th>
<th>Axis 1 (+24.33%)</th>
<th>Axis 2 (+13.68%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>You</td>
<td>+28.43%</td>
<td>T2’s students</td>
</tr>
<tr>
<td>‘You think’</td>
<td>+28.41%</td>
<td>How</td>
</tr>
<tr>
<td>T2 alone</td>
<td>+9.87%</td>
<td>T2 alone</td>
</tr>
<tr>
<td>‘You (Vous)’</td>
<td>+2.73%</td>
<td>‘You (Tu)’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative contributions</th>
<th>Axis 1 (+24.33%)</th>
<th>Axis 2 (+13.68%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2’s students</td>
<td>−6.43%</td>
<td>T1’s students</td>
</tr>
<tr>
<td>T1’s students</td>
<td>−2.81%</td>
<td>T1 alone</td>
</tr>
<tr>
<td>‘You (vous)’</td>
<td></td>
<td>‘You/We (On)’</td>
</tr>
<tr>
<td>‘You/We (On)’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Even though the amount of variance explained is relatively low, two tendencies emerge.

The first of these axes, which compares T2’s speech with that of his students, reveals the first of these tendencies and indicates that the associated vocabulary is particularly characterized by the use of ‘You’ and ‘You think’.

The second tendency (second axis) specifically compares T2 and T1 and shows that, compared with T1, T2 is characterized by the use of ‘How’ and ‘You’.

**Some quantitative dimensions of the teachers’ speech in each class: an attempted summary**

T2 is more prone to the use of expressions that prompt reflection (‘How’, ‘You think’, ‘Why’) and invite the students to take part in the work (‘You’, ‘You think’), whereas T1 prefers more general speech (cf. her frequent use of on). The automatic analysis of the speech provides indications that are consistent with the global perception of the teachers’ work that we were able to develop on the basis of the didactic analysis: one can
argue that T2 favours a deliberative stance in class while accompanying his students in a way that encourages their involvement.

We will now compare these differing characterizations of the two teachers’ behaviour with the students’ results in the tests that immediately preceded and followed the studied sequence.

**The pre-test and the post-test: a description of the additional questions**

As we mentioned above, the research team constructed a written pre-test (six questions). The first six questions of the post-test were the same as the first six questions of the pre-test. In addition, the post-test included five more questions intended to assess the students’ comprehension of the text. These additional questions referred to the core meanings as found in the epistemic analysis of the text. The written pre-test and post-test were passed by each student of each class (22 students in T1’s class and 21 students in T2’s class).

**Additional questions in the post-test**

The following questions were added to the post-test:

7. Who is Fier de l’Aile?
8. Fier de l’Aile’s mummy encourages him to do something. What does she encourage him to do?
9. Why does Fier de l’Aile find himself alone?
10. At the end of the text, Fier de l’Aile follows the advice of an old crow. Whom does he fight? (Circle the right answer)
   An old crow—An eagle—Himself—The other crows—A dove
11. At the end of the text, Fier de l’Aile has lots of friends. Why does he have lots of friends? (Circle the right answer)

Because he’s the most beautiful crow in the world – Because he prefers to talk to other crows rather than fight them – Because he’s made his mother happy – Because he’s the proudest of all the crows

According to the research team, these questions should make it possible to distinguish between the students’ comprehension performances. Of these five questions, the first three (7, 8 and 9), which are *open-ended* questions, are better able to reveal differences that the multiple-choice questions (10 and 11) would automatically reduce.

**Operational hypotheses concerning effectiveness**

The *in situ* study and the items taken from the automatic analysis of the speech presented above led us to formulate the following four specific hypotheses concerning effectiveness:
H1: A positive overall effect in favour of T2’s students for the set of comprehension questions (questions 7–11).

H2, H3, H4: An effect in favour of T2’s students on questions 7, 8 and 9, respectively.

These hypotheses are accompanied by a question:

Q: What is the effect of this ‘playing with uncertainty’ on the students (particularly on less-achieving students)?

Testing the operational hypotheses: what the students learned during the sequence

General results: the pre-test

The results of the students in the two classes did not differ significantly in terms of mean values for the questions during the pre-test (Student test not significant at threshold of 5%). We can, therefore, say that all the students involved in the study possessed the ‘essential minimum’ in terms of the reading, decoding and literal comprehension required for the text in question. The results obtained in the post-test are, therefore, probably very largely owed to the didactic activity performed in situ.

General results: the five additional questions in the post-test

We now look at the students’ responses to the questions which directly investigated comprehension.

Questions 10 and 11 in the post-test

On each of these multiple-choice questions, T2’s class performed better than T1’s class: question 10, 70% correct responses compared with 55%; question 11, 55% compared with 45%.

There is, therefore, a distinct tendency toward the validation of the general hypothesis (H1) even if the difference between the two classes was not statistically significant for these questions alone.

Question 9 in the post-test

In the case of question 9 in the post-test (Why did Fier de l’Aile find himself alone?), we experienced a difficulty in interpretation owing to a reduced level of interjudge agreement (cf. section below): thus, the correlation between the judgements made by two of them fell from 0.62 (question 8) to 0.38 (question 9). We, therefore, preferred to exclude the responses to question 9 from the results of the study. It is, therefore, not possible for us to either to confirm or reject hypothesis H4.
Question 7 in the post-test

We now examine question 7 in the post-test (Who is Fier de l’Aile?), which was an open-ended question. By way of indication, here are some of the responses we obtained:

- He’s a crow he’s a boy who is very nice
- It’s a crow
- He’s a crow
- The mummy and Fier de l’Aile

To attribute a clearly defined value to each of these productions, we first of all collated all the productions obtained from the students in the five classes studied (of which the two classes examined in this article constitute a subset). We designated them with a code that ensured their anonymity and then distributed them at random. We then submitted these productions to four specialist assessors who, therefore, saw responses to which they had to attribute one of three values. During an initial meeting, these assessors agreed on the basic principles to be used during scoring, in particular that the priority should be placed on comprehension. In the light of this agreement, the preceding productions were scored as follows:

- It’s a crow; He’s a crow: value 1 (maximum)
- He’s a crow he’s a boy who is very nice: value 2 (intermediate)
- The mummy and Fier de l’Aile: value 3 (minimum)

After this initial meeting, the assessors scored the responses independently, and each response was assigned a value, which was the mean of the four values given by the assessors.

An examination of the values attributed to the students’ productions reveals some considerable differences. In effect, the number of ones (maximum value) obtained by T2’s class was much greater (16 values of one and four ‘others’ in T2’s class; 11 values of one and 13 ‘others’ in T1’s class). This difference is significant (chi-squared test, $p = 0.02$): the students in T1’s class produced significantly fewer responses that were unanimously judged positively by the assessors. Furthermore, there was no significant difference in the number of threes (minimum value) between the two classes ($p = 0.488$).

The differences in the success levels for question 7 therefore make it possible to validate hypothesis H2.

Question 8 in the post-test

For question 8 in the post-test (Fier de l’Aile’s mummy encourages him to do something. What does she encourage him to do?), we proceeded in the same way as for question 7.

Similarly to the case of question 7, a differentiated analysis shows genuine differences. In effect, the students in T1’s class obtained more threes (minimum value) (15 values of three compared with nine ‘others’ in T1’s class; six values of three compared with 14 ‘others’ in T2’s class). This
The differences in the success levels for question 8 therefore make it possible to validate hypothesis H3.

What the students learned during the sequence: a summary

We posited an operational hypothesis H1 that there would be a general positive effect in favour of T2’s class. In all the cases where it was possible to produce an objective judgement (questions 7 and 8), the students in T2’s class were seen to obtain better scores. The proposed hypothesis is confirmed: the students in T2’s class benefitted from teaching which gave them a better understanding of the read text as we have been able to evaluate it here.

As far as question Q is concerned (What is the effect of the ‘playing with uncertainty’, particularly on the less-achieving students?), none of the statistical analyses above indicates a better level of success for the less-able students in T1’s class. In contrast, we saw in the case of question 8 that T1’s students produced more unsatisfactory responses. This, therefore, suggests that the use of uncertainty made by T2 did not result in negative differential effects on the students who felt less at ease.

We now examine the areas in which these results are consistent or inconsistent with the progress results observed in the longer term, i.e. over a year.

The relations between learning during the sequence and general progress results over the year

For both of the teachers whose in situ practices we are studying here, we possess progress results for their students based on standardized national evaluations for both of the years covered by the research.14

For year 1

A regression analysis makes it possible to characterize the progress made by the students during the year preceding the one in which the sequence commenced. On the basis of a given sociodemographic category and initial level15 (the effect of these two variables therefore being controlled for), we find that the students in T2’s class made significantly more progress during the year than those in T1’s class (21.2 points more on a sample mean calculated at 100).
For the school year corresponding to the period during which the studied sequence was commenced, the regression analysis, still performed while controlling for sociodemographic category and initial level, produced the following results:

In table 3 above, T2's class is used as the reference. It can be seen from this table that the difference in the progress made in comprehension by the two classes was very significant (at the level of 1%). It therefore confirms the results observed in the first year. It should be noted that even though the difference in the progress between the two classes is clear, it is effective only in the case of comprehension in the narrow sense. At the level of phonology, and more generally that of decoding, there is no significant difference between the two classes.

This format provides us with a new set of indices that help us fine-tune our representation of the way in which each of the classes is taught. The fact that the students in T2’s class made more progress in comprehension over the year is consistent with the results of the didactic analysis, the items revealed by the automatic discourse analysis and the results of the pre-test/post-test comparison.\(^1\)

We now return to our two main objectives, the theoretical one (the set of conditions of teaching effectiveness) and the methodological one (the articulation of various types of analysis grounded on a conjectural paradigm). We comment on our results with respect to each of these objectives, and highlight avenues for future research.

Discussion

A possible first set of conditions of teaching effectiveness

The conditions of teaching effectiveness we propose are to be seen not so much as criteria applying directly to the didactic process but as some useful clues stemming from the Joint Action Theory in Didactics which can be taken into account in analysis of the practices. They have to be considered upstream and downstream.

For instance, the first condition *(Encountering the problem)* relies on some upstream requirements; among them one has to acknowledge the necessity of creating joint attention (Tomasello, 2010) between the teacher and the students in joint action. As an example, in our case study,

<table>
<thead>
<tr>
<th>Classes</th>
<th>Reading coefficient</th>
<th>Phonology coefficient</th>
<th>Comprehension coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1’s class</td>
<td>-11.5**</td>
<td>-6.1 ns</td>
<td>-12.6***</td>
</tr>
<tr>
<td>T2’s class</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**significance at the level of 5%.
***significance at the level of 1%.
we have briefly shown how the teacher T2 was able to enact some teaching techniques on physical simulation thanks to which the students bodily ‘acted’ some of the states and relations present in the text. One can consider such techniques as joint attention didactic techniques, whose purpose may lie (and actually did lie in this case study) in the encountering of the problem.

If we focus now on the fourth condition (Identifying the piece of knowledge at stake), we recognize the necessity of downstream consequences of this institutionalization’ condition. For example, one has to take into account the prominent role played by the evaluation designs and assessment practices in the fulfilment of this condition, particularly in what we could call ‘the future of knowledge’, by which we mean how what is learnt here and now will be useful and productive at a higher level within the educational process.

From a general viewpoint, this set of conditions has to be thought of as a system. In the studied episodes, it was not easy to highlight this fact, given the limited scope of our study. Nevertheless, it is fair to say that, for example, articulating the reasons why ‘Fier de l’Aile does not fight the old crow’ enabled the students first to practice the language-game of relationship (one does not fight one’s friend) and second to adopt the stance of a literary critic. Thus, the second and the third conditions are closely linked. When the students articulate reasons in order to justify their epistemic beliefs, they have to do so through the knowledge language-games that they must master.

These considerations emphasize the fundamental role played by the teacher in the didactic process. It is obvious that the set of conditions refers to the student’s action, as a consequence of our analysis of the educational process, in the Joint Action Theory in Didactics, as a conditional game, where the teacher ‘wins’ if the student ‘wins’, i.e. learns. The teacher is fundamentally responsible for this process, however. Indeed, if one looks at the set of conditions, one is struck by two general necessities of the teacher’s activity which our empirical inquiry enables us to link to these conditions.

The first necessity resides in the fact that teachers are effective if they communicate a given piece of knowledge and have, therefore, succeeded in thinking about and working how this knowledge can be communicated (Deng, 2007, 2011; Shulman, 1986). Within this perspective, we believe that the present study shows that, although T2 undoubtedly did not understand the text ‘Fier de l’Aile’ any better than T1, he was able to ensure that certain core meanings of the text were actually worked out by the students.

The second of these necessities resides in the fact that teachers are effective if they help to construct the certainty within which the knowledge of an object becomes established in their students. In the foregoing, we have briefly described this tension between certainty and uncertainty or, at a different conceptual level, between the milieu, which gives the students pieces of evidence that ensure a certain quality to their certainty, and the contract, which must allow them to assimilate the new features of the milieu.
Within such a perspective, an effective teacher is one who acts in such a way that his/her students develop a level of rational certainty through their own endeavour.

We think that these two necessities are closely interlinked: if a teacher has worked hard on a piece of knowledge and the ways in which it can be communicated then he/she has also thought about the student’s path toward the rational acquisition of this knowledge; similarly, the construction of certainty presupposes the certainty of the thing in question and communication skills here would not be relevant enough unless they applied to what has to be taught to the student.

Linking these two necessities (knowledge mastering and knowledge communicability on the one hand, and the achieving of a great quality of certainty, on the other hand) to the tentative set of our effectiveness conditions allows us to emphasize the fundamental dialectics of the teaching process. The didactic joint action is effective if the communication process in the classroom achieves at once a transactional effectiveness and an epistemic effectiveness. The joint action must involve epistemic transactions in order to be effective, i.e. transactions that enable this joint action to build the knowledge at stake in the meaning-making process.

In this respect, it is worth noting a fundamental point in our study. Our goal was not at all to identify effective teachers per se, but to rely on the two studied practices in order to propose a certain conception of effectiveness. It is obvious that the two teachers in this study worked according to different outcomes that were functions of implicit teaching–learning theories. That being so, our purpose in this paper does not consist at all in identifying who was the better teacher but to rely on the relationship between teaching and learning that we have documented to propose a certain conception of effectiveness. Beyond that, we wanted to be able to make assertions about the nature of teaching designs and their effects on students’ learning.

**Articulating analyses of different kinds in a conjectural paradigm**

(1) We present the conjectural paradigm in which this study was carried out as founded on the elaboration of a system of indices taken from the different analyses performed. In this respect, none of the analyses mentioned above is self-sufficient. We need to articulate them to produce a set of indices that are (or are not) mutually consistent. That is to say that one analysis alone, for example, the pre-test/post-test statistical analysis, cannot be seen as validating a hypothetical set of teaching effectiveness conditions, even though such a pre-test/post-test statistical analysis can validate precise hypotheses. We assume that what corroborates a given set of teaching effectiveness conditions lies in identifying the configuration of the indices that enables certain statements concerning the real observations studied here. One index or another taken in isolation is
not sufficient: it is the system of consistent indices that proves to be relevant. In this respect, we do not assume that, say, only the results of the pre-test–post-test analysis, which showed that the identity of Fier de L’Aile has been better recognized by T2’s students than by T1’s, or only the results of the didactic analyses, which showed a greater complexity of T2’s joint action, or only the results of the statistical speech analysis, which showed a more involving stance in T2’s teaching, can enable us to corroborate our teaching effectiveness conditions. We assume that the consistency between this set of results allows us to find reasons for these results in our set of teaching effectiveness conditions through an abductive inquiry process (Peirce, 1992). Therefore, we can consider these reasons as a causal explanation of the observed results (Sensevy et al., 2008).

(2) The conjectural paradigm in which the present study unfolded does not allow us to differentiate the relative weight of different characteristics (which one could call variables in an experimental paradigm). For example, we consider that T1’s topogenetic position hindered the achievement of the first condition (Encountering the problem) and we show that her failure to organize the public work of comprehension in her class impeded the fulfilment of the fourth condition (Identifying the piece of knowledge at stake). In a conjectural paradigm, we may see these two results of the didactic analysis as consistent clues, as reasons that can help explain the effectiveness of practice. We were not able to identify the specific strength of each of these reasons, however. Thus, we are currently planning further studies in order to discriminate their specific weights. To this end, we need to characterize in greater detail the theoretical categories we used and to test these characterizations in precise causal hypotheses within a quasi-experimental paradigm. Above all, we need to design a model that allows us to understand how these different reasons work in a system.

(3) In this paper, didactic analyses refer to cases. Thanks to further characterization, the teachers’ practices could be seen as paradigmatic cases in Ginzburg’s sense (1989), in that they represent basic examples (1) of different concrete features of teachers’ topogenetic position and (2) of the way to deal with the certainty issue. Yet, they could also be seen as exemplars in Kuhn’s sense (Kuhn, 1979) if one uses them to achieve a better understanding of the theoretical categories of ‘Topogenesis’ or ‘Epistemic certainty’.

(4) The operational hypotheses were tested at two levels between which we established a relation: within the reading sequence itself (pre-test/post-test), during the year of the research and the year preceding the research (regression analyses). The establishment of this relation, which underpins the validation of the operational hypotheses, suggests that the phenomena
identified during the two studied sequences have a long-term action and may explain the progress made in the long term. Consequently, this relation results in the production of a further hypothesis: at the micro level of certain sessions, it is, under certain conditions, possible to understand something of what it is that secures long-term effectiveness. This hypothesis remains to be tested further.

In effect, in order to work out this relationship between different scale levels (Tiberghien & Sensevy, 2012), we need also to improve some methods to ensure that a particular session is representative of a larger teaching–learning process in relation to certain dimensions of practice (particularly the monitoring of certainty along with the epistemic thickness of the didactic activity). It is not an easy problem, given the fine-grain analyses which are necessary to explain the nature of the teaching–learning process in terms of epistemic issues, and the large-grain level, for the long duration that enables an enquiry to characterize a ‘general’ epistemic teaching system. This exploratory study has, however, allowed us to deepen our methodological reflections.17

(5) In this paper, we used the theoretical frame of the Joint Action Theory in Didactics in line with previous works which argue for the importance of the interrelationship of content and process in students’ argumentation (Erduran & Jiménez-Aleixandre, 2008; Von Aufschanaiter et al., 2006), in a transactional perspective (Clancey, 2011; Cobb, 2011). By presenting empirical facts and theoretical analysis of these facts, we hope to contribute to the dynamic understanding of this meaning-making system and to encourage rethinking of the issue of teaching effectiveness.

(6) It is important to point out that this research was not carried on in a design-based research paradigm (where collaboration between teachers and researchers is at the core of the design of specific ways of teaching), but rather in a specific experimental paradigm with the conjectural features presented above. It is perfectly possible, however, to enact the same conjectural features in a design-based research paradigm (Sensevy, 2012).

Some concluding remarks

This paper is exploratory. From a theoretical viewpoint, the set of teaching effectiveness conditions we propose has to be refined both by improving the conceptual system it relies on and by unfolding the upstream requirements and the downstream consequences involved. From a methodological viewpoint, the conjectural paradigm we try to work out demands further elaboration. In particular, we need first to improve each kind of analysis in order to obtain more significant basic results and then
to design better ways of articulating the different sorts of analysis, particularly the relationship between different scales of analyses (Tiberghien & Sensevy, 2012).

We assume that a better understanding of teaching effectiveness, as well as most of the important issues in curriculum studies, depends on our collective capacity to prevent the division of labour between ‘ quantitative’ and ‘ qualitative’ research, or between ‘ experimental’ and ‘ qualitative’ methods (Ercikan & Roth, 2006, 2007). We argue that there is a strong need to go beyond restrictive specialization, to foster a new paradigm, which overcomes the prevailing divisions of labour.

Finally, it should be noted that this type of study also reveals the complexity of the demands placed on teachers today. The research work cited here places the emphasis on the need to consider text comprehension as an object of teaching in the same way as phonology, for example. T2’s practices provide examples of a shared construction of meaning which we consider to be largely responsible for the knowledge acquired by the students and the progress they exhibited. It cannot be claimed, however, that the teachers studied in this research genuinely engaged themselves in a systematic study of each of the core meanings of the text. Thus, regardless of the undisputed professionalism and technical expertise demonstrated by the teachers involved in the study, it did not seem easy for them to work on the systematic clarification of the texts presented to their students.

Against this finding, we argue, for example, within the perspective opened up by lesson studies (Stigler & Hiebert, 1999), for the development of cooperative studies (we term this cooperative engineering, Sensevy, Forest, Quilio, & Morales, 2013) involving researchers and teachers, capable of producing instructional strategies that owe their forms to the knowledge at stake. That is to say that the efficiency of didactic joint action is not achieved merely through a ‘ transactional system ’; it asks at the same time for a curricular endeavour, in which the knowledge embedded in designs and gestures need to reflect the educational ends that are shared by teachers and researchers. As Deng (2007, 2011) argues, in the educational process, one has to pay attention not only to the ‘ pedagogical task of transformation ’, but also and before that to the ‘ curricular task of transformation ’. With this respect ‘ what classroom teachers primarily work with is not the subject-matter of an academic discipline, but the subject matter of a school subject embodied in curriculum materials—subject matter that results from special selection, framing, and translation of cultural knowledge for educational purposes ’ (Deng, 2007, p. 290).

Making possible such transformation process is one of the fundamental purposes of the cooperative engineering s we aim to design, in which teachers and researchers can locally share an ‘ engineer stance ’. According to us, overcoming the current division of labour between teachers and researchers means reconsidering the distinction between action research and fundamental research. Moreover, it leads to a new conception of the teacher profession, in which teachers take an important part in research teams as doctors can do in clinical research (Bulterman-Bos, 2008), and, one has to say, to a new conception of the researcher profession, in which
researchers learn to produce a fundamental research directed toward social objectives.

Notes

1. The first year of primary education in France when students are six years old.
2. Conducted in response to the call for a national project as part of the Programme Incitatif de Recherche en Education et Formation (PIREF = Programme for the Promotion of Education and Training Research), entitled ‘The social contexts of learning’.
3. The whole set of data on which we based the present article was completed only for the two teachers whose teaching practices are studied here. This is the reason why the three other teachers’ teaching practices are not taken into account in the present paper, even though the observation of their practices contributed to the elaboration of the conditions of teaching effectiveness which we present below.
4. This goal stems from a theoretical position close to that of Klafki: ‘teaching and learning must be understood as processes of interaction, i.e., as processes in which relationships between people—between teachers and learners and between the learners themselves—play a central role. These processes must therefore be comprehended not only as processes of acquisition in which subject matter and problems are confronted, but also as social processes or processes of social learning’ (Klafki, 2000, p. 142).
5. The students were in their first year of formal reading teaching, but the teachers found they were able to perform individual reading of some texts at that time. Individual reading does not, however, mean accurate and complete reading. The students had to explore the text in order to recognize the reading units they were familiar with or were able to decipher.
6. This mathematical interlude was the teacher’s responsibility. It refers to a class tradition, which we have seen regularly in our observation of this teacher’s practice.
7. In the following, the symbol + means a short pause, the symbol ++ a longer pause, the symbol <…?> an inaudible utterance.
8. ‘Turn’ refers to the speaker’s turn in the dialogue.
9. This suggestion is also supported by the study of the seven sessions produced by this teacher during the two years of the study.
10. One can argue that it is difficult to differentiate in such an evaluation between the fruits of comprehension abilities and writing competence, but it must be remembered that these comprehension questions were the teacher’s choice and not the research team’s.
11. Sphinx Lexica software.
12. We have chosen to present this analysis in tabular form for reasons of clarity.
13. The pairwise correlation level between the scores produced by each of the assessors was significant and above 0.6 in all cases, except for question 9 (see previous section).
14. In this section, we use the results of work undertaken by Céline Piquée as part of the PIREF research project (Piquee, 2007) and we should like to thank her here.
15. The genre repetition was not different between the two classes, for Year 1 as well Year 2.
16. It should be noted that for these two teachers, the order of progress in mathematics was reversed, with T1’s students making more progress than T2’s.
17. In an ongoing research, we designed an experiment in which teachers’ practice was characterized through a systematic fine-grain analysis of a subset of a long teaching sequence that we systematically compared with a large-grain analysis of the whole of this teaching sequence.
18. One may acknowledge the deep commonalities of such a conception with the viewpoint provided from the didactic transposition theory (Chevallard, 2007; Chevallard & Sensevy, in press.)
References


