Functional Linguistics
a SpringerOpen Journal

RESEARCH Open Access

Analysing pedagogic discourse: an approach from genre and register

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Abstract

This paper presents a novel analysis of pedagogic discourse using genre and register theory. Curriculum genres are analysed as configurations of pedagogic activities, relations, modalities, knowledge and values. Each of these register variables is realised as discourse semantic patterns, including exchange structures, learning cycles, multimodal sources of meanings, and experiential and interpersonal elements. Each of these discourse patterns can be presented side-by-side, in each unit in a pedagogic exchange, using tables or spreadsheets. The presentation enables the analyst to identify local and global patterns in pedagogic discourse of many kinds, particularly the intricate patterns of classroom exchanges. Analyses are illustrated for each register variable, followed by systems of options for their realisation in discourse. The paper concludes by illustrating a combined analysis of a stretch of classroom discourse.

Keywords: Pedagogic discourse; Classroom discourse analysis; Genre; Register; Exchange; Activity; Modalities; Knowledge; Value; Learning theory

Introduction

The title of this paper refers both to Bernstein's theory of pedagogic discourse (1990, 2000), which for Bernstein includes the whole field of pedagogic activity and its social relations, and to the field of classroom discourse analysis, that is an ongoing concern for educators and educational linguists. Pedagogic discourse for Bernstein included both the discourse of skills and knowledge that he called 'instructional', and the creation of social order, relations and identity that he termed 'regulative'. The analysis here assumes that patterns of discourse in pedagogic contexts serve to create, maintain and reproduce syndromes of social relations, identities and order over time. While the development of these syndromes is beyond the scope of this paper, the analysis is intended to be broad enough to enable their description. This is one of a set of research problems that the analysis is designed to address. Some related issues that may concern researchers and students include:

1. Structuring of pedagogic exchanges, including roles of teachers and learners, which students participate in classroom exchanges and how;
2. The knowledge that is exchanged, and how it is accumulated as exchanges unfold;
3. Structuring of learning activities, including learning tasks, and how they are initiated and followed up by teachers and peers;

4. Roles of spoken, written, visual and bodily modalities, including the sources of meanings in the exchange, and how they are brought into the exchange.

The scope of these questions suggest a complexity to classroom teaching that is difficult to capture, either in classroom research or in teacher education. The complexity of the teaching task is only partly addressed by analysing teacher/learner exchanges using exchange structure theory (Berry 1981, Christie 2002, Martin 2006, Martin and Rose 2007), or by reference to 'IRF' cycles (Alexander 2000, Sinclair and Coulthard 1975, Wells 1999). Studies of structures of school knowledge and patterns of knowledge accumulation have flowed from Bernstein (2000) and Halliday and Martin (1993), including Christie and Martin (1997, 2007), Christie and Maton (2011), Martin and Maton (2013), Maton (2014); structuring of learning activities are addressed by Christie (2002), Martin (2006), Rose and Martin (2012), Rose (2004, 2007); and structuring of semiotic modalities has been a major research focus, from Halliday's (1985) description of spoken and written language, to recent work on non-verbal modalities inspired by Kress and van Leeuwen (1996), such as Dreyfus et al. (2010), Painter et al. (2012).

However what makes classroom teaching and learning so complex is that all these semiotic dimensions are unfolding simultaneously, moment-by-moment, in a social context involving 20–30 or more learners, exchanging knowledge through multiple modalities in a great variety of activities. Given the complexity of the teaching task, it is not surprising that education outcomes are slow to improve, particularly for less advantaged students, and that teacher education seems to have little effect on rates of improvement. In fact, according to researchers such as Nuthall (2005), and teachers themselves, most of daily teaching practice is done intuitively, using skills that have been developed tacitly through experience, rather than researched, theorised, designed and taught by the academy. To improve the capacity of teachers to analyse, design and control their own classroom practice, we need an analysis capable of capturing the complexity of their task.

Alongside the literature cited above, the analysis presented here has emerged from a long term action research project, aimed at designing and training teachers in effective methodologies for embedding literacy teaching in classroom practice. Known as *Reading to Learn*, this project began with teachers of Indigenous Australian students with English as another language (Rose et al. 1999, Rose 2011), but has expanded over fifteen years across primary, secondary and tertiary education in Australia (Culican 2006, Rose and Martin 2013, Rose et al. 2008), Africa (Childs 2008, Dell 2011, Millin 2011), Asia (Liu 2011), and Europe (Coffin et al. 2013). Many thousands of teachers have participated in the project over this time. Major foci of the teacher education program are, on one hand, analysing the genres in which knowledge is written and read in the school, and on the other, designing the classroom discourse in which these genres are negotiated. To this end, large volumes of classroom practice have been observed, recorded and analysed, with a view to providing teachers with tools to effectively design their own discourse. Many of the exchanges used as illustrations in this paper can be observed directly in videoed lessons, available with transcripts and commentary at www.readingtolearn.com.au, and on the website of the NSW Board of Studies, Teaching and Educational Standards (http://www.boardofstudies.nsw.edu.au/7-10-literacy-numeracy/). The analysis has also been inspired by collaborating with other researchers, including

Harni Kartika (in prep) and Lucy McNaught (in prep). While the illustrations are focused on classroom discourse in schools, it is proposed that the analysis is potentially useful for any pedagogic activity. To this end, an instance of parent–child pedagogic activity is also analysed to illustrate its scope.

A model for analysis

A toolbox for comprehensively describing classroom discourse has been developing over recent decades, using genre and register theory (Christie 2002, Martin 1992, Martin and Rose 2007, 2008). Halliday (1978) models the social contexts of language in three dimensions as field (what is going on), tenor (who is involved) and mode (the role of language). Martin (1992) groups these social variables as **register**, and proposes a more abstract contextual stratum of **genre**, that weaves together register variables to achieve participants' goals. Figure 1 represents these relations as sets of nested circles, in which tenor, field and mode are distinguished at the level of register, and realised intrinsically in the interpersonal, ideational and textual functions of language, but woven together at the level of genre.

Martin further models field as sequences of activities, involving taxonomies of entities (people, things); tenor as relative status and contact of participants; and mode as discourse that accompanies activity or constitutes a field, as either dialogue or spoken or written monologue. If we interpret genres as recurrent configurations of register variables, then two general types of pedagogic genres may be distinguished. We can use the term **knowledge genres** for field constituting texts, through which institutional knowledge is acquired (such as the stories, chronicles, explanations, procedures, reports, arguments and text responses described by Martin and Rose 2008). And we will use the term **curriculum genres** (following Christie 2002) for the dialogic discourse of the home, school, further education, recreation and workplaces, through which knowledge is negotiated. The focus of this paper is on the structuring of curriculum genres.

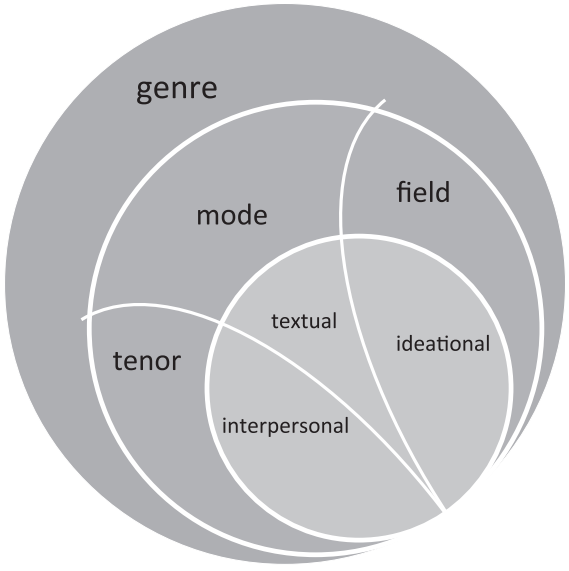

Figure 1 Genre, register and language.

A defining feature of curriculum genres is their two fields, on one hand the **knowledge** to be acquired by learners, and on the other the **pedagogic activity** through which it is acquired. Types of knowledge may range from domestic, recreational and manual trades that can be demonstrated and acquired ostensively, Bernstein's 'horizontal discourses' (2000), to theoretically organised bodies of knowledge of professional occupations, Bernstein's 'vertical discourses', that are typically acquired through formal education (cf Martin's 1992 classification of fields acquired through 'doing' and 'studying'). Knowledge is also always associated with social values, that learners acquire together with knowledge. Values enact social hierachies of status, authority, prominence. Pedagogic activity unfolds as sequences of learning activities, through which knowledge and values may be accumulated.

Learning activities are enacted dialogically as exchanges between teachers and learners. We can refer to the social relations enacted between teachers and learners as **pedagogic relations** (after Bernstein 1990, 2000). Pedagogic relations include hierarchies of authority between teachers and learners, inclusion and exclusion in classroom learning, success and failure in evaluations, hierarchies that may be more or less explicit. Pedagogic relations are not only enacted orally between teachers and learners, but include relations between producers of texts and learners, the texts that learners produce for evaluation, and teachers' spoken and written evaluations of learners' texts, together with relations between learners.

Curriculum genres typically involve multiple modalities: teacher/learner exchanges are often negotiated orally, but may also be written or on-line, and the sources of knowledge exchanged may lie in the activities of participants, or their sensory environment, in written texts, visual images, film or performance. We can refer to these as **pedagogic modalities**. Figure 2 represents pedagogic activities, relations and modalities as register variables, as in Figure 1, but the knowledge and values exchanged as another layer.

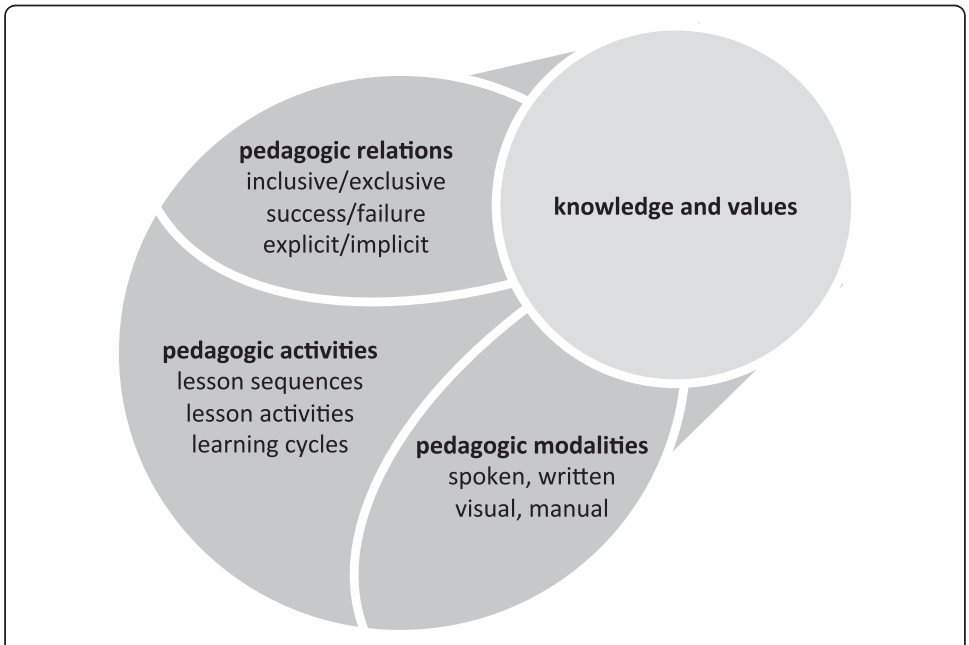

Figure 2 Dimensions of a curriculum genre.

Martin 1999 and Christie 2002 propose a metaphor of projection to represent the relations between the two fields of pedagogic activity and knowledge (as the act of saying projects locutions). The model here further suggests that knowledge and values are shaped by the entire configuration of pedagogic activities, relations and modalities, in order to account for variations in learners' acquisition of knowledge and values, depending on their participation and status in pedagogic exchanges, their control of pedagogic modalities (particuarly writing), and the varying benefits they thus obtain from pedagogic activities. Conversely, the model facilitates design of each register variable to maximise benefits for all students. To this end, it provides a framework for systematically analysing any curriculum genre, from classroom activities to parent–child exchanges.

In classroom discourse, each register variable is realised in particular discourse semantic structures that are mapped together in each step of the unfolding genre. Pedagogic relations are enacted as teacher/learner roles in exchanges, in which one or more learners participate; pedagogic activity is realised as phases in learning activities; pedagogic modalities include sources of meanings and the processes that bring them into the discourse; knowledge and values exchanged are realised as experiential and interpersonal elements, and relations between elements as an activity unfolds. Relations between these pedagogic register variables and discourse semantic patterns are schematised in Table 1.

Analysing curriculum genres

The starting point for analysis is with the global structuring of curriculum genres. As with genres in general, defined broadly as 'staged, goal-oriented social processes', the first step is to identify their stages. We can refer to these as **lesson stages**, so that each curriculum genre is realised by one or more lesson stages. For example, the curriculum genre designed by Joan Rothery and colleagues for teaching writing is widely known as the 'teaching/learning cycle' or TLC. Its staging has been described as Deconstruction, followed by Joint Construction, followed by Independent Construction, schematised in Figure 3 (from Rothery 1994).

However, the writing TLC is actually a macro-genre (Martin 1996, Martin and Rose 2008), in which Deconstruction, Joint Construction, and Independent Construction are distinct genres, that may occur in separate lessons, and consist of their own staging (Martin and Dreyfus to appear). Curriculum macro-genres like the writing TLC unfold through a sequence of lessons, which we can refer to as a **lesson sequence**.

Each individual curriculum genre unfolds through a sequence of lesson stages. For example, the Joint Construction genre may include lesson stages such as Note Making (in which content is recorded as notes on the board), Text Negotiation (in which the teacher guides the class to construct the text, scribed on the board), and Text Review (in which the text's field, generic structuring, and language features are reviewed, before students attempt individual constructions). Figure 4 illustrates a Text Review stage. The class has completed the Text Negotiation stage of writing a science explanation. The

Table 1 Register variables and discourse semantic patterns

Register	Pedagogic relations	Pedagogic activity	Pedagogic modalities	Knowledge & values
Discourse semantics	Roles & participation in teacher/learner exchanges	Phases in learning activities	Sources of meanings	Experiential & interpersonal elements & relations

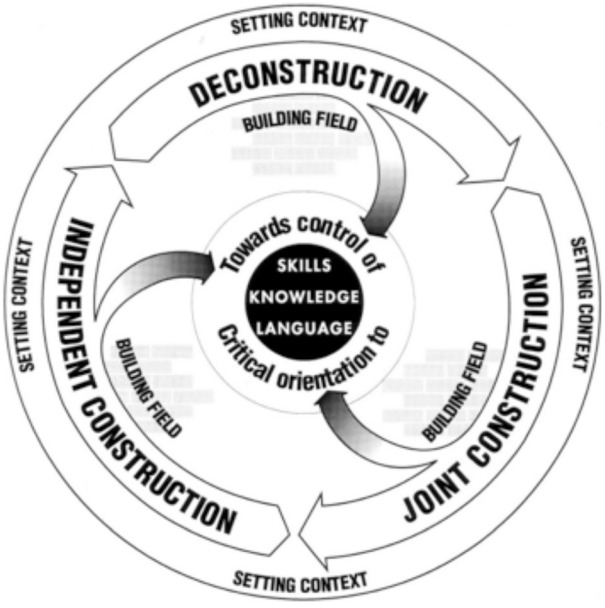

Figure 3 TLC curriculum genre.

teacher is reviewing the text structure by marking and naming each component of the explanation they have written. Her oral commentary is transcribed on the image.

Pedagogic relations

In classroom discourse, pedagogic relations are enacted as teacher/learner exchanges. There are two general types of exchanges, of knowledge or action. In an action exchange, one person performs an action, which may have been demanded by another. The person performing the action is known as the primary actor or A1; the person demanding the action is a secondary actor or A2 (after Martin 1992, Martin and Rose 2007, following Berry 1981). Action exchanges are consummated by the A1 performance.

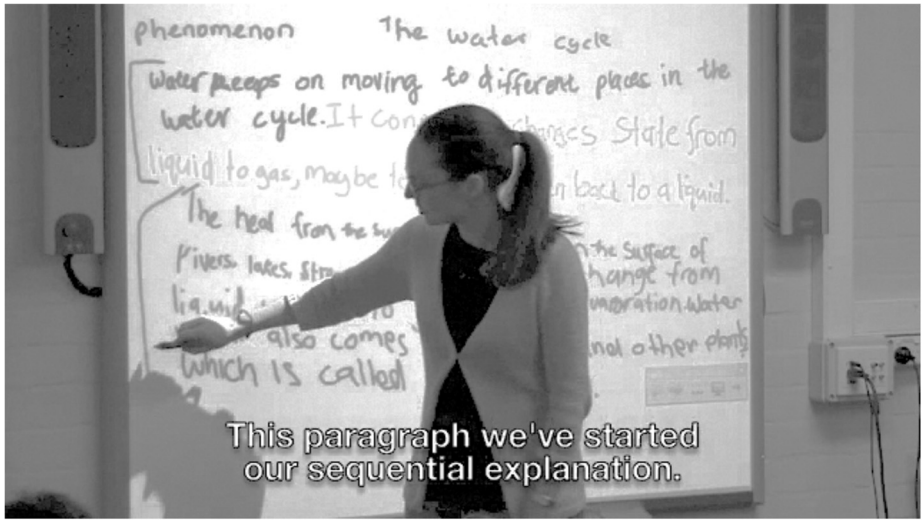

Figure 4 Text review stage in joint construction.

A minimal action exchange consists of just an A1 action, without an A2 demand, so A1 is the core role in an action exchange. In ~~Table 2~~ the teacher asks a student to scribe on the board, and tells him what to write (A2). The student does what he is asked (A1).

Here the A2 role is realised by a question *'do you want to?'* and a command *'just write'*. An A2 role may be realised by commands, questions and/or statements. Its demanding function in the exchange is given by the curriculum genre, and the unequal status of teacher and student. In ~~Table 2~~, this inequality is apparently reduced by phrasing the demand as the student's choice *'do you want to?'*, but the relation between demand and compliance is expected by the genre and the pedagogic relation. The major functions of action exchanges in classroom discourse are to manage the learning activity or students' behaviour.

From a grammatical perspective, the A2 demand in ~~Table 2~~ includes three moves, realised as three clauses, *// do you want to come up on the smartboard // and write the heading for us in the middle // just write 'The Water Cycle'//*. From this perspective, it may be analysed as a move complex (Martin 1992, Martin and Rose 2007). But from the perspective of speakers' roles in the pedagogic exchange, it is one functional unit, so we will refer to such A/K units as exchange **roles**. An exchange is realised by a sequence of one or more roles, each of which is realised by one or more moves.

In a knowledge exchange, the person giving information is the primary knower or K1. A person demanding or receiving information is a secondary knower or K2. Typically one asks a question to obtain information, so the questioner is K2, and the answerer K1. K1 is the core role in a knowledge exchange. A minimal knowledge exchange consists of just a K1 role, without a K2 demand.

Pedagogic exchanges are unusual, in that the teacher is usually the one with the knowledge for students to acquire. Teachers ask questions for students to display their knowledge, but their responses are almost always evaluated. Bernstein tells us that "the key to pedagogic practice is continuous evaluation… evaluation condenses the meaning of the whole [pedagogic] device" (2000:36). Evaluation of learners' knowledge is the core K1 role in a teacher/learner exchange, as it tells the learner whether acquisition has been successful. The teacher has the authority to evaluate knowledge, so the teacher is usually takes the primary knower role, or K1. Learners' knowledge is given value by the teacher's evaluation, so learners are usually in secondary knower roles, or K2. The teacher's K1 evaluation is delayed until after the learner's response. So teachers' questions are referred to as delayed K1, or dK1 moves, as in ~~Table 3~~.

As with action exchanges, the sequence of dK1 question, K2 response and K1 evaluation is expected by the curriculum genre and asymmetric pedagogic relation; students are expected to display their knowledge in response to teachers' dK1 demands and to be evaluated. The display enables teachers to judge the effectiveness of the learning activity; the evaluation enables learners to gauge their success. The structure of the

~~Table 2~~ Exchange 1: Pedagogic action exchange

Spkr	Exchange	Roles
T	*So Mert, do you want to come up on the smartboard*	**A2**
	and write the heading for us in the middle?	
	Just write 'The Water Cycle'.	
S	[scribes 'The Water Cycle' on the smartboard]	**A1**

~~Table 3~~ Exchange 2: Pedagogic knowledge exchange

Speaker	Exchange	Roles
T	*So what was this paragraph called?*	**dK1**
Ss	*Phenomenon*	**K2**
T	*Yep*	**K1**

pedagogic relation is tacitly recognised by all teachers and students. The most common options for pedagogic exchange roles are set out in Figure 5.

In the options for knowledge exchanges, the first option (K1) is performed by the teacher, simply by giving information. The second option (dK1^K2^K1) is illustrated in ~~Table 3~~ above, in which the teacher's K1 evaluation is anticipated but delayed by a question (dK1) and learner response (K2). The final option (K2^K1) is less common, in which a student may ask a question of the teacher, or the teacher may ask a student for information that she does not already know.

In the options for action exchanges, the first option (A1) is performed by the teacher, such as handing out equipment or reading aloud. In the second option (dA1^A2^A1), a student may ask permission for an action (dA1), the teacher gives permission (A2), and the student performs the action (A1). The third option (A2^A1) is illustrated in ~~Table 2~~ above, in which the teacher directs students' activity or behaviour.

In addition to these most frequent types of exchange moves, teachers and students may also follow up an A1 move with thanks, or follow up a K1 move with a comment. These can be labelled as followups (A1f/A2f; K1f/K2f). Moves may also be tracked to clarify understanding, and challenged. These can be labelled as tracking (tr), response to tracking (rtr), challenge (ch) and response to challenge (rch). These options are examined in more detail in Martin and Rose (2007), Rose and Martin (2012). ~~For examples of followup and tracking moves, see Table 4 and Table 5 below.~~

Participation

To this point, the analysis can be applied to any pedagogic exchange, from parent–child interactions to classroom teaching, whether there is one or more than one learner. However, there are wide disparities in students' degree of inclusion in classroom conversations. By far the most common way of initiating a classroom exchange is when the teacher asks a question of the class. Teachers typically report that a minority of

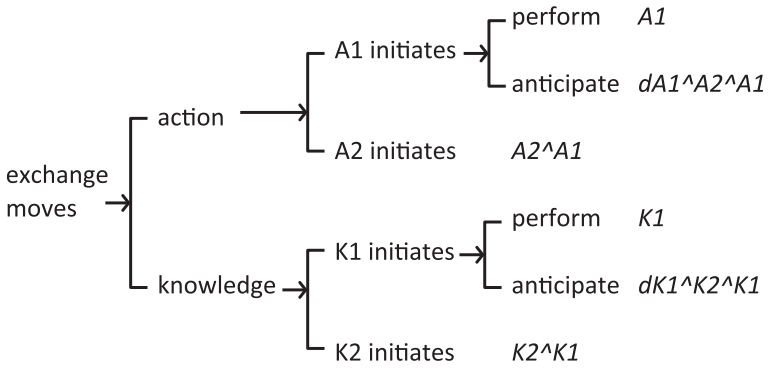

Figure 5 Basic options for pedagogic exchange role.

~~Table 4 Exchange 3~~: Learning by doing

			Roles	Cycle phases	Sources
1	St	*What's **this**?*	K2	Identify	point, refer to place
	T	*No **that**'s no good.*	K1	Reject	refer to place
2	T	*Throw more soil over **here**.*	A2	Focus	point, refer to place
	St	***This**?*	tr	Identify	point, refer to place
	T	*Yes exactly, **that** hole **there**.*	rtr	Affirm	refer to place
3	St	[starts to dig]	A1	(Identify)	
	T	*No, **that**'s no good.*	A2f	Reject	refer to place
4	T	*Look.*	A2	Prepare	point
		***This** is good.*	K1		refer to place
		Look.	A2		point
		*It's **over yonder**.*	K1		refer to place
5	T	*Dig away on the **other side**.*	A2	Focus	refer to place
	St	***This**?*	tr	Identify	point, refer to place
	T	*Yes, **that**'s it!*	rtr	Affirm	refer to place
6		*Try **that there**.*	A2	Focus	refer to place
	St	[starts to dig]	A1	(Identify)	
	T	***That**'s it!*	K1f	Affirm	refer to place
	St	*Aha!*	K2f	Concur	

students consistently respond to their questions, and these are usually the more successful students (Rose 2011, Rose and Martin 2012, 2013). Nuthall (2005:919–20) comments that "The teacher is largely cut off from information about what individual students are learning… Teachers depend on the responses of a small number of students as indicators and remain ignorant of what most of the class knows and understands". Relations between classroom participation and educational success are schematised in Figure 6.

To analyse inclusion, we need to identify which students are addressed in the exchange, which students speak, and how they are evaluated. This addresses a major gap in much classroom discourse analysis, which typically uses transcripts of classroom talk, although only a minority of students' voices are recorded in a transcript. We will use the term **participation** to cover which students are addressed and speak in exchanges.

Most commonly, teachers' questions address the whole class, one student responds (perhaps raising a hand to speak), and the teacher evaluates that student. ~~Table 6~~ includes two exchanges; in each, the teacher asks a dK1 question, one student responds (K2), and the teacher affirms that student's response (K1).

Although only one student responds and is affirmed, the teacher's expectation is that the rest of the class will learn from the exchange. To this end, the teacher adjusts S6's response '*It's part of Step 1*' (labelled as tracking) before affirming him, so the class gets more precise information. Conversely, S10's response is precisely what she wants the class to know, so she repeats it with strong affirmation.

In ~~Table 7~~, the teacher first prepares for the question, with information addressed to the whole class (K1). She then asks the class for a technical term (which they have

~~Table 5 Exchange 4:~~ Detailed Reading analysis

		Exchange	Roles	Part.	Phases		Sources		Experiential	Interpersonal	Functions
1	T	*So, let's now look at it in detail, and prepare to be writing it ourselves.*	A2	class	Prepare	reading	refer	reading		*let's, ourselves*	specify
		So we're going to go through sentence-by-sentence now.	K1	class		activity		text	*sentence-by-sentence, key words, structure, Phenomenon*	*So we're going to*	activity
		So if you've got your highlighters there,									
		we're going to identify the key words in the text.									
		Coming back up, we've looked at the big structure of the text.									
		Coming back up to the Phenomenon.									
2	T	*The first sentences are talking about what's going to be explained.*	K1	class	Prepare	sentence	refer	text	*sentences, Water Cycle,*	*Alright, so I'll*	preview first
		They're talking about why it's called a Water Cycle overall.									
		Alright, so I'll read you the sentences.	A1	class			refer	text	*sentences*		sentences
		'Water is found in many different forms on Earth and is constantly moving from one place to another. As it moves, it changes state in cycles, from liquid water to water vapour, sometimes to ice, and back to liquid again.'					read	text			
3	T	*So Zac, can you tell me, what is this all about?*	dK1	S1	Focus	Item, position	refer	text	*what about, beginning*	*So Zac, can you*	detailed
		What's the beginning there?									
	S	*'Water'*	K2	S1	Identify	item	read	text	*Water*		reading
	T	*Water. Fantastic, that's right.*	K1	S1	Affirm	praise			*Water*	*Fantastic, right.*	first
		Can we all highlight the word water, please, the very first word in our text.	A2	class	Direct	marking	refer	text	*water, word*	*Can we all*	sentence
	T	*OK, it goes on to say that water is found in many different forms.*	K1	class	Prepare	position	refer	text	*water, forms*		
		But what is the water doing? Have a look through our sentence.	dK1, A2	class	Focus	item	refer	text	*water doing*	*But what*	
		Rodney, what is the water doing?	dK1	S2							
	S	*It's 'constantly moving'*	K2	S2	Identify	item	read	text	*moving*	*constantly*	
	T	*Excellent*	K1	S2	Affirm	praise				*Excellent*	

~~Table 5 Exchange 4~~: Detailed Reading analysis *(Continued)*

	T	*Can you give me a little bit more information about that?*	dK1	S2	Focus	structure	refer	text	*information*	*Can you, little bit more*	
	S	*'from one place to another'*	K2	S2	Identify	structure	read	text	*one place…*		
	T	*OK*	K1	S2	Affirm	approve				*OK,*	
		So let's highlight that whole section that it's constantly moving from one place to another.	A2	class	Direct	marking	refer	text	*constantly moving…*	*so let's*	
4	T	*OK, the next sentence gives us something else that the water is doing. Now, I've read it to you before.*	K1	class	Prepare	sentence	refer	text	*next sentence water doing*	*OK, Now, I've*	detailed reading
		As it moves it… Alex? As it moves it…	dK1	S3	Focus	item	read	text	*moves*		second
	S	*'changes'*	K2	S3	Identify	item	read	text	*changes*		sentence
	T	*Changes.*	K1	S3	Affirm	repeat			*changes*		
	T	*Changes what?*	dK1	S3	Focus	item	refer	text	*changes*		
	S	*'changes state'*	K2	S3	Identify	item	read	text	*changes state*		
	T	*State.*	K1	S3	Affirm	repeat			*state*		
		Remember, state's the scientific word we use for whether it's a solid, a liquid or a gas, or what form it's in.	K1	class	Elaborate	technical field	remind	prior lesson	*scientific word, solid, liquid, gas, form*	*Remember,*	
		So can we highlight 'change of state'.	A2	class	Direct	marking	read	text	*change of state,*	*So can we*	
		OK, can we highlight the 'in cycles' as well.	A2	class	Direct	marking	read	text	*changes state in cycles*	*OK, can we, So we've actually*	
		So we've actually got those four words highlighted together, 'changes state in cycles'.	K1	class							
	T	*So what were those four states again?*	dK1	class	Focus	field	remind	prior move	*four states*		
		The end of the sentence names them.	K1	class	Prepare	position	refer	text	*end sentence*		
		So, Amon, from…?	dK1	S4	Focus	position	read	text			
	S	*'from liquid water'*	K2	S4	Identify	item	read	text	*liquid water*		
	T	*Liquid.*	K1	S4	Affirm	repeat					

~~Table 5 Exchange 4:~~ 1 Detailed Reading analysis *(Continued)*

	T	*To…?*	dK1	S4	Focus	structure	read	text			
	S	*'water'*	K2	S4	Identify	item	read	text	*water*		
		Water vapour. OK.	K1	S4	Affirm	repeat			*Water vapour.*	*OK.*	
	T	*That's the key that it's a gas, our word 'vapour'.*	K1	class	Elaborate	field	present	knowledge	*gas, vapour,*	*That's the key*	
		So, if we can highlight 'liquid water' and 'water vapour'.	A2	class	Direct	marking	read	text	*Liquid, vapour*	*So, if we can*	
	T	*So there are two sides to the Water Cycle. Water might have travelled a long way from the oceans to get to the mountains, or a long way through a long river system. But it's also changing state. It changes from liquid to gas to liquid, maybe to solid and then back again, all the way through the cycle.*	K1	class	Elaborate	technical field	present	knowledge	*Water Cycle. Oceans… river system, state, liquid, gas, solid*	*might have, maybe, all the way*	
	T	*What happens to it in the atmosphere? It becomes…?*	dK1	S6	Focus	item	refer	text	*atmosphere*		
	S	*'cold'*	K2	S6	Identify	item	read	text	*cold*		
	T	*Cold. Excellent.*	K1	S6	Affirm	praise			*cold*	*Excellent.*	
	T	*So, when it becomes cold, what are we forming?*	dK1	S6	Focus	item	refer	text	*cold, forming*	*So, when, what*	
	S	*'forms clouds'*	K2	S6	Identify	item	read	text	*forms clouds*		
	T	*Thank you, Ng, excellent.*	K1	S6	Affirm	praise				*excellent.*	
		Just make sure we've highlighted the words 'cold' and clouds'.	A2	class	Direct	marking	read	text	*cold, clouds*	*Just make sure we've*	
5	T	*Why do you think, in the diagram, that we have a change in the colour of the clouds? What might that be related to? What's going on?*	dK1	class	Focus	technical field	refer elicit	image knowledge		*Why do you think, might*	elaborate technical
		Alex?	dK1	S3	Focus	field	elicit	knowledge	*going on*		field
	S	*Sometimes it makes it rain*	K2	S3	Propose	structure	infer	knowledge	*rain*		
	T	*Yeah,*	K1	S3	Affirm	approve				*Yeah*	
	T	*So what must be happening in the clouds?*	dK1	class	Focus	field	elicit	knowledge	*clouds*	*what must be*	
	S	*It gets darker*	K2	S7	Propose	structure	infer	knowledge	*darker*		
	T	*It gets darker,*	K1	S7	Affirm	repeat			*darker*		
		and it gets heavier.	K1	class	Elaborate	field	present	knowledge	*heavier*		

~~Table 5 Exchange 4~~: Detailed Reading analysis *(Continued)*

	What's in this cloud? Water in what state?	dK1	class	Focus	field	elicit	knowledge	*Water, state*	
S	*as ice*	K2	S8	Propose	item	infer	knowledge	*ice*	
T	*It could be icy,*	tr	S8	Affirm	repeat			*icy*	*could be*
	falling on the mountains as sleet, or even as snow.	K1	class	Elaborate	field	present	knowledge	*sleet, snow.*	
T	*But there's more liquid water than solid water.*	K1 [dK1]	class	Prepare	field	present	knowledge	*liquid water, solid water.*	*But more than*
	[implicit: So what must be happening in the clouds?]								
S	*condensation*	K2	S9	Propose	item	recall	prior lesson	*condensation*	
	There's more condensation that's happened. That's right.	tr, K1	S9	Affirm	repeat			*condensation*	*That's right.*
T	*So when you get the lighter, fluffier clouds they might still be just in the process of the water coming from the vapour back to the liquid.*	K1	class	Elaborate	technical field	present	knowledge	*lighter, fluffier clouds, water, vapour, liquid,*	*might still be just*
	But you know it's going to be a real downpour when the skies get dark.	K1	class	Elaborate	everyday field	present	knowledge	*downpour, skies, dark*	*But you know*

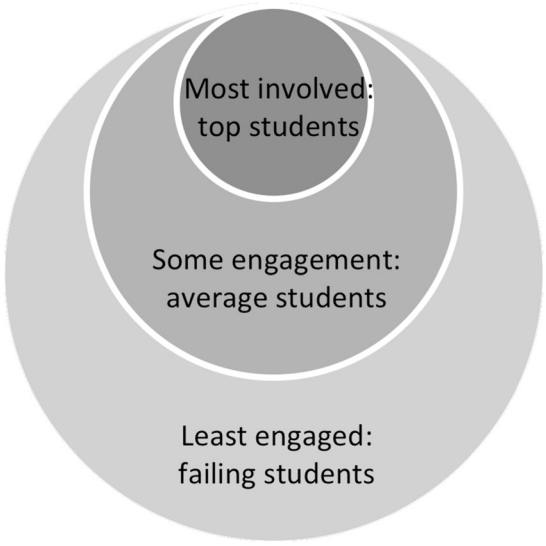

Figure 6 Classroom participation and educational success.

discussed in an earlier lesson stage), and further asks them to respond together (dK1), which they do (K2). The evaluation is then addressed to the whole class (K1).

By asking '*Can we say that together again?*' the teacher is explicitly asking the whole class to respond. Note that she is not demanding action, but knowledge, as she has not told them what to say. There is a single dK1 role here, with two demands, one specifying the item of knowledge, and the other specifying who should respond.

Alternatively, the question can address a particular student, whose response is then evaluated, as in ~~Table 8~~, but this is much less common than asking the whole class.

Although the teacher's dK1 role is phrased as a command '*continue with your suggestion*', it is again a demand for knowledge, not action. Amon proposes a wording to add to the joint text, which the teacher approves and repeats. Again the repetition is for the benefit of the whole class, and the student who is scribing the text on the class board.

Often, students' responses are not what the teacher wants. Rejecting a response typically requires another cycle, as in ~~Table 9.~~

In this example, student S7 proposes a whole clause *'so this is called transpiration'*. But the conjunction is not appropriate, and the teacher is forced to reject his response.

~~Table 6 Exchange 5:~~ Individual student response and evaluation

Spkr	Exchange	Roles	Participation
T	*What's this third dot point?*	dK1	**class**
	Which section of our writing did we label it as?		
S6	*Step 1*	K2	**S6**
T	*It's part of Step 1*	tr	**class**
	Yeh	K1	**S6**
T	*So how am I going to show that in our rewrite?*	dK1	**class**
S10	*Start a new paragraph*	K2	**S10**
T	*Start a new paragraph*	K1	**S10**
	Fantastic		

~~Table 7 Exchange 6:~~ Whole class participation

Spkr	Exchange	Roles	Participation
T	*So the main idea we've got to convey in this paragraph is that it's about evaporates*	K1	**class**
	Or the word for the process is…?	dK1	**class**
	Can we say that together again?		
Ss	*Evaporation*	K2	**Ss**
T	*Excellent*	K1	**class**

Student S6 then proposes an alternative that **is** appropriate, which the teacher affirms, by repeating, approving and praising him. In this very common pattern, one student is rejected and another affirmed.

In ordinary classroom discourse, students' responses may be rejected until the desired response is proposed and affirmed. This is one factor in the inequality of participation in classroom exchanges, as the pattern starts from the first days of school, and continues year after year. Inequality of participation is a critical factor in the construction of the hierarchy of inclusion and exclusion in classroom learning. For this reason it is crucial to include this feature in classroom discourse analysis. It is also essential in analysing peer discussions in group work. To my knowledge it has rarely been adequately considered in classroom research, partly because non-participating students are not apparent in transcripts of classroom discourse.

Basic participation options are given in Figure 7. Students either address or speak, and the participant may be the whole class, a group of students, or an individual, i.e. by addressing the class the teacher treats the whole class as an interactant in the exchange. Analysing participation shows the proportion of students who are actively included in the classroom conversation. Analysing evaluation further shows the proportion of included students who are affirmed.

Pedagogic activity

Knowledge of all kinds is acquired through pedagogic activity. At the core of pedagogic activities are learning tasks. Only the learner can do the task; a teacher cannot do it for them. However, a learning task is usually specified by a teacher (orally or in writing). For example, the teacher may give an instruction or ask a question, which learners respond to. We can refer to the phase that specifies the task as the Focus. Thirdly, a learning task is usually evaluated by a teacher, including various degrees of affirmation or rejection, for example, from a high distinction to a fail. So the nucleus of a learning activity includes the elements Focus, Task and Evaluate, as in Figure 8.

In addition, the learning task may be prepared by a teacher, for example, by demonstrating how to do the task, or contextualising it in the learners' experience. The task may also be elaborated after it has been successfully completed. The elaboration may

~~Table 8 Exchange 7:~~ Teacher addresses individual student

Spkr	Exchange	Roles	Participation
T	*Amon, continue with your suggestion.*	dK1	**S5**
S5	*Trees and other plants*	K2	**S5**
T	*Good*	K1	**S5**
	Trees and other plants		

~~Table 9 Exchange 8:~~ Rejected response triggers a further cycle

Spkr	Exchange	Roles	Participation
T	*We're going to keep the technical term*	dK1	**class**
S7	*So this is called transpiration*	K2	**S7**
T	*It's not really a 'so' link*	K1	**S7**
S6	*Which is called*	K2	**S6**
T	*Which is called*	K1	**S6**
	You're right jeremy		
	Good one		

be a further step in the activity, or it may give learners a more technical or abstract understanding of the task they have done, or a commonsense interpretation. Optional phases of a learning activity thus include Prepare and Elaborate phases, as in Figure 9.

This is an orbital type of structure (Martin 1996), in which elements are more or less central and more or less optional. The learner's Task is the core of the activity, Focus and Evaluate phases are nuclear, and usually present, while Prepare and Elaborate phases are marginal, and more optional. Sequencing is not fixed in orbital structures. The typical sequence is Prepare^Focus^Task^Evaluate^Elaborate, but teachers may prepare after the Focus, or elaborate before the evaluation. Nevertheless, Prepare and Focus phases necessarily precede the Task, while Evaluate and Elaborate phases must follow it.

The orbital structure of pedagogic activity is a general structuring potential. But pedagogic activity is also organised hierarchically, in sequences of larger units composed of smaller units. As genres are realised by texts, a curriculum genre is realised by a **lesson**. Each lesson is composed of one or more **lesson stages**. Each lesson stage is composed of one or more **learning activities**. As our analysis unfolds below, we will see that each lesson activity is composed of one or more **learning cycles**. Each of these ranks is realised by the orbital structure of pedagogic activity, with a Task at its core. The Task of a lesson stage is realised by one or more learning activities; the Task of a learning activity is realised by one or more learning cycles. This organisation is presented as a rank hierarchy in Figure 10. Note that higher rank Prepare and Elaborate phases may also be realised by lower rank activities.

Pedagogic activity (field) is negotiated by pedagogic relations (tenor). Learning cycles are enacted as teacher/learner exchanges (as a message is negotiated as a statement or

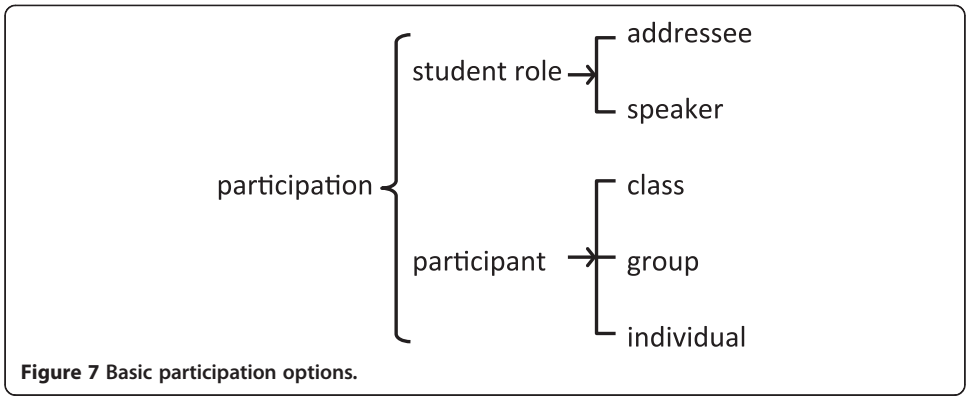

Figure 7 Basic participation options.

Figure 8 Nucleus of pedagogic activity.

question). At its simplest, the Focus is enacted as a teacher's dK1 role, followed by a learner's K2 response, followed by the teacher's K1 evaluation. The learner's Task is to respond to the teacher's Focus. The Focus specifies the type of response expected. Students' tasks in classroom exchanges are (most generally) to either Propose an idea from their knowledge or Identify an element in a text. ~~Table 10~~ is from the first learning cycle in the Text Negotiation stage of a Joint Construction. Cycle phases are shown to the right.

The pedagogic function of this Focus is to specify the next item in a sentence that the class is writing together. This Focus provides sufficient guidance for a student to propose the item '*moving*,' which the teacher affirms by repeating and approving. The sequence is negotiated as a dK1^K2^K1 exchange.

Prepare phases provide information that guides learners towards a response. ~~Table 11~~ adds a Prepare phase which contextualises the activity in students' prior knowledge, and the procedure they will follow in writing.

The Prepare phase here includes three messages: the first is a proposition '*we're going to*' (K1), the second is a proposal '*we need to*' (A2), and the third is another proposition '*we're going to*' (K1). Each functions as part of the Prepare phase: the first gives general information '*follow the same pattern*'; the second specifies the steps they will follow; the third specifies the first item in the sentence.

Elaborate phases may build on students' responses with more detailed, technical or abstract knowledge, or they may relate an unfamiliar field to students' commonsense knowledge. Teachers typically use students' responses as semantic platforms to provide an element of new knowledge in Elaborate phases (widely discussed as 'feedback' moves, e.g. Gibbons 2009, Wells 1999). Knowledge may thus accumulate through elaborations over a series of learning cycles. In ~~Table 12~~, the class continues constructing the sentence from notes on the board. A student proposes the elements *changing* and *state*, which the teacher affirms and then elaborates with more technical detail, the three states of matter *solid, liquid, gas.*

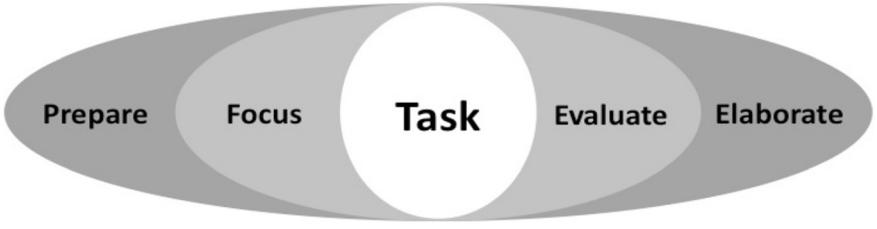

Figure 9 Optional phases of pedagogic activity.

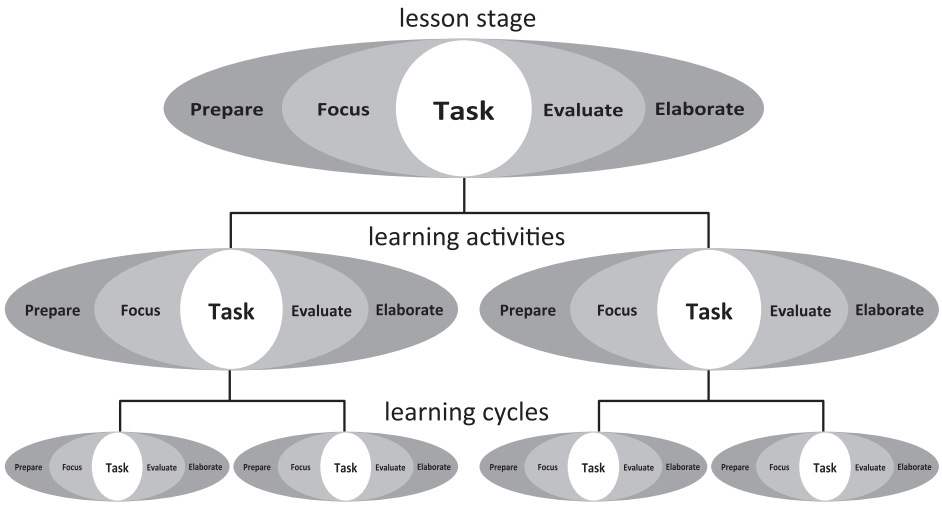

Figure 10 Rank hierarchy of learning activities.

Prepare and Elaborate phases may be single K1 units, or they may involve other exchanges with students. For example, the teacher could have asked students to provide the elaboration as in ~~Table 13~~.

Analysing the movement from Prepare to Focus to Task to Elaborate phases can show how knowledge is built up through an exchange, and related to learners' experience. It can also help show how students are included or excluded from the activity. In an inclusive practice, Prepare and Focus phases may be framed within students' existing knowledge (closer to commonsense). This may enable more students to do the task successfully, whether proposing or identifying a meaning. Elaborate phases may then be more detailed, technical or abstract (more uncommonsense) (Liu 2011). Such a sequence enables accumulation of curriculum knowledge. A less inclusive but more common practice lacks a Prepare phase, and the Focus is an interpretive question, for which students must recognise an appropriate response, from their prior knowledge and values (Alexander 2000, Nuthall 2005, Rose 2004, 2011). Elaborations may then commit more meaning, enabling knowledge accumulation only for those students who understood the question and response (Rose 2004, Rose and Martin 2012). Or the teacher may attempt to repair lack of understanding by elaborating with commonsense (Martin and Maton 2013). Patterns like these are referred to as semantic waves by Maton (2014).

Figure 9 sets out the most common options for cycle phases. The learners' task is central, and may involve identifying an element in a text (Identify), or proposing an element from their knowledge (Propose). The task may be prepared or not (Prepare), and is specified by focusing on either a text or the learners' knowledge (Focus). Following the task, it is evaluated by either affirming or rejecting (Affirm/Reject), and may be

~~Table 10 Exchange 9~~: Nucleus of a learning cycle

Spkr	Exchange	Roles	Participation	Cycle phases
T	*What is the water doing?*	dK1	class	**Focus**
S	*Moving*	K2	S1	**Propose**
T	*It's moving*	K1	S1	**Affirm**
	OK, good			

~~Table 11 Exchange 10~~: Prepare phase in a learning cycle

Spkr	Exchange	Roles	Participation	Phases
T	*So we're going to follow the same pattern in our writing as the text that we've just read.*	K1	class	**Prepare**
	We need to have the same introduction,	A2		
	identify what it is we're going to talk about,			
	move through the steps,			
	and finish it with a conclusion.			
	We're going to start with 'water'.	K1		
	What is the water doing?	dK1	class	**Focus**
S1	*moving*	K2	S1	**Propose**
T	*It's moving*	K1	S1	**Affirm**
	OK, good			

elaborated or not (Elaborate). In addition, the teacher may direct learners' activity or behaviour (Direct) (Figure 11).

Less common cycle phases include scribing on the board and dictating to the scribe (Scribe/Dictate), and students may concur or disagree with the teacher or other students (Concur/Differ). These are not of the same status as teachers' evaluations, and do not consummate classroom learning cycles. On the other hand, in small group exchanges, students may assume the teacher's role and evaluate other students, by affirming or rejecting.

Specifying cycle phases

Relations between cycle phases may be analysed in more detail, to show the nature of students' tasks, and how they are prepared, specified, evaluated and elaborated. In Table 14, the teacher first prepares the activity, with the structure of the genre to be written, and the then specifies the first lexical item in the sentence *water*. The Focus then specifies the item to propose, *what water is doing*, i.e. a process. In response, a student proposes an associated lexical item *moving*. The evaluation includes three types of affirmation: repeating the student's response, *it's moving*, and approving it twice, *OK, good*.

~~Table 12 Exchange 11~~: Elaborating phases

Spkr	Exchange	Roles	Participation	Phases
T	*So it's moving*	K1	class	**Prepare**
	What else is it doing?	dK1	class	**Focus**
S1	*changing*	K2	S1	**Propose**
T	*changing*	K1	S1	**Affirm**
	good			
T	*What's it changing?*	dK1	class	**Focus**
S2	*state*	K2	S2	**Propose**
T	*state*	K1	S2	**Affirm**
	from solid, liquid, gas	K1	class	**Elaborate**
	OK	K1	S2	**Affirm**

Table 13 Exchange 12: Elaborating phase as exchange

T	*What's it changing?*	dK1	class	**Focus**
S2	*state*	K2	S2	**Propose**
T	*state*	K1	S2	**Affirm**
	OK			
T	*What are the three states of matter?*	dK1	class	**Focus**
S3	*solid, liquid, gas,*	K2	S3	**Propose**
T	*That's right.*	K1	S3	**Affirm**

Affirmation or rejection of a response indicates the effectiveness of Prepare and Focus phases. Here the Prepare phase first orients students to the procedure they will follow for writing, then the starting point for writing. The Focus then specifies the next item to propose. Together these criteria guide the student to propose the item '*moving*'.

However, it is far more common for learning cycles to be unprepared; teachers typically expect a response to their Focus questions without preparing, and only prepare when they do not get a desired response. Furthemore, Focus questions often provide little or no clue to the desired response, but require students to interpret one from their knowledge. This is another factor in unequal participation, as only a few students typically have the confidence to risk displaying their knowledge and capacities for interpreting, where affirmation is uncertain.

Preparations and elaborations are diverse, and contingent on variations in activities and knowledge, so I will not attempt to further specify them here. But options for Task and Focus phases can be specified with more delicacy. The learners' Task may be to identify an element in a text or propose an element from knowledge, and the element proposed or identified may be a single item or a grammatical structure, such as a phrase, clause or clause complex. Working back from the learner's response, we can

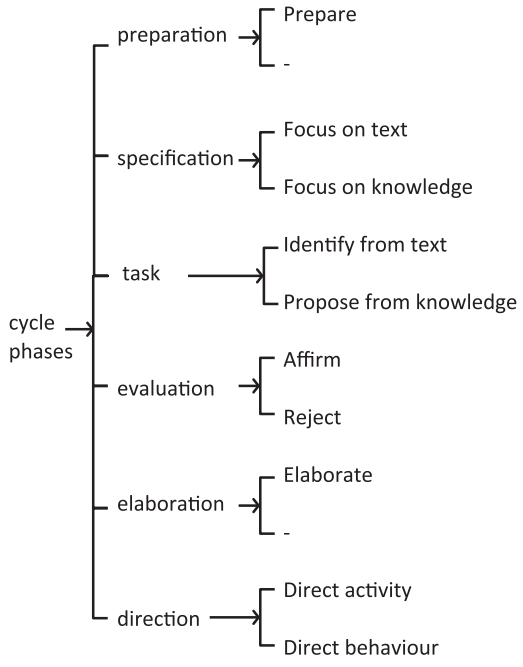

Figure 11 Basic options for cycle phases.

~~Table 14 Exchange 13~~: Specifying cycle phases

Spkr	Exchange	Roles	Participation	Phases	Specify phase function
T	*So we're going to follow the same pattern in our writing as the text that we've just read.*	K1	class	Prepare	**writing activity**
	We need to have the same introduction,				**genre structure**
	identify what it is we're going to talk about,				
	move through the steps,				
	and finish it with a conclusion.				
	We're going to start with 'water'.				**item**
	What is the water doing?	dK1	class	Focus	**item**
S1	*moving*	K2	S1	Propose	**item**
T	*It's moving*	K1	S1	Affirm	**repeat**
	OK, good				**approve**

ask whether the teacher's Focus specifies a text or student knowledge as the source of the response, whether it provides guidance to the desired response or not, and whether it expects a single item, or a whole structure in response. These options are shown in Figure 12.

Evaluations either affirm or reject students' responses, but as appraisals, they may grade the force of affirmation or rejection from weak to strong. Figure 13 presents some common options for graduation of evaluations. Affirmations may simply repeat the response, they may approve it with *Yep*, *OK, good*, or they may praise the student. Repetitions, as we have seen (~~Table 6, Table 14~~), re-present the response as knowledge for the whole class to acquire.

Perhaps the weakest form of rejection is to simply ignore a response, which is very common. Any student proposal that is not explicitly evaluated has been ignored. Teachers often try to lessen the impact of rejection by qualifying the response, but if a

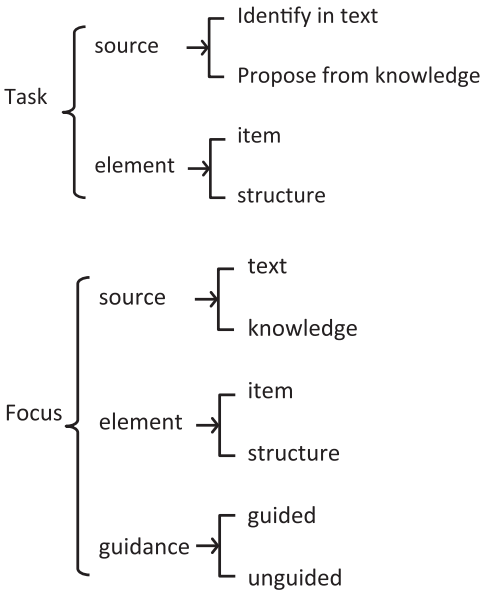

Figure 12 Further options for focus and task phases.

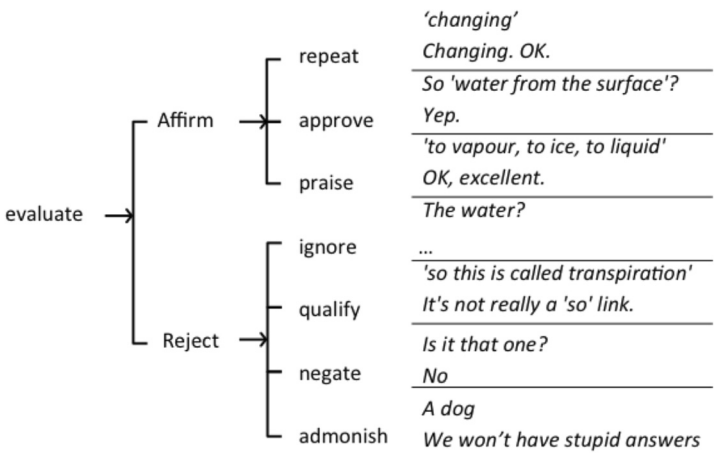

Figure 13 Further options for Evaluate phases.

response is not affirmed, students always know it has been rejected. Sometimes responses are simply negated, and the strongest rejection is to admonish a student.

Pedagogic modalities

Pedagogic modalities include spoken, written, visual, gestural and manual modes of communication. Pedagogic modalities phase together pedagogic relations, activities and knowledge, as classroom discourse. All these modalities may be in play simultaneously. They are deployed in various ways to bring meanings into the discourse, and to manipulate meanings. For example, in Figure 14, the teacher gestures as she orally explains relations between a visual diagram and written captions on the board. A student is also manually highlighting captions in his own copy of the diagram.

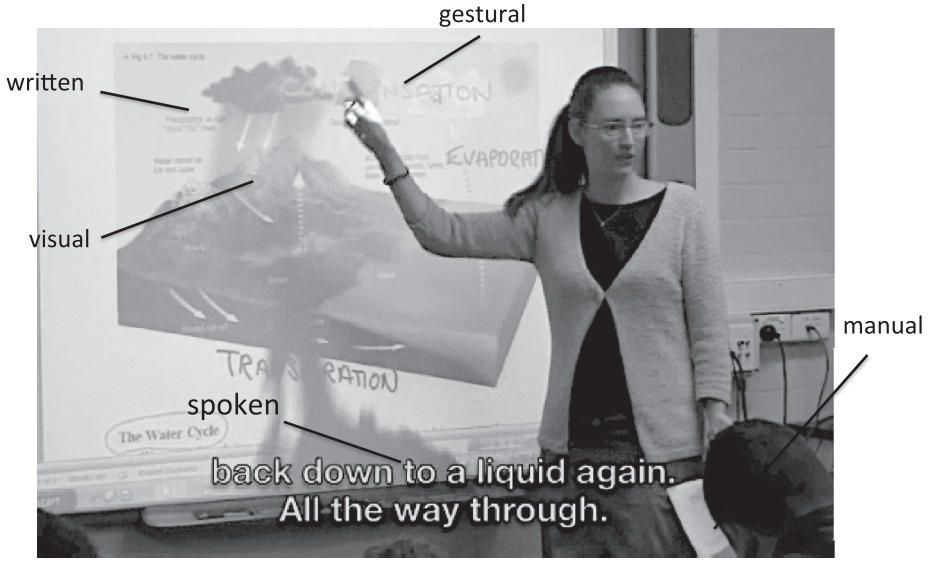

Figure 14 Pedagogic modalities: spoken, written, visual, gestural, manual.

Sources of meanings in the discourse thus include shared texts and images, such as written texts, notes and images on the board, and students' individual copies of texts and images. These meanings may be brought into the discourse by reading, pointing or referring to them, as they are discussed. On the other hand, spoken sources of meanings are teachers' or students' knowledge. Teachers orally prepare and elaborate meanings from their own knowledge, and their Focus questions typically ask students to propose answers from their knowledge. Knowledge may be shared through prior learning cycles or prior lessons, or it may be from teachers' or students' individual experience beyond the lesson sequence. These meanings may be brought into the discourse by teachers presenting their own knowledge or eliciting students'. They may remind students of shared knowledge, or ask for their individual prior knowledge. Students may recall shared knowledge, or infer the desired answer. We will refer to the means by which meanings are brought into the discourse as **sourcing**.

In ~~Table 15~~, the teacher prepares by reminding students of elements of the text they have just read. She then prepares by pointing to notes previously written on the board, specifically the word *water*. Her Focus then refers to the next item in the notes, with a semantic cue, the general class of item *doing*. This provides sufficient guidance for one student to propose the item *moving*, which he has read in the notes on the board.

Figure 15 sets out basic options for sources of meanings. The source may be spoken by teachers and students (labelled 'discussion') or recorded. Recorded texts may be verbal (written or aural) or visual (still or moving). Recorded texts may be shared, such as scribed or projected on the class board, or individual copies. Meanings may be brought into the discourse by reading, pointing or refering to a recorded text. Visual and aural texts may be shared by projecting or copying, but written texts may be shared by reading aloud. Although visual and aural texts may be pointed to or verbally referred to, only written language can be read. In other words, if a text is read, it must be written. This is indicated in the network as superscript 'I' (if read) and 'T' (then written). Written texts and still images may also be marked and annotated, and these may become sources for the discussion.

Spoken sources in the classroom discussion are teachers' and students' knowledge, that may be shared through prior learning cycles or prior lessons, or may be their individual knowledge. Teachers may present their own knowledge, or elicit students' knowledge.

~~Table 15 Exchange 14~~: Sources of meanings

Spkr	Exchange	Moves	Phases	Sourcing	sources
T	*So we're going to follow the same pattern in our writing as the text that we've just read.*	K1	Prepare	**remind**	**prior lesson**
	We need to have the same introduction,				
	identify what it is we're going to talk about,				
	move through the steps,				
	and finish it with a conclusion.				
	We're going to start with 'water'.			**point**	**notes on board**
	What is the water doing?	dK1	Focus	**refer**	**notes**
S	*Moving*	K2	Propose	**read**	**notes**
T	*It's moving*	K1	Affirm		
	OK, good				

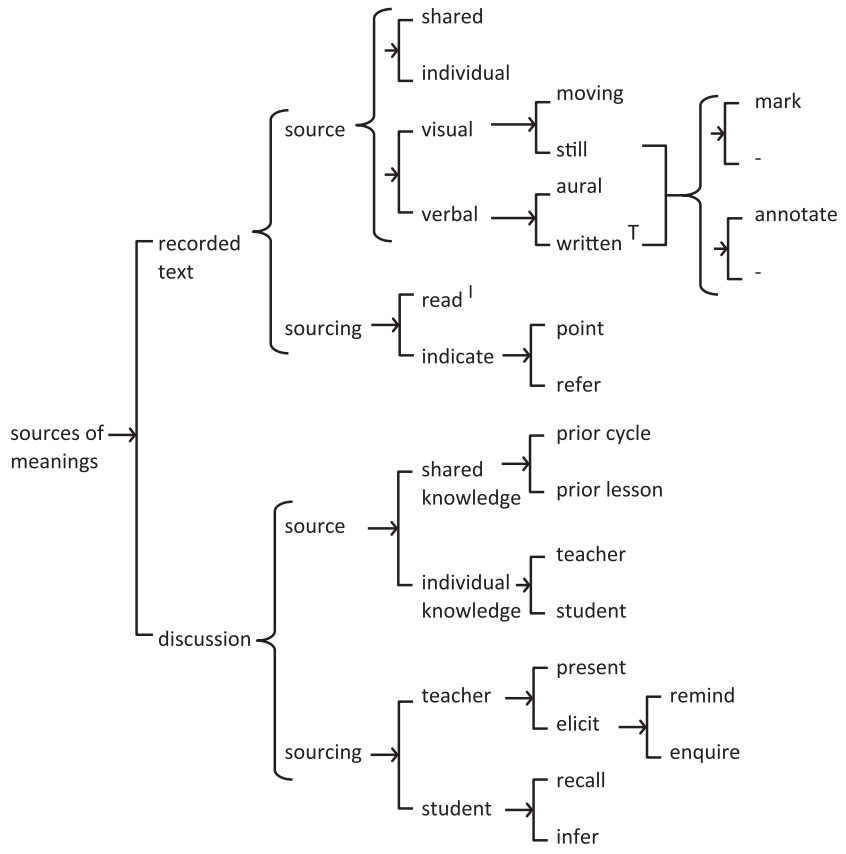

Figure 15 Basic options for sources of meanings.

Students may recall items of knowledge, or infer answers implied by teachers' questions. This is perhaps the most common type of Focus question, that expects students to infer an appropriate response.

Of course more detail may be added to these options. The system is drawn in Figure 15 to be as brief as possible, and is open to adjust and expand. For example, moving visual texts may be film or performance, still images are of many kinds, aural texts may be verbal, musical or both.

As it derives from observing pedagogic discourse, this analysis varies in some respects from other models of communicative modalities. For example, the term 'read' is often used in conjunction with visual images (Kress and van Leeuwen 1996), but only written language can be read aloud; visual and aural texts can only be referred to in discussion. The analysis also elaborates Martin's analysis of mode as either accompanying or constituting a field (Martin 1992, Martin and Rose 2007, 2008). This is because fields are constructed from multiple sources as a lesson unfolds. This may not be as significant in linguistic analysis of a recorded text, as the sources of meanings are fixed in the transcript; its wordings either present a field lexically or presume the activities and entities they originally accompanied. But for teachers and learners in the midst of a lesson, the sources of meanings are critical. The analysis here is intended to identify and hence facilitate choices about the sources and sourcing of meanings in classroom learning. This perspective also has implications for analysis of written texts, as reading is the pedagogic activity through which their authors' knowledge is exchanged. Their textual

organisation can be interpreted as managing the pedagogic activity, and their interpersonal patterns as managing the pedagogic relation.

Knowledge and values

The knowledge exchanged in a curriculum genre is realised by lexical items, and by lexical relations and reference relations between items. Briefly, lexical relations include a) nuclear relations between processes, people, things, places and qualities in an activity; b) activity sequences that construe unfolding series of activities; c) taxonomic relations between lexical elements in a text, including repetition, synonymy, contrast, meronymy (whole-part) and hyponymy (class-member).

Both knowledge and pedagogic activity may be given value by appraisals, modal responsibility, vocation, and participation in the exchange. Appraisals include a) attitudes: affect, judgements of people, appreciations of things; b) graduations of these attitudes; c) engagement. Modal responsibility refers to the responsibility assigned to participants, e.g. '*we're going to*'. Vocation is the terms used to address participants, such as students' names or teacher honorifics, e.g. *sir, miss*. Options for lexical relations and appraisal are described in Martin and Rose 2007, Martin and White 2005. There is a large literature on knowledge structures in both SFL and Bersteinian traditions, of which Martin and Maton 2013 provide a useful overview.

~~Tables 16, and 17~~ adds experiential and interpersonal elements to the analysis. One column presents experiential items, the other interpersonal elements. As there is limited space in each column, items are presented selectively.

With respect to knowledge, this learning cycle commences a lesson activity whose goal is to construct a figure (*water keeps on moving*), that is part of an explanation sequence in science (*the water cycle*). Elements of the figure are built up in each learning cycle. We can simply use the term **topic** for such curriculum knowledge discussed in a curriculum genre. Simultaneously, knowledge about language or KAL is presented, applied and reinforced. In any lesson there may thus be two fields of knowledge, KAL and topic.

The teacher prepares for the activity with KAL that the class has acquired from reading, using items such as *text, introduction, steps, conclusion,* referring to *the text that we've just read*, and to *our writing* that they are about to undertake, linked by '*the same pattern*'. She

~~Table 16 Exchange 15:~~ Lexical and appraisal items

Spkr	Exchange	Moves	Phases	Sources	Experiential items	Interpersonal
T	*So we're going to follow the same pattern in our writing as the text that we've just read. We need to have the same introduction, identify what it is we're going to talk about, move through the steps, and finish it with a conclusion.*	K1	Prepare	prior lesson	***pattern, text, introduction, steps, conclusion***	***we're going to, we need to***
T	*We're going to start with 'water'.*	dK1	Focus	notes on board	***start with water***	***we're going to***
	What is the water doing?	dK1	Focus	**refer**	***water doing***	
S	*moving*	K2	Propose	notes	***moving***	
T	*It's moving*	K1	Affirm		***moving***	
	OK, good					***OK, good***

Table 17 Exchange 16: Experiential and interpersonal elements

Spkr	Exchange	Moves	Phases	Sources	Experiential	Interpersonal
T	*So we're going to follow the same pattern in our writing as the text that we've just read. We need to have the same introduction, identify what it is we're going to talk about, move through the steps, and finish it with a conclusion.*	K1	Prepare	prior lesson	***pattern, text, introduction, steps, conclusion***	***we're going to, we need to***
T	*We're going to start with 'water'.*	dK1	Focus	notes on board	***start with water***	***we're going to***
	What is the water doing?	dK1	Focus	**refer**	***water doing***	
S	*moving*	K2	Propose	notes	***moving***	
T	*It's moving*	K1	Affirm		***moving***	
	OK, good					***OK, good***

also refers to the curriculum field they are studying as *what it is we're going to talk about.* Lexical relations include class - *patterns in texts* - to members - *introduction, steps* and *conclusion,* and all these elements are presented in an activity sequence, the procedure they will follow in writing. The class-member relations remind students of the reading activity, to prepare the writing activity. As the activity begins, lexical relations include nuclear relations between elements of a figure, *water* (entity) and *moving* (process); and repetition: *moving-moving*. The nuclear relations guide students to propose the next element; the repetition is used to affirm the choice for writing.

In the Prepare and Focus phases, modal responsibility includes teacher and students together in the activity, *we're going to,* along with obligation, *we need to*. In the Affirm phase, *OK* approves the choice of item for writing, while *good* acclaims the student. The difference between valuing the response and praising the student can be seen with grading; valuation: *OK, that's right, exactly*; praise: *good, well done, excellent.*

From learning cycles to lesson activities

Having identified the functions of cycle phases, the sources of meanings, and the knowledge being accumulated, we can now widen our perspective to the learning activity they are part of. First we can specify the functions of each learning cycle in the sequence of a learning activity, and secondly identify the phases of learning activities in which they function. Further columns can be added to the analysis to show **cycle functions** and **activity phases**. A series of learning cycles may serve one function in a learning activity, so they may be treated as a **cycle complex**.

~~Table 18~~ shows the initial activities in the Text Negotiation stage of a Joint Construction. In ~~Table 18,~~ five cycle complexes can be distinguished, of one or more learning cycles. The functions of the first three cycle complexes are to 1) preview the activity, 2) write the title, and 3) review the genre structure. The functions of the next two cycle complexes are to 4) start writing the first sentence, and 5) complete the sentence.

At the rank of lesson activity, the function of cycles 1–3 is to specify the writing activity, so these constitute the Focus phase of the lesson activity. The function of cycles 4–5 is to start creating the text, so these begin the lesson Task. These larger scale Focus and Task are phases of the learning activity or **activity phases**.

~~Table 18 Exchange 17~~: Cycle functions and activity phases

	Spkr	Exchange	Phases	Specify	Cycle functions	Activity phases
1	T	*So what we're going to do now is write our own explanation, making sure that we remember about the sequence of steps.*	Prepare	preview activity	**specify activity**	**Focus:**
2	T	*So Mert, do you want to come up on the smartboard and write the heading for us in the middle. Just write 'The Water Cycle'.*	Direct	scribing	**write title**	**specify writing task**
	S1	[scribes 'The Water Cycle']	Scribe			
3	T	*So we're going to follow the same pattern in our writing as the text that we've just read.*	Prepare	review genre	**specify activity**	
		We need to have the same introduction, identify what it is we're going to talk about, move through the steps, and finish it with a conclusion.		structure		
	T	*How about Peter? Can you come up and start the first sentence please?*	Direct	scribing		
4	T	*We're going to start with 'water'.*	Focus	item	**start first sentence**	**Task: createtext**
	S3	*'moving'*	Propose	item		
	T	*It's moving. OK, good.*	Affirm	repeat		
5	T	*What does it do? I can't say 'water moving', can I? We've got to change the word.*	Focus	structure	**complete sentence**	
	S4	*'keeps on'*	Propose	structure		
	T	*We could say 'keeps on moving'. So yep 'keeps on'.*	Affirm	repeat		
	T	*So Peter, if you can write up, 'Water keeps on'.*	Direct	scribing		
	S2	[scribes 'Water keeps on']	Scribe			
	T	*'Water keeps on' What is it keeping on doing?*	Focus	item		
	S5	*'moving'*	Propose	item		
	T	*keeps on moving'*	Affirm	repeat		
	S2	[scribes 'moving']	Scribe			

Analysis of pedagogic activity proceeds from both above and below. i.e. from the functions of lesson activities in the curriculum genre, down to the functions of learning cycle phases. The curriculum genre in this case is Joint Construction, and the lesson stage is Text Negotiation, that has followed a Note Making stage; the activity involves using the notes to create a new text. Within the Text Negotiation stage, each lesson activity includes the phases Focus (specifying the task), Task (creating the text) and Evaluate/ Elaborate (review the text). From below, the first Prepare phase functions to preview the writing task, the next phases (2) start writing, and the next (3) review the genre structure. From above, the general function of these phases is to specify the writing activity, constituting the Focus phase of the lesson activity. Cycle 4 commences the writing task, by specifying the first lexical item in the sentence. Cycles 5 complete the sentence, by specifying the following structures and items. These cycles thus commence the Task phase of the lesson activity.

While Joint Construction is a designed curriculum genre, the analysis can be applied to any pedagogic practice to describe its structuring, functions and effectiveness. It can also be used to design effective pedagogic practice. By way of illustration, it is applied in ~~Table 19~~ to beginning language learning, in the protolanguage stage (age 14 months,

~~Table 19 Exchange 18:~~ Learning the mother tongue

Exchange		Roles	Cycle phases	Sources	Experiential items	Cycle functions
Child	*dae* [pointing at bird]	K2	Identify	point at entity		
Mother	*yes*	K1	Affirm			prepare
	bird		Elaborate	name entity	*bird*	word
Child	*da* [pointing]	K2	Identify	point at entity		
Mother	*bird*	K1	Elaborate	name entity	repeat *bird*	
Child	*da* [pointing]	K2	Identify	point at entity		
Mother	*that's a bird.*	K1	Elaborate	refer & name entity	refer & repeat *bird*	
Child	*ba; ba* [pointing]	K2	Identify	point & name entity	repeat *bird (ba)*	propose
Mother	…	K1	(Affirm)			word

from Painter 1986:81). Language teaching may involve drawing the learner's attention to phenomena, or following the learner's attention, shown in ~~Table 19~~.

As the child initiates the exchange here, there is no Focus phase, but the pointing and naming activity is prepared by thousands of instances of caregivers pointing and naming the world, long before infants start to do so themselves. The task is to identify elements in the sensory environment, and eventually to articulate their mother tongue names, a universal pattern of human language learning. The mother capitalises on the child's attention, by first affirming, and then elaborating with the mother tongue word *bird*. It is this evaluation and elaboration that marks this as a pedagogic exchange, in which the mother is the teacher and the child the learner. The affirmation evaluates the child's utterance as success with a learning task, rewarding the child with positive emotion. Expectation of this reward is the child's motivation for pointing and naming, and for engaging in pedagogic exchanges in general. In this instance, the reward encourages the child to repeat the identifying act again and again. On the mother's side, she knows intuitively that success and affirmation enhance the child's capacity for learning, which she capitalises on by repeating her elaboration, initially just with the word, but then with a whole clause. Elaborations such as these provide models of mother tongue language features such as lexical items (*bird*) and grammatical structures (*that's a bird*), at the precise moment when the child is most ready to recognise and remember them. The outcome of repeated success and elaboration is that the child begins to replicate the mother tongue word. Painter comments that 'A few days later 'ba' became the regular form for bird' (1986:82).

~~Table 4~~ illustrates the analysis with a manual activity. In this case an Indigenous Australian elder is guiding a young person to dig for the delicacy *tjala* 'honey ants' (from Rose 2001, 2010). These insects live in small chambers a metre underground, at the end of long narrow tunnels, so great skill is required to find them. The pedagogic goal is learning to recognise the tunnels and excavate correctly to locate the honey ant chambers without damaging them. The student identifies features and the teacher guides by focusing attention, and affirming or rejecting what is identified. The features are not named, but are pointed and referred to. The exchange is translated from the original Pitjantjatjara; reference items are in bold.

This example illustrates the variable relations between pedagogic cycle phases and pedagogic exchange roles. While the teacher directs activity with A2 commands, their

pedagogic function in cycles 2, 5 and 6 is Focus, followed by Identify and and Affirm/Reject phases. Furthermore, the initial Identify phase is enacted as a K2 question, that is rejected. The student's non-verbal A1 actions in cycles 3 and 6 can also be analysed pedagogically as Identify phases, since they are evaluated by the teacher. In efforts to interpret Bernstein's analysis of pedagogic discourse in terms of exchange structure, it has been proposed to code knowledge exchanges as 'instructional' and action exchanges as 'regulative' (e.g. Christie 2002). However, as action exchanges often also have an instructional function, Martin et al. (2007) propose a 'double coding' of such exchanges as both action and knowledge. In contrast, pedagogic exchange structures and pedagogic activity cycles are analysed here as serving distinct interpersonal and ideational functions. Pedagogic activity is negotiated as pedagogic exchange, and both require distinct, complementary analyses.

Using a spreadsheet, analyses can be extended indefinitely, as a lesson unfolds. The display facilitates the analysis, enabling the analyst to see patterns emerging in pedagogic relations, activities, modalities, knowledge and values, illustrated in ~~Table 5~~. Learning cycle nuclei are shaded. To save space, non-verbal A1 roles are left implicit.

Detailed Reading is a highly designed curriculum genre in which teachers guide students to read and comprehend texts that may be well beyond their assessed reading capacities (Rose and Martin 2012, Rose 2014). The class here is junior secondary science, with students whose literacy is very low. ~~Table 5~~ illustrates key features of Detailed Reading, which we can identify by examining each column of the analysis in turn. Firstly, the exchange structures appear little different from the universal pedagogic dK1^K2^K1 pattern, but participation differs from common practice in that the teacher usually addresses individual students by name, so that nine students actively participate in turn in this brief extract from the lesson.

Secondly, the pedagogic activity begins with preparing students for the activity (1), and to comprehend sentences as the teacher reads them aloud (2). Focus phases then guide students to identify each element of meaning in the sentences (3–4), by specifying the meaning to identify, and/or its position in the sentence. Where necessary, the Focus is preceded by a Prepare phase that provides semantic and/or position cues. Consequently, each student successfully identifies the wordings under focus and is affirmed. The teacher then directs the class precisely which words to highlight. This ensures that all students successfully identify and understand each wording. Success and affirmation also ensure that all students are able to comprehend and keep pace as the text is read, and are ready for elaborations of meanings. Where appropriate, the teacher then elaborates the identified meaning, e.g. by reinforcing the technical field, e.g. *state's the scientific word we use for whether it's a solid, a liquid or a gas.* Towards the end of the second sentence (4), she elaborates a more complex feature of the technical field, *two sides to the Water Cycle.* In the final cycles (5), the field is elaborated interactively by refering to the water cycle diagram, and asking students to infer a technical process (*condensation*) that had been discussed before reading.

Thirdly, the source of meanings during the reading activity is generally the text itself, either refered to or read. Prepare and Focus phases usually refer to the text, but the identifying task may be made easier by the teacher reading up to the words to identify. Students then identify elements by reading the text. Elaborations either present the teacher's knowledge or remind students of prior cycles or lessons. In the elaborating

sequence (5) sources shift to eliciting and infering students' knowledge, culminating with presenting the teacher's knowledge. This is a more common pattern in classroom discourse, where sources are students' or teachers' knowledge.

Fourthly, experiential elements construe features of both the text and its technical field. Prepare and Focus phases often refer to the text, students then identify the field in the text, and the teacher may elaborate with more technicality. In the elaborating sequence (5), the technical field is related to commonsense *what's going on, makes it rain, what must be happening, gets darker, could be icy.* This diversion to commonsense is less successful, as students intuitively relate *cold* to *ice*, when the technical process is actually *condensation* from water vapour to liquid water. This pattern of guesswork is very common in classes of less advantaged students. It is ameliorated here by the focus on the written field.

Finally, interpersonal elements here are overwhelming intended to engage students in the activity, inviting them, *let's now look, can we all, if we can, can you give me, just make sure we've*, and rewarding them by praising their success. Some appraisals are features of the technical field, *constantly, might have, maybe, all the way, might still be just*, that serve to grade processes and categories in science.

Conclusion

The goal of the analysis outlined above is an exhaustive description of curriculum genres. Classroom discourse analysis is itself a genre, that varies with the informing theories and specific purposes of the analyst. The analysis here is elaborate, as it is informed by the elaborate social semiotic models of genre and register theory, and its purpose is an integrated description of the whole of pedagogic practice. Genre and register theory enables us to describe how knowledge is presented, accumulated and evaluated through pedagogic activity; how pedagogic activity is organised as cycles of learning tasks, that are prepared, focused, evaluated and elaborated by teachers; how pedagogic modalities are deployed as sources of meanings; and how pedagogic relations are enacted in patterns of participation and evaluation in teacher/learner exchanges.

Some of the analysis has previously been presented in SFL research, but is re-organised and extended here. Pedagogic exchanges are described by Martin (2006), Martin and Rose (2007), alongside the early language work of Halliday (1975), Painter (1984, 1986, 1999), and are extended here by analysing learner participation. Pedagogic activity as learning cycles has been described by Rose (2004, 2007, 2010), Martin and Rose (2007), Rose and Martin (2012), and is extended here by specifying the functions of cycle phases. Knowledge and value as patterns of ideational and interpersonal meaning is well described by Martin (1992), Halliday and Martin (1993), Christie (1999), Christie and Martin (1997), Martin and Veel (1998), Martin and White (2005), Martin and Rose (2007, 2008), Martin and Maton (2013). The analysis of pedagogic modalities as sources of meanings was flagged in Rose (2010), and Rose and Martin (2012), but is more fully delineated here

A further goal is to make this complex analysis as practicable as possible, allowing rapid analysis of extended stretches of discourse. To this end, spreadsheets are used with columns for each component of the analysis. This presentation enables relations between each component to be readily seen, both horizontally within each role of an exchange, and vertically as the exchange unfolds in time. A spreadsheet allows the

analysis to extend indefinitely, vertically in time, and horizontally in larger units, from phases in learning cycles, to cycle functions, to phases in learning activites, to functions of each activity in lesson stages, potentially up to whole lessons. Automated programs also have the potential to manage this complexity, such as O'Halloran et al. (2013). To make the analysis consistent and replicable, system networks have been outlined for each component, suggesting how to categorise and label instances in discourse.

How the analysis is used will depend on the analyst's purposes. Once patterns of discourse in each component have been described, along with relations between components, the next step is to interpret the patterns of pedagogic register that they realise. For example, how inclusive are pedagogic relations, how effective are pedagogic activities for groups of learners, how well are pedagogic modalities deployed to this end, what knowledge structures are construed, and how are they evaluated? This level of interpretation may enable evaluation of pedagogic practices (McNaught in prep), and design of more effective practices (Kartika in prep). It may enable articulation with other models of pedagogic practice, such as Bernstein's theory of pedagogic discourse, or Maton's legitimation code theory. It is capable of describing exhaustively how the categories of any pedagogic theory are realised as genre, register and language.

Competing interests
The authors declare that they have no competing interests.

Received: 17 August 2014 Accepted: 31 October 2014

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doi:10.1186/s40554-014-0011-4
Cite this article as: Rose: **Analysing pedagogic discourse: an approach from genre and register.** *Functional Linguistics* 2014 **2**:11.