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Five-year-olds doing science and technology:

How teachers shape the conversation

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Abstract

This paper presents an analysis of a series of lessons observed and recorded over nine weeks in a pre-primary classroom where children were undertaking science and technology activities. Using a functional discourse analysis, we describe how teachers use various strategies to structure the discourse to facilitate the children's learning in this area. These strategies include various methods of controlling the topic and discourse participants, techniques involving questioning, ways of dealing with vocabulary and constructing inclusive relationships with children. We propose that explication of these discourse strategies is a valuable research tool for pre-service and new teachers who are evolving their own classroom communication skills and techniques.

Introduction¹

Discourse analysis is a valuable tool for analysing and reflecting on classroom practice. To this end, we observed and audio-recorded a series of science and technology lessons over nine weeks. Afterwards we applied a functional discourse analysis to the transcripts in order to identify the strategies the teachers used to engage the children in the learning.

Science and technology are vital learning areas in primary school education and are increasingly being emphasised in the early years. Classroom discourse in these curriculum areas is a ripe location for examining children's literacy, how they are initiated into scientific

¹ This study formed part of the project, 'Early Science Literacy in Indigenous and Culturally Diverse Communities', funded by a [university] [Faculty] small grant 2009-2010.

and technological discourse and the role of teachers in developing this discourse. Teachers' roles involve, among other things:

- engaging the learners in the discourses of and about science,
- helping them to question claims about scientific matters, and
- assisting them to investigate, question and draw conclusions about science topics (Rennie, Goodrum & Hackling, 2001). According to Rennie (2005) engaging in scientific discourse

means:

being able to read about and talk about science in a sensible and comfortable way ... being able to participate in the communication of science ... not being frightened of science but being willing to engage with it... (p. 12)

The Australian Curriculum Science (v.3.0) describes "scientific literacy" as follows:

Students can experience the joy of scientific discovery and nurture their natural curiosity about the world around them. In doing this, they develop critical and creative thinking skills and challenge themselves to identify questions and draw evidence-based conclusions using scientific methods. The wider benefits of this "scientific literacy" are well established ...

(The Australian Curriculum v.3.0 Science. Rationale, 2012)

Constructivist and sociocultural theories of education suggest that in order to learn most effectively, children need hands-on activities, observations and social interactions with peers and adults; and the learning of science lends itself to such an active learning approach (Shepardson & Britsch, 2001, p.43). Indeed, scientific inquiry necessitates the type of environment where children can observe, ask questions, seek answers, make discoveries and justify their decisions (DuVall, 2001). This is at the heart of what it means to 'do' science. This study will investigate to what extent teachers (and children) were able to create and participate in situations conducive to science learning.

To involve children with science, teachers first need to engage them and get them to respond, as Rennie (2005) notes. The extent to which their responses go beyond the minimal and simplistic will be an indication of their involvement, and this is illustrated in our discussion of turn length below, particularly in the case of some children. Student initiation of talk, occasionally found in our data, is another indicator of engagement.

One of the roles of the teacher is to model appropriate discourse, in this case scientific discourse. There may be scientific processes, such as drawing conclusions, which are beyond the capabilities of very young children; modelling of these processes by the teacher is one way of introducing children to the learning of science. Other scientific processes such as observation are well within the capacity of children of this age, and the teacher's job is to set up structured situations where they will be able to practise these processes. Mastery of a discourse is shown by the use of appropriate register, including the scientific terminology focussed upon by teachers in our data.

Use of appropriate feedback is another way of setting up a situation conducive to learning, in this case science learning. Teachers' targeted feedback can draw attention to terminology and classification systems, for example by use of antonyms such as 'rough' and 'smooth', or can encourage the children to think about the reasons behind processes and phenomena. Various types of questioning are involved in this feedback and questions are a very important means of encouraging students to think scientifically.

As the children in our data set are very young, their current scientific knowledge may be rather limited, but their skills of thinking and interacting, as supported and developed by the teachers in our data, will set them up for further learning in this area.

Below, we discuss how the teachers shaped activities and spoken discourse with the aim of developing the children's scientific and technical knowledge and literacies. Our intention was to analyse the classroom talk and to make our findings available for pre-service teachers

and others who could learn from these experienced teachers. The analysis we use is based on functional linguistics, which provides a holistic model of language in society, linking language variables to their social context. (Halliday, 1993, 1994; Halliday & Matthiessen, 2004; Martin & Rose, 2007; for functional work relevant to young children and to the classroom, see Painter, 1998; Christie, 2002; Droga & Humphrey, 2003; Derewianka, 2011.)

Methodology

The children observed in this study were from various cultural and linguistic backgrounds, including Indigenous Australian, Amharic, Japanese, Mandarin, Spanish, Swedish and Vietnamese, making for a multicultural classroom environment. The researchers audio-recorded classroom 'conversations' of two of the nine groups of children. There were three teachers working with the children; here they are given the pseudonyms of Sara (SC), Laura (LA) and Davida (DW). The teachers were accompanied at various times by aides, parents and the school chaplain. One of the authors was also involved in observing the lessons.

Below, we first outline the scope of the unit of work done by the children, then briefly: describe the analysis we undertook, present examples of some of the features we observed, and discuss the teachers' discourse styles and what pre-service teachers could learn from them.

The Field: topics and activities

According to teacher Laura, the observed lessons were designed to give the children "a complete understanding of buildings and the reasons why we need them". She went on to say that the teachers aimed to immerse the children in the topic through hands-on and problem-solving activities, beginning with the question, "What makes a house and what makes a home?" Nine groups of children rotated through nine activities, one each week.

Before and after the group activities, teachers convened whole-class sessions to preview and then reflect on the week's topic. Small-group activities included a photoshoot, a building materials investigation and sketching using scale and perspective.

One of the authors followed one group of children throughout the nine weeks of activities. Another group was followed by a research assistant. All of the discourse was audio-taped and later transcribed. The researcher and research assistant took field notes for their groups and interviews were conducted with staff before and after the unit of work.

The research question: How did the teachers shape the children's learning?

The following analyses¹ focus on how the teachers used discourse and actions to shape the children's learning:

Number and length of turns

This describes participation in the discourse by looking at who is talking and for how long.

Speech Function

This analysis describes types of Initiation, Response and Feedback structures and their place in the discourse.

Exchange Structure

This involves turn-taking, and predictable and unpredictable discourse moves. It gives information on the dynamics of the interactions.

Register

Register describes different aspects of any given situation: the subject matter and what is going on (Field); relationships among participants (Tenor); and medium of communication, (Mode). See Martin & Rose (2007, pp. 296-308) for an outline. In this paper we focus on the Field and the Tenor of the discourse.

¹ Please note that it is conventional to write some technical linguistic terms with initial capital letters, in order to indicate their place in the system of analysis.

Space does not permit us to give a detailed description of these analyses here; instead we present a discussion of what each of the tools enabled us to notice in our data.

DISCOURSE ANALYSIS

Number and length of turns

This simple analysis can help indicate power relationships in the discourse and the extent to which children have been supported to produce lengthier utterances. The most straightforward way to count turn length is by the number of lines in the transcripts.

However, with some basic knowledge about language, the analyst can calculate the grammatical complexity of turns, which reflects on children's development in this area.

Number and length of turns were measured for both the children and the adults. Teachers were extremely dominant overall. The children's turns varied considerably, with some children being prolific talkers. The number and length of turns from particular children seemed to depend on the situation and on which adult they were working with. Table 1 illustrates the overall distribution of turns in our data.

[Insert Table 1 about here.]

Speech Function

A Speech Function analysis can include a traditional Initiation/Response/Feedback (IRF) analysis (Sinclair & Coulthard, 1975; Halliday, 1994, p.69). This IRF analysis is shown in Example 1, adapted from our data:

Example 1

		IRF analysis	
1	SC	Initiation (I)	It is Wednesday. I'm wearing a shirt that should give you a big clue. I know lots of people in my class know. Karen, do you know the name...?
2	Ka	Response (R)	A remembering day for the people that died in the war?
3	SC	Feedback (F)	It's Remembrance Day, that's right.

In our data set adults predominantly initiated topics and threads of conversation, although occasionally children performed Initiations.

An IRF analysis can be combined with an analysis of the Speech Functions of Statement, Question, Command and Offer in order to look more closely at the meaning of each element.

For example, it is very common for teachers to initiate with a Question, as illustrated in Examples 1 and 3, and this indicates their control over the discourse; a Question, unlike a Statement, strongly requires a response and therefore this is one way in which the teachers make it necessary for the children to participate in the discourse.

Exchange Structure

An Exchange Structure analysis (Martin & Rose, 2007; Ventola, 1987; Berry 1981a,b,c) goes beyond the concept of Speech Function, coding the discourse for whether it involves talking or action (or both) and the role of the speaker in terms of their level of expertise, for example the 'primary knower' role. For a very brief introduction to Exchange Structure see Thwaite 1993, pp. 163-165. For a recent application of Exchange Structure to classroom discourse, see Jones, Kervin & McIntosh (2011).

Discourse dynamics

Discourse structure

As mentioned above, teachers, rather than children, are overwhelmingly the initiators of exchanges in our data, as is common in classroom discourse. Example 2, however, shows children vying with the teacher (DW) for control of the exchange.

Example 2

53	Cr	...when they built my house, they used the cement and I was only a little baby.
54	DW	Oh goodness me.
55	Am	Guess what?
56	Cr	And I watched the video of my...
57	DW	Did you now? Okay.
58	Cr	...when I was a baby.
59	Am	Guess what?
60	DW	We're going to stop now...
61	Am	It's about bricks.
62	DW	...and we're going to go over because we're got some activities to do and we need to do it quickly.

Prior to the extract above, Amanda had succeeded in making considerable input, and other children had also joined in. Line 61 is particularly interesting in that it shows Amanda's awareness of discourse conventions. She has been bidding for another turn and, in the face of Davida's closing remark (line 60), here she attempts to justify her bid by stating that her utterance is on topic. However, for management reasons, Davida exercises her right to close Amanda down; but, mindful of the fruitful discussion she is interrupting, she explains her reason for doing so.

When teachers initiate an exchange, most often with a question, there is usually more than one child who responds, some non-verbally. The teacher then selects one or more children to take the floor. Typically, the teacher then acknowledges what each child has said, although in large groups it is not always possible to respond to everyone. The acknowledgement often takes the form of repeating, paraphrasing or 'recasting' the child's discourse. Teachers rarely directly contradict what children have said. After their feedback, teachers may round off the discussion or introduce a new (sub) topic. In this way, they are opening up the discussion for as many children as possible to contribute. They are also helping to shape the children's ideas, modelling generalisations and conclusions and, in some cases, showing how different sub topics in the fields are related. The IRF analysis in Example 3 illustrates the typical discourse pattern, showing some different types of feedback moves and what they do.

Example 3

		IRF	
26	DW	I	Well, we're talking about bricks today and bricks that we've used, and yes, bricks can be made for the floor like you said, Cara, or for paving. And are they all the same colour, bricks?
27	Ss	R	No.
28	DW	F (repeating)	No...
29	Cr	R	Some are brown and some are white.
30	DW	F (repeating) I	Some are white. Any other colours that bricks can be?
31	Je	R	Are some...?
32	M	R	Black?

33	DW	F (elaborating) I	Yeah, there's some black bricks over there, look, isn't there? Any other colours?
34	Am	R	Orange bricks.
35	DW	F (summarising)	Orange bricks, mm, bricks can be all different kinds of colours.

Above, several children add to the discourse, including Mario (line 32), who is usually quiet. Thus Davida's questions appear to be successful in encouraging contributions from the children and engaging them in the discourse. This is a step towards them thinking and talking scientifically, although responses are often very short.

Elaboration

In order to develop the conversation, teachers add information to children's utterances, often with just a single adjective, for example, 'beautiful' in line 343 below:

Example 4

341	LA	In the bathroom , uh huh, that's a tile .
342	Ok	Yeah, they go in bathrooms; they go in bathrooms .
343	LA	A beautiful tile in your bathroom .

Above, Laura's response to Okko acts as a confirmation of the value of his utterance, a variation on the obvious feedback such as, "Yes, that's right." This arguably helps the interaction seem more conversational, although outside the classroom this would be an odd discourse move.

Elaborations used by teachers may be in the form of a question or series of questions, often including an alternating question using the word 'or', for example, "Was it **easy** or **hard**?" The use of this type of 'suggesting' question is typical of the classroom discourse of Sara (SC) and is also used by the other teachers. For example, in each of two lessons, Cristiano, a child from South America, has two of these questions directed to him, even when the teacher seems not to have quite understood what he is saying. Perhaps questions like this are helpful to a child who is struggling for an appropriate answer, or having difficulties finding vocabulary, because the question clearly suggests possible responses.

Enabling and extending children's answers

Teachers give prompts or hints to assist children to respond to their initiations, by referring to previous discourse. For example, Sara says, "We just said it; we just said it right now", clearly indicating where the answer to her question can be found. In Example 5 Davida helps Jessica to respond.

Example 5:

37	DW	What do you think brick's made from?
38	Je	Are they really ... some of those hard things?
39	DW	Mm, well they are hard, aren't they? I think you told us before, Jessica. You said they were made of something and then they dry out. Can you remember?
40	Je	Clay.
41	DW	Clay. That's exactly right.

Above, Davida refers to Jessica's previous discourse, and substitutes the general word 'something' in place of the answer, which she is successful in obtaining.

Types of Questions

'Teacher knows the answer' questions

This commonly-used type of question, usually a closed question, is known as a 'dk1' ('delayed primary knower') move in Exchange Structure. Table 2 shows the extent to which these moves are used by the adults in our data. Overall, the adults use more closed questions than open ones. However, given this pattern, as a whole the proportion of open questions used by the teachers is greater than that of the other adults.

[insert Table 2 about here]

An illustration of the use of dk1 moves by teacher Laura is shown in Example 6.

Example 6

402	LA	Up. Where does it go? Does anyone know where it goes? Cristiano's right, it goes on the top of your house. Do you know what it is? No? I really haven't seen one this close before either. It's a roof tile . Yeah? And lots of those together form the roof when they're joined together. And roofs are very useful. What are roofs very useful for?
403	S	They give you shelter .
404	LA	Oh, absolutely .

Here Laura is using the questions in line 402 to teach vocabulary, among other things. While dk1 moves sometimes receive bad publicity, this is an example of a case where they are useful: Laura has some terms and concepts that she wants the children to learn, and the closed questions above are a quick way of achieving this. Some other dk1 moves have

already been shown above: “And are they all the same colour, bricks?” (Example 3) and “What do you think brick's made from?” (Example 5), illustrating how this discourse strategy is successfully used by these teachers.

Extending children's answers

Experienced teachers ask a variety of questions. In our data the adults ask various types of questions, sometimes ‘how’ and ‘why’ questions, but often questions which only require a one-word answer (cf Example 3): of the 1326 teacher questions in our data 935 (71%) are closed questions. Open questions are used to extend the conversation, such as in Example 7, where Sara is looking at Okko’s construction and asking him to explain aspects that she is not aware of:

Example 7

79	SC	Why is the door going to open out like that?
80	Ok	Because it's ... because I want it to, because it can't open by itself.
81	SC	Oh, it can't open by itself. Is it going to be, like, an electric door?
82	Ok	Yes, it's an electric door.
83	SC	So it goes up or does it go out? Does it go up to let people in, Okko?
84	Ok	Yes.
85	SC	It does, fantastic.

In this segment, Sara follows her open ‘why’ question with three yes/no questions, in order to encourage Okko to talk more specifically about the door, using his name to get his attention.

Redirecting questions

If a child does not give a preferred response or does not respond, the adults will rarely criticise. In accordance with early childhood pedagogy, they use various feedback strategies to elicit a response, or in some cases may redirect the question, either by asking a different child, or by framing the question in another way, such as by using Modality.

Modalised questions

A negative response can sometimes be avoided by use of Modal verbs (markers of probability or uncertainty), as in Example 8.

Example 8

381	LA	What part of the building do you think that [<i>a wooden block</i>] would be used; where would you use...?
382	Y1	A bridge.
383	LA	On a bridge? Okay. You might use it on a bridge outside.

Above, Laura uses the Modal verbs 'would' and 'might' and the Mental process 'think' to encourage Yolanda to suggest an answer even if she is not certain.

As can be seen from the analysis samples for Speech Function and Exchange Structure above, the adults shape the discourse by determining who speaks, for how long, and on which general topic, and the children are encouraged to contribute to the content of the exchanges. Questions are a very important part of the adults' repertoire, having the functions of allocating turns, directing the discourse, and helping the children to extend their thinking and their contributions.

REGISTER

We now turn to the concept of Register, and here focus firstly on Field and secondly on the Tenor of the discourse. Field involves:

- the subject matter and how it is organised,
- topics of conversation, and
- vocabulary;

Tenor concerns the construction of relationships among the participants. Our discussion indicates what these analyses can teach us about teacher dialogue strategies.

Field

Introducing vocabulary

In many of the observed lessons there was a strong focus on vocabulary, a key part of inducting the students into the discourse of science and technology. For instance, the teachers directly named some items, as with the tile in Example 4, above. We have already mentioned vocabulary being introduced in ‘suggesting’ questions such as, “Was it **easy** or **hard?**”, where the child simply needs to choose one item from two provided by the teacher. Laura explicitly refers to vocabulary in requests such as, “I want some good **words** to write up on our brainstorm.” She is persistent in eliciting the descriptive vocabulary, as can be seen in Example 9.

Example 9:

52	LA	Can you give me some more words about those bricks? Mario, what do you think? Have you had a good feel? What do you think about bricks, Mario? Are they smooth? They're very hard .
----	----	--

Above is another example of a ‘suggesting’ question, where Laura provides the word ‘smooth’ as a possible answer. However, she is open to other suggestions from Mario.

Sometimes the vocabulary is jointly constructed between teacher and children, as in Example 10.

Example 10:

30	SC	I wonder how it's staying up there.
31	J	Because sticks are holding it up.
32	O	Yeah, because poles are here.
33	SC	You can touch it. Touch it and see if they are sticks . Does that feel like sticks ?
34	O	They're poles .
35	SC	What are poles made from?

In this example Jessica and Otto provide names for the roof supports, but it is Otto's suggestion of 'poles' that is endorsed by the teacher.

Jointly-constructed spoken tasks such as those in which these children were involved over the nine weeks have been described as "Activity-based Sharing" (EDWA, 1997, p.3).

Children gradually develop the types of language they need to complete these tasks: the least challenging language involves labelling, followed by describing, with classifying being the most difficult (EDWA, 1997, p.3). Vocabulary in the present data set was used in these three different ways.

Overall, the vocabulary was mostly at the Labelling end; however the teachers also did some Describing and Classifying with the children who they knew were capable of using these functions. With children who needed greater input there was a lot of repetition to reinforce the vocabulary. All three teachers also used some quite advanced vocabulary with the five-year-olds, for example *alfresco*, *pergola*, *ventilation*, *heft* and *palaeontologist*, and the children showed evidence of understanding these words in context.

Teacher generalisations

To help children organise their knowledge of the Field, Sara provided generalisations, as in Example 11.

Example 11

109	Hn	Some houses are made out of leaves.
110	SC	Are made out of...?
111	Hn	Leaves.
112	SC	Leaves, yes. So they're made out of different materials.

Here she connects 'leaves' and 'materials', relating the discussion to the exploration of building materials over the nine weeks, and simultaneously **drawing a conclusion**, thus modelling an aspect of scientific literacy.

Focus on scientific processes

As well as developing the children's Field-related vocabulary, the teachers also focussed on scientific processes. For example, Sara concentrated on the key process of **observation** (cf. DuVall, 2001) by firstly asking the children to feel a bike rack, and secondly getting them to look at what shape it was and what material it could be made from.

Tenor

Relationship constructed with children

Sara, in particular, constructed quite an egalitarian relationship with the children, given the fact that they were five years old. She assumed that the children may have diverse experiences of the world; for example, she questioned Hannah about the location of a park

she visited, implying that it might be overseas. She also made a joke about her own position as a teacher, thus decreasing the distance between herself and the children:

Example 12:

601	Aide	they just discussed what would be in a community.
602	SC	Oh. And what was one thing that a community needs? A school? ... You didn't have a school?
603	Aide	No.
604	SC	Maybe next week they'll put a school in the community; I hope so.
605	Aide	Maybe.
606	SC	Otherwise we won't have a job.

Sara's discourse could be described as 'high-level' in some respects, and to an extent Laura's discourse was also at an advanced level in relation to the age of the children. Sara was very inclusive and responded positively to the varied circumstances of the children in the class. She demonstrated an international outlook and often mentioned things about other countries, connecting with the children's cultural, linguistic and family backgrounds. For example, in talking to Cristiano she used the Spanish word for 'house'. Speaking with Yolanda, she included discussion of the family's religious practices, and this elicited a long stretch of discourse from Yolanda, who was normally rather quiet. Sara talked about different places of worship, including temples, synagogues and mosques, in contrast to teacher Laura, who emphasised Christian churches in her presentation to the class. Space precludes us giving examples of Sara's inclusive discourse here but it would certainly be a useful model for beginning teachers who are striving to incorporate such discourse into their practice. This is, of course, relevant to all learning areas, not just science and technology.

Discussion

The analyses selected have illustrated some aspects of the teachers' conversational strategies that helped their students to learn about science and technology in the contexts we observed.

In this series of learning experiences the adults facilitated the children's learning by:

- Controlling the structure of the discourse as it unfolded.
- Controlling turn-taking, attempting to include as many children as possible in the interactions.
- Asking various types of questions, in some cases 'how' and 'why' questions, but often questions that only required a one-word answer, sometimes as part of encouraging children to participate.
- Eliciting and introducing vocabulary. Teachers Sara and Laura used some advanced vocabulary, which the children demonstrated that they understood.
- Facilitating use of vocabulary for labelling, describing and sometimes classifying, to help develop children's knowledge of the Field.
- Constructing inclusive relationships with the children.

While we have dealt with each analytic device separately, clearly all of the strategies used by the adults were being employed simultaneously, which serves to underline the adults' linguistic dexterity in juggling all these discourse behaviours while at the same time managing groups of up to fifty five-year-olds.

Having access to a toolbox of analyses such as these can help teachers reflect on their practice. While some aspects of classroom discourse may appear self evident and can be accessed through simply listening to an audio-recording, it is not until one actually delves deeper by, for example, analysing the number and type of turns from each participant, that one gains further insight into "what is going on" and, perhaps more importantly, **how** it is

going on. Some of the linguistic patterns of these teachers are quite subtle and could be easily overlooked, especially by pre-service teachers.

Having some analytical concepts at their fingertips can also help teachers talk about their practice more easily. A case in point is the *dk1*, a much less cumbersome term than “teacher knows the answer question”. In our work with teachers we have found that they benefit from looking at transcripts (and if possible, videos) of their own classrooms and appreciate being given some questions and analytical tools to aid their self-reflection. (See Thwaite & Rivalland, 2009.)

However, the analysis is more than the sum of its parts. A holistic analysis necessitates a good foundational knowledge about language and the ability to draw on various tools to describe interactions. It takes some time to learn how to do this and our aim in this paper has not been to instruct readers in how to do the analyses. Instead, we have attempted to share with readers how these analyses have helped us to notice some characteristics of the excellent work of teachers such as Sara, Laura and Davida. In a paper of this length, there has not been space to discuss in detail the context of each of the strategies used by the teachers and how they planned, set up and carried out their interactions. This is a limitation of our discussion and is an area that it would be useful to develop in the future.

Finally, while our discussion has been limited to our sample data, which focuses on the science and technology learning area, the techniques illustrated could be readily applied to other subject areas. This too could be a topic for further research and discussion.

Conclusions

We contend that trainee teachers can learn about classroom discourse from observing teachers like these. Analysing talk is not an easy task, as some of its features are very subtle. For example, we sometimes advise pre-service teachers to, “Make sure everyone has a turn”. However, an overemphasis on equitable turn-taking could be detrimental to the discourse in

other respects, such as a detailed development of concepts. Classroom discourse is a highly complex area and we have barely touched on its complexity here. One area which we have not gone into here but which we experience in our daily work is pre-service teachers' experiences with the concepts discussed here; we would welcome the opportunity to undertake further research on this.

Our analysis has focussed on linguistic variables. Obviously there was much going on in the learning environment in terms of non-verbal behaviour, but this aspect of the conversation would require another paper.

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Table 1**Number and length of turns**

Non-verbal turns are not included. Turn length is given in lines.

Speaker	Number of turns	Maximum length
Teachers		
Sara	874	19
Davida	385	22
Laura	376	16
Other adults		
Mrs Edgar (teacher aide)	226	15
Mrs Naxos (teacher aide)	95	10
Mary (chaplain)	88	11
Father (parent helper)	3	1
Tt/Ts = adults together	7	1
T = unidentified adult	62	6
Students		
Albert	3	1
Alex	43	2
Alison	6	1
Amanda	30	2
Amy	14	1
Anna	13	2
Astika	1	1

Betty	7	1
Bruce	79	3
Cara	20	4
Chad	12	2
Cristiano	311	8
Dennis	6	1
Eddie	1	1
Elena B	1	1
Elena C	1	1
Elena X	19	1
Enda	1	1
Hannah	115	2
Jackson	4	1
Jacob	7	1
Jessica	19	1
Joe	20	2
Juan	11	1
Karen	36	4
Karina	5	1
Katrina	98	2
Kim	10	1
Kylie	6	1
Lorenzo	36	4
May	7	1
Mike	8	1

O (not clear if Okko or Otto)	5	1
Okko	221	3
Otto	33	4
Patricia	10	1
Pearl	2	1
Roberto	7	1
Sasha	5	2
Susan	6	1
Yolanda	44	2
Zerlina	50	1
Ss = students together	96	3
S = unknown student	727	3
Researcher 1	35	2
Researcher 2	2	2

Table 2

Adults' Questions

dk1 = turn contains one or more dk1s ('teacher knows the answer' moves)

Speaker	dk1	Question type	
		open	closed
Sara (teacher)			
total	80	157 (23%)	525 (77%)
	TOTAL Qs	682	
Davida (teacher)			
total	90	101 (30%)	235 (70%)
	TOTAL Qs	336	
Laura (teacher)			
total	39	133 (43%)	175 (57%)
	TOTAL Qs	308	
Mrs Edgar (teacher aide)			
total	119	64 (21%)	237 (79%)
	TOTAL Qs	301	
Mary (chaplain)	19	10 (14%)	59 (86%)
	TOTAL Qs	69	
Mrs Naxos (teacher aide)	1	7 (12%)	52 (88%)

	TOTAL Qs	59	
Mrs Stoppard (teacher aide)	0	0	2 (100%)
	TOTAL Qs	2	
Leonie (parent helper)		0	1 (100%)
	TOTAL Qs	1	