

Rocks in the Head: Children and the Language of Geology

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This paper describes an action research project involving a class of seven-year-olds at a country school in Australia. Their teacher, Fran Egan, had been introduced to Michael Halliday's functional grammar and was keen to try applying her new insights about language in her classroom.

Although Fran was delighted with the children's progress and attitude to writing in their 'whole language/process writing' classroom, many of the whole language activities had become isolated exercises – re-tellings, cloze passages, shared book, and so on – divorced from the 'real' language happening in other curriculum areas. How to get language out of 'the language block' and into the curriculum? How to promote purposeful interaction between speaking, listening, reading and writing?

In her language programming, Fran widened her perspective from the individual activity to a whole thematic unit. The focus became *language for learning*, fostering an explicit consciousness in the children of how language functions in the learning process.

In particular, Fran was interested in Halliday's notion of Register. Register is a way of describing how the *context* influences the language produced in a particular situation. In the classroom situation it is essentially the teacher who controls the context. The ways in which he or she constructs the classroom context can help promote the sort of language which contributes to learning. The following pages describe the ways in which Fran programmed to create certain contexts and how these contexts influenced the language of the classroom.

PLANNING THE CONTEXT

According to Halliday, there are three main variables which determine the Register of any particular context – the Field, the Mode and the Tenor. We could represent this diagrammatically (see Figure 12.1). Let's look at how each of these influenced Fran's programming.

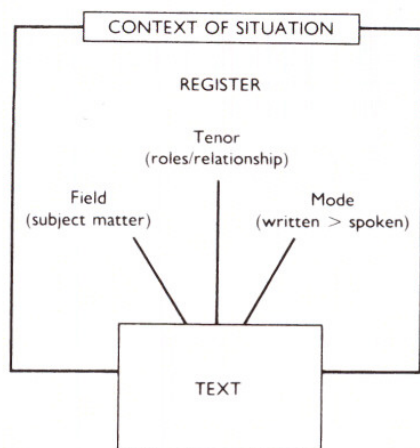


Figure 12.1 Register and context

The Field

In basic terms, Field refers to 'content'. The content of any learning is ultimately embodied in language. To learn content is to learn language. The class had developed an avid interest in rocks and Fran decided to build on this, taking 'Why We Study Rocks' as the theme of the unit. In a broad sense then, the Field which Fran was planning to develop was geology, and in particular 'rocks'.

Fran acknowledged the children's existing knowledge of the field of 'Rocks' and was concerned with extending the field in both planned and unplanned directions. One of the functions of education is to help children to explore and make sense of their world and language is a major resource in this endeavour as it is through language that we represent our world. Language enables us to express the relationships we perceive between phenomena in the environment. The children's understanding of the field would be developed not only through the labelling or naming of various rocks, but through the identification of relationships within the field.

Fran therefore planned for opportunities for the children to develop and use the language needed to observe, describe, define, compare, contrast, group, classify, and generalise. The children's knowledge of the field then would hopefully grow during the unit from their fairly random, everyday 'commonsense' knowledge about rocks to a more explicit, systematised, integrated knowledge.

This might sound like a rather onerous, sombre undertaking for such young children, but Fran didn't want to patronise them. She had high expectations and so did they. They were eager to 'name their world' in ever increasing detail, to discover how it is organised and how it functions. And to do that they needed the appropriate language tools.

The Mode

Learning can take place through the oral mode or the written mode. Fran was interested in the different roles these modes played in the learning process.

We could look upon learning as a gradual 'distancing' process – from an involvement in the detail of the here-and-now to stepping back, reflecting, seeing the bigger picture, relating and consolidating and putting things in perspective. And in fact Halliday talks of a variety of modes each playing a part in this distancing process. He plots these modes along a continuum, ranging from the sort of language that accompanies action to the sort of language employed in reflection. At the 'action' end of the continuum the language tends to be oral – the sort of exploratory, interactive language used when coming to grips with the world. Stepping back further, one might reconstruct the action by telling someone what happened or writing a recount of it. Further towards the 'reflection' end of the continuum, we can exploit the 'frozen' nature of the written mode as it invites us to play around with the thoughts captured on paper – to shape and refine them, to extend them, to make connections between them. At each step backwards, choices are being made to select significant aspects of the experience/subject matter and order them coherently.

ACTION \longleftrightarrow REFLECTION
 e.g. language \rightarrow commentary \rightarrow reconstruction \rightarrow construction
 accompanying the action

Fran decided to use this Mode continuum as the guiding principle in her programming. She would let the children explore the content first in the oral mode - interacting, sharing, bouncing off each other, with all the hesitations, unpredictability, backtracking, and approximations typical of spoken language. Then she would gradually move them along the continuum, shunting backwards and forwards as necessary, until they were able to reflect upon their experiences and understandings and pull them together in the written mode.

The Tenor

Fran was aware however that the learning power of the various modes could only be fully utilised if the Tenor in the classroom situation allowed for this to happen.

Tenor refers to the relationships between the participants and the roles that the participants engage in. The traditional classroom relationship between teacher and pupil is one in which the balance of power is very unequal, with the teacher in control of the knowledge and the patterns of classroom interaction. The sort of language which flows from such a relationship is typically long slabs of teacher monologue, punctuated by routines of pseudoquestions, programmed answers, evaluative comment by teacher, with the occasional regulatory outburst.

More conducive to learning might be the sort of language which reflects a more even balance of power – where children feel comfortable to contribute information, to hypothesise, to admit ignorance, to ask questions, to make suggestions, to give opinions, to initiate topics, to take responsibility. Fran planned therefore that, at appropriate stages during the unit, the children would enter into a variety of relationships – teacher/class, teacher/group, parent/child, child/child, child/group, child/class – each relationship enabling the child to interact and learn in a particular way.

Another closely related aspect of Tenor which she took into account was the *roles* adopted by child and teacher. At times these were deliberately structured into the programme according to the learning activity at the time. The teacher's role would range from 'knower' to 'co-learner', while the children became 'geologists', 'lapidarists', 'builders', 'researchers', 'authors', 'apprentices', 'experts', etc. They were expected to live the role, posing the sorts of questions and making the sorts of observations that such a role would demand. The adopting of these roles aimed at empowering the children, encouraging them to see themselves as responsible learners, apprentice members of the discipline, moving from a tentative grasp of the field towards a more definite, confident control.

The unit was designed not only to develop knowledge about rocks, but also to provide opportunities for the children to learn the sorts of roles necessary to become independent learners.

In summary, we can see learning language (and even learning itself) in terms of the mastery of a wide range of Registers. Each of these Registers is characterised by a particular Mode, Field, and Tenor.

Figure 12.2 is an attempt at describing how a number of Registers were developed over the three-week unit, starting at the 'action' end with physical engagement with rocks, employing a variety of modes as the children worked towards the 'reflection' end with the production of a written text – a jointly composed 'Big Book' drawing together what they had learnt about rocks. It represents the learning process as a spiral with no definite beginning or end.

PUTTING IT INTO PRACTICE

By now Fran had designed a programme which consciously structured the learning context in terms of Mode, Field and Tenor:

- ◆ The Mode would range from oral/active through to written/reflective as the unit progressed.
- ◆ The overall Field involved an ever-increasing knowledge of 'Rocks', deliberately introducing an awareness of how the Field is constructed through comparing, contrasting, classifying, etc.
- ◆ The Tenor would reflect the various roles and relationships engaged in by teacher, children (and parents).

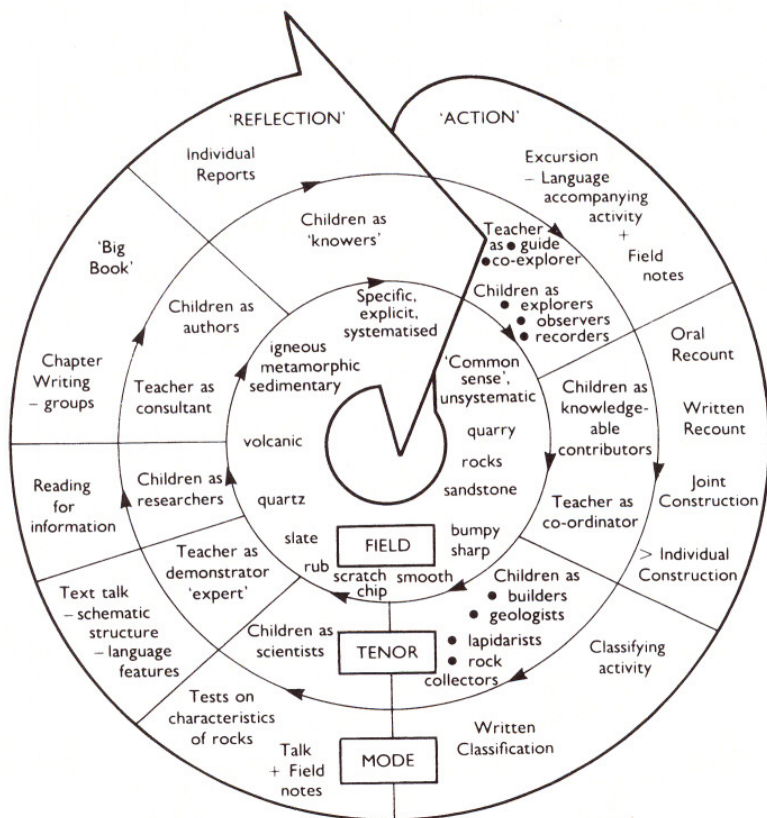


Figure 12.2 Diagrammatic description of a three-week unit of work

Now Fran was curious to see whether this structuring of the context did in fact produce the sort of language which we would associate with learning.

In the following pages, we will trace through the stages of the unit as described in the spiral diagram, giving examples of the typical language produced at each stage.

a) Language accompanying action

To initiate the children's formal study of rocks, an excursion into the surrounding countryside was organised, with a number of parents volunteering to drive the children around. To a certain extent the activity was planned – they would visit a variety of sites where different types of rocks could be observed, and it was suggested that the children note rocks in their natural state and rocks that had been used in construction. But otherwise the 'content' was determined by the children themselves, the open-ended nature of the activity allowing them to relate current knowledge to new information.

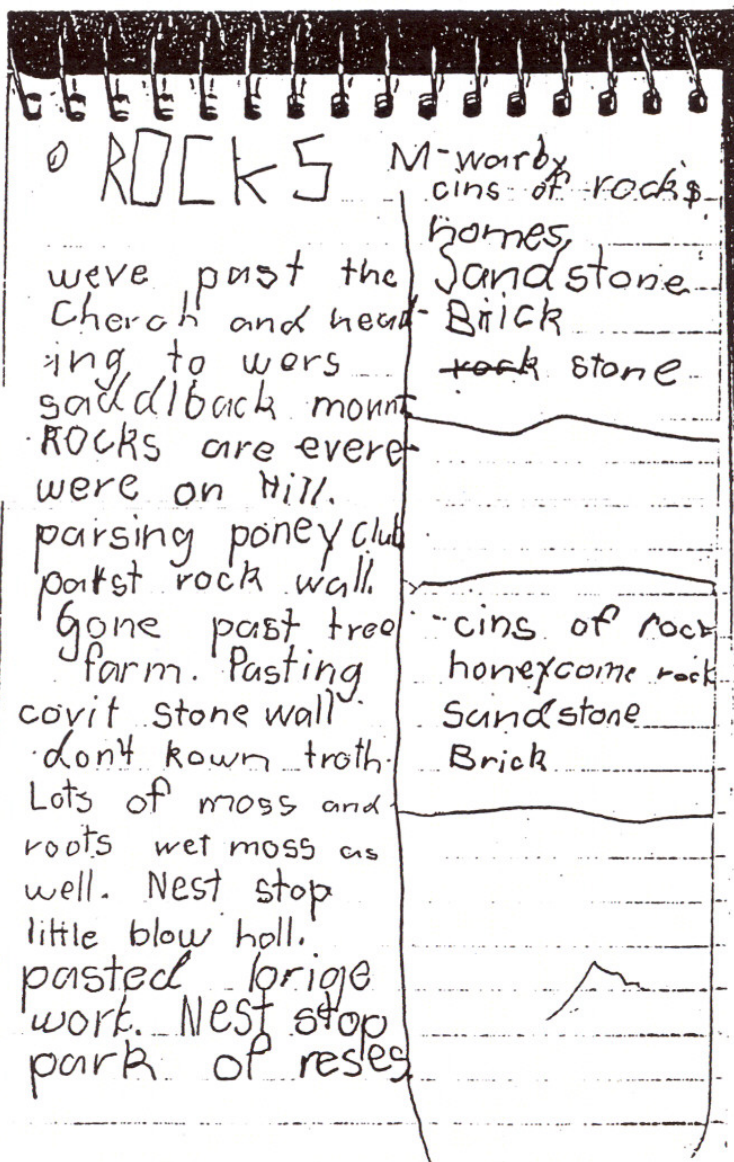
They first stopped at some old rock walls, previously just part of the landscape but now seen through new eyes. While they speculated on the origin of the rocks, parents recounted tales from local history about how the walls were constructed by Irish immigrants. Then on to a cutting where the freeway was slashing its way through a hillside. The children observed the layers of rock telling their stories of different geological eras. Nearby was a rock platform at the beach where they saw how the molten lava from nearby extinct volcanoes had solidified at the ocean's edge. Then around to the harbour with its pebbly shore and smooth rounded rocks. And finally the local quarry surrounded by stately walls of columnar basalt.

Along the way, the children had noted four sandstone churches, several stone walls, the rock fences in the paddocks, a few houses and a school made of basalt, the retaining walls of the harbour, the road surface, a couple of stone park benches, and a number of other rock constructions, including of course their own sandstone school building.

Mode

The language, captured on audio tape and video, was primarily oral: very much 'language accompanying activity' – the language of observing, exploring, coming to terms with the here-and-now. The written mode also played a minor role in its function of recording, capturing fleeting thoughts for later retrieval. The field-notes represented more than mere 'memory-joggers' however. They were early attempts at identifying significant details from the wealth of experiences surrounding the children (see the example on the opposite page).

Field notes



Tenor

The relationship between the adults and children in this context was more of an 'equal status' nature, allowing the children the freedom to make discoveries along with their teacher and parents. The children themselves were asking the questions, sharing information and giving instructions ...

'Come and see this!'

'This one's got holes.

'Look – sparks!'

'Why have they got that column shape?'

'It's sort of crumbly.'

'I know why it's smooth.'

They believed themselves to be apprentice geologists and their language reflected this role.

Field

Their command of the field at this stage was a mixture of everyday terminology ('moss rocks', gravel, orangey rocks, stones) and more specific terms (quartz, basalt, quarry, sandstone). In context, and in response to their questions, terms such as igneous, latite, columnar basalt, etc., were introduced.

b) Recount

Mode

On their return to school, the class shared their experiences in the form of an oral recount. This was intended not only as a pooling of information, but as an initial 'distancing' from the action of the excursion – putting things in perspective, selecting significant aspects, ordering them in time.

This was followed immediately by a written recount of the day's outing in the form of a 'joint construction'. With the teacher acting as scribe using the overhead projector, the class, drawing on their shared experience, jointly composed the text. Within this functional context, questions arose regarding sequence, tense, singular/plural, spelling and punctuation. Most of these were initiated and worked through by the children themselves, though Fran explicitly guided them to a recognition of the typical features of the Recount genre:

- ◆ an opening *Orientation* (putting the reader in the picture – who took part? when? where?) followed by a series of *Events* sequenced in time, finishing with a *Reorientation*;
- ◆ the use of conjunctions of time to link up the events (first, firstly, then, next, then, then, next ...);
- ◆ the use of location indicators (in the Jamberoo, Jerrara and Kiama areas, out of the school yard, at Jerrara, on the top of the fence, on the rocks, at the new bridge work, in the rock cutting, at the base, at the top, out of the hole, into Kiama, etc.);

- ◆ individual, named, known participants (Year Two, Nicole, we, Jamberoo school, the Little Blowhole, Kiama, the Quarry);
- ◆ action verbs in the past tense (we walked, we touched, they wiggled, we stopped, we travelled, we talked, we went, we finished).

Here is the 'joint construction' text:

Year 2 Excursion to Observe Rocks

Year Two became interested in studying rocks when one of the classmembers (Nicole) talked about a rock book she had read in Silent Sustained Reading. Year Two and their class teacher Miss Egan decided to go on an excursion in the Jamberoo, Jerrara and Kiama area.

As we walked out of the school yard we noticed the Jamberoo School Infants building is made out of sandstone. Our first stop was at Jerrara where we could observe rock fences. We observed lots of things here. Firstly we saw how the rocks were not stuck together properly. Then we touched them – they wiggled. Barbed wire was placed on the top of the fence. There was dried coloured moss on the rocks. The colours were green, grey, white and light orangey brown. There were different colours in the rocks.

Next we stopped at the new bridge work. The bridge was made out of cement. We saw mountains of rock that had been cut through. We saw little lines in the rock cutting. These were left by big building drills (jackhammers).

There were fragments of rock left at the base. At the top there was a stack of rocks left by the workmen.

From the bridge we travelled down to the Little Blow Hole. We noticed the rocks here were sharp and they had little holes in them. We talked about how the igneous rocks were formed long ago.

At the Blow Hole there was a dark hole. It's sort of a hole with cracks in it. When big waves come the water spurts out of the Hole.

Then we went into Kiama. We observed how a bridge's foundations were being turned (changed) into cement. Then we went to the Kiama Infants School and saw it was made out of basalt.

Next we went to the Kiama Harbour shore. We noticed there was black sand from the volcanoes. The rocks here were mainly round and smooth. We saw cunji on the rocks.

From here we went to the Quarry. We saw column shaped rocks. This was called latite. We also noticed that tar is shiny sticky stuff with sparkling minerals in it.

We finished up our excursion by climbing on a huge pile of rocks at the Quarry. It was interesting to observe and find rocks.

Tenor

Because they had all participated in the excursion, the children came to the writing task with something to say – the experience had been shared and each participant had something to contribute. The teacher therefore withdrew to the role of scribe, allowing the children to debate which points they felt were worthy of inclusion in an account of the outing. The teacher did not always play a passive role however. The scribe can in fact exercise a great deal of power, and when necessary the teacher used this power to guide the children towards a more effective text – reminding them of their audience, pointing out inconsistencies in tense, pronoun reference, helping with the overall structure, and so on.

Field

Generally the Field of a Recount is ‘What went on’ and tends to emphasise events. This Recount however is not simply an itinerary of the excursion. It also records the observations made by the children. (This is reflected in the high incidence of verbs such as ‘we noticed’, ‘we observed’, ‘we saw.’) We could represent the Field of the Recount by drawing up strings of related phenomena from the text:

Table 12.1 Field of Recount

Human Participants	Locations	Rocks	Constructions
Year Two	Jamberoo	rocks	Jamberoo
Nicole	Jerrara	sandstone	PS Infants
Miss Egan	Kiama	cement	School
	the school yard	mountains of rock	
	Jerrara	rock cutting	rock fences
	the bridge	fragments of rock	
	Little Blowhole	stack of rocks	bridge's
	Kiama	sharp rocks	foundations
	Kiama Harbour	igneous rocks	
	the Quarry	basalt	Kiama PS
		black sand from volcanoes	Infants School
		round rocks	
		smooth rocks	
		column-shaped rocks	
		latite	
		tar' – minerals	
		huge pile of rocks	

From the 'Rocks' string we can see that at this stage the children's knowledge about rocks is still expressed in everyday terms, with the occasional technical term creeping in (igneous, basalt, latite, minerals). As yet there is not much evidence of the children attempting to bring order to the Field, but this is understandable, as the purpose of a Recount is simply to tell what happened.

c) Classification activity

Mode

At this point we 'shunted' slightly backward along the Mode continuum towards the 'action' end. The children had brought back their rock samples and were now going to classify them. The small-group discussion, while fairly reflective and orderly, nevertheless allowed the children to question, interject, change their minds, react to feedback. This oral give-and-take led to rather unsophisticated written classifications in diagrammatic form (see Figure 12.3). The ability to summarise in a precise, logical way is an important function of the written mode and was a significant step along the continuum.

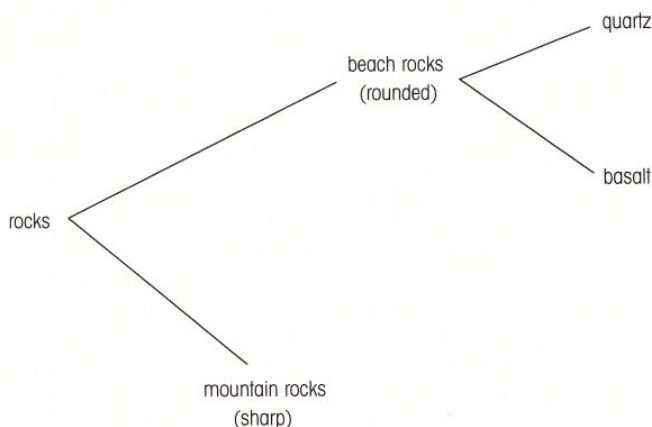


Figure 12.3 'Geologist' group classification

Tenor

Roles were quite deliberately structured for this activity. The children were able to choose whether to be geologists, builders, lapidarists or rock-collectors according to their interest and knowledge. The children looked for the particular characteristics in the collection of rocks which would be of interest to their group:

- ♦ The geologists examined the features of each sample, noted the location where it was found and hypothesised as to its origins, justifying their decisions.
- ♦ The builders considered the different attributes of the rocks and classified them according to their possible uses.
- ♦ The lapidarists grouped their rocks with an eye to aesthetic qualities.
- ♦ The rock-collectors classified their samples according to idiosyncratic criteria – shape, colour, size, etc.

In each group the children took their roles very seriously, genuinely trying to tackle the problem from the specialist point of view.

The peer/peer relationships of the small groups permitted the children to interact as equals, without the 'expert' adult inhibiting their attempts. For example:

- P1 I think this comes from down in the earth because it's all got kind of bits of dirt in it.*
- P2 I don't reckon this is glass. It doesn't feel like it.*
- P3 I know, cause it's been washed around.*
- P4 Geologists can tell what ... they can tell what is what and which is which because they've got these special tools and stuff like that to open them up and see what they're like ...*
this man and then he polishes it and stuff like that and then he sells it for a lot of money and ...
- P1 I think this one comes from the mountain because it's got all like it was buried in the ground ... like ... cause it's got all grassy patterns on it.*
- P3 They've come from the sea because they're all smooth and they've got ... um ... sort of like sea patterns and they're real real clean and that one's got all green on it and it's really really smooth – like a giant button.*
- P4 The blue rocks ... people might think they're from the sea and the water made them blue, but Kirsty said they're from the fishpond.*

Field

The children made a valiant effort at the classifying activity (see opposite), but whilst they learned a lot about the process of classifying, (i.e. going from the most general to increasingly specific classes, according to particular attributes) they were frustrated by the lack of a more detailed knowledge of rocks and their attributes. This awareness of their limited knowledge of the Field is reflected in their later write up.

Classifying activity

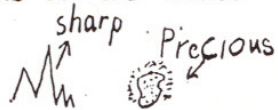
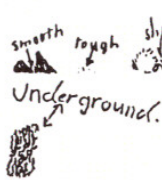
HOW DO YOU GROUP ROCKS?

When our class studied rocks we collected rocks and

put them into groups. Here's an example of the names

we gave them,

Little Variable



until we found the scientific

names for them. The scientific names for them were

IGNEOUS. SEDIMENTARY. METAMORPHIC. Igneous rocks means volcanic

rocks.

Sedimentary rocks means layer rocks. Metamorphic means

Changed rocks. Geologists can make up more groups of rocks because they know more about rocks and minerals than we do.



d) Experimenting

Mode

Still towards the 'action' end of the continuum, the children carried out a variety of experiments on their rock samples in order to come to a more detailed understanding of the attributes of different types of rocks. The dominant mode was oral, although again the written mode played an ancillary role as the children dictated their observations to a group scribe. These notes were later shared with the whole class.

Tenor

In their role as 'scientists', they chipped and hammered and rubbed and scratched. Their language reflected a sense of responsibility for their own learning – an expectation that they would ask the sorts of questions and make the sorts of observations one would expect of a scientist ...

'The crystal cr ... smashed up in three goes.'

'That's why I'm experimenting with it.'

'I'm gonna experiment with this one.'

'You get a little bit on your finger and dab it onto the paper and it makes a sort of red colour.'

The small group resulted in a peer relationship which encouraged the children to participate on an equal footing. The following transcript shows children utilising the oral mode to negotiate meanings about rocks, empowered by their roles as respected, knowledgeable equals:

Hammering Test

P1 *What happened to it?*

P2 *Nothing. It's a bit hard.*

P1 *What is it?*

P2 *Too hard to smash up.*

P1 *What name of the stone? ... Igneous ... firestone.*

P2 *No. It's too hard ... too hard ... too hard.*

(Spontaneously consult named rock collection)

P1 *Probably be that one.*

P2 *Check with this.*

...

P2 *Feels as though it's crushed. And it is. I know it is. It has to be.*

You're not allowed to pick them up and keep them.

P3 *I'm not ... I'm just having a look at them.*

P1 *Doesn't matter what rock.*

P2 *These look as though they came from a cave ... a sort of a cave. See. Cause Jenolan Caves ... that kind of thing.*

...

P2 *There. I crushed it up easily in three goes.*

P1 *'The crystal crushed up ...'*

P2 *Easily! No, 'the crystal cr ... smashed up in three goes'.
That one's too easy.*

P1 *I know. That's why I'm experimenting with it.*

...

P2 *Try this. Try this. Slate. A piece of slate.
That's slate. See how it's the same.
Crush up some slate. We know the name ... we know the
stone's name ... Try it with the sharp end.*

P1 *That should do.*

P2 *Bet you it isn't – it would be crushed up.*

P1 *Slate didn't get crushed.
I'm gonna experiment with this one.*

P3 *That one will crush.*

P1 *It has to be wrapped ...*

P2 *Try it wrapped.*

...

P2 *Do this ... Try this and see what colour it makes! What
colour it makes! What colour it makes.*

P1 *Hang on. Watch this.*

P2 *... yellow. See what it makes up with the yellow.*

...

P2 *Check it out with this one.*

P1 *That will be shale. It could be shale.*

Field

The Field was one of *doing* ('smashing', 'crushing', 'experimenting', 'squashing', 'watching') and of discovering *attributes* ('very sharp edges', 'a bit too hard', 'too hard to smash up', 'crushed', 'orangey'). The group was also keen to find out the names for the various rocks ('What's the name of the stone?' 'Igneous. Firestone.' 'Crystal.' 'Sandstone'.) They regularly compared their samples with those in a labelled rock collection ('That's slate. See how it's the same? ... We know the name – we know the stone's name.')

By this stage the children had had plenty of opportunities to explore the subject of rocks in the oral mode – using familiar terminology but gradually acquiring more specific terms at the point of need. Every so often, they employed writing to preserve their observations. Now Fran started to exploit the power of the written mode to start ordering their experiences. All their understandings about rocks were to be brought together in the form of a 'Big Book'. The children decided which aspects they were particularly interested in and formed themselves into groups to produce a chapter on their chosen topic. We were now moving towards the reflective end of the mode continuum – going from the multitude of specific details to more generalised, orderly reflection.

4) Text talk

Mode

The emphasis now shifted to written texts, although oral language still played an important interactive role. Fran chose a short expository text on Rocks. Using the overhead projector, she guided the children to engage with the text by identifying and underlining various features (schematic structure, major 'participants', the use of exemplification, etc., as well as layout aspects such as headings, illustrations, captions, glossary).

This demonstration was aimed at helping the children develop strategies for locating information in written texts. It also served as an explicit model for the children's own writing. (See below for model text and indication of the sorts of features identified by Fran and the children.)

ROCKS ← Heading

explanation

technical terms eg.

examples eg.

Scientists group rocks into three main types: **igneous**, **sedimentary** and **metamorphic**.

IGNEOUS rocks are produced by white-hot material deep inside the earth which rises towards the surface as a molten mass called **magma**. If the magma stops before it reaches the surface, it cools and forms rocks such as **granite**. If the magma erupts, it forms a red-hot stream called **lava**. When the lava cools it becomes rock. One of the most common lava rocks is called **basalt**. Igneous rock is used in the formation of the other two main types of rocks - sedimentary and metamorphic.

SEDIMENTARY rock is formed by small particles or **sediments** such as sand, mud, dead sea animals and weathered rock. These are deposited in layers and become solid rock over millions of years as they are squeezed by the weight of other deposits above them.

The word **metamorphosis** means 'change'. Rocks which have been changed by heat and pressure are called **METAMORPHIC** rocks. They are formed deep inside the earth. **Slate** for example is formed from compressed mud or clay. **Marble** is another type of **metamorphic rock**. It is produced from limestone which has undergone change through heat and pressure.

Opening Classification

Description

- Types of rocks
- igneous
- sedimentary
- metamorphic

Tenor

In this activity, the teacher took on the role of 'expert', sharing her knowledge of text with the class. The children, however, were not passive recipients, but were invited to actively participate in an un-threatening, supportive environment.

Field

The written text presented the Field in an organised manner – filling in gaps in the children's knowledge and drawing out relationships, in particular the class/subclass taxonomy:

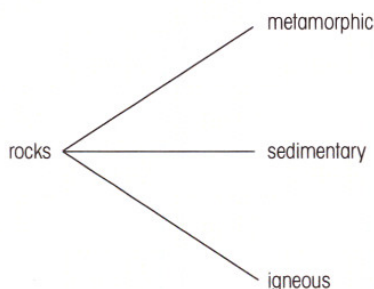


Figure 12.4 Presentation of Field in written text

f) The big book

Mode

By now the class was well into 'the writing process'. The oral mode was still important as the groups pooled their knowledge and collaborated in researching and constructing their joint texts. But it was the written mode that took precedence as they sought information from books, jotted down their notes, organised their knowledge, drafted, redrafted, edited and finally published.

The children also worked on individual reports, summarising what each one now knew about rocks.

Tenor

The children assumed the roles now of researchers and authors and were learning the skills to make them competent in these roles. Most of the interaction was at the peer level as they shared their information, asked each other questions, made suggestions and came to decisions. Because of the constant and explicit modelling by the teacher (e.g. text talks, joint constructions, public editing, shared book) the children were able to be independent and productive in their small groups.

Before publication, the class was fortunate to be visited by a real-life editor of children's books, who took on the role of expert to answer their questions about what an editor does. They also had discussions with a group of Indonesian geologists visiting the area who were quite taken with the way that the children took seriously their role of 'apprentices' in the field.

Sample writing from 'the big book'

Rocks

Rocks are found everywhere. We live on rocks all joined together with pressure. There are

Billions millions and trillions of rocks. In rocks there is precious stones which lapidarists cut a way to see if they can polish the stone. There are three kinds of rocks a sedimentary igneous and a metamorphic. A sedimentary rock is made up of lots of layers. An igneous rock is a fire rock because it comes from a volcano. When the lava met the sea it cooled down and was called a volcanic rock. A metamorphic rock is a sedimentary rock and an igneous rock pressed for a very long time and it makes a metamorphic rock. Rocks have patterns and lots of colour in them.

Field

A perusal of the published 'big book' reveals a well-developed knowledge about the field of rocks. The children appeared to be quite comfortable with the three major classes of rocks and happily took to the terms 'igneous', 'sedimentary', 'metamorphic', defining them in their own words ('fire rock', 'a rock made up of lots of layers', 'two rocks pressured for a very long time'). They also became aware of an extensive variety of subclasses (quartz, crystals, gems, slate, shale, marble, latite, sandstone, pumice, coal, columnar basalt, blue metal, etc.). They had started to look at the composition of rocks and had an inkling about minerals. They had a good knowledge of the characteristics of various rock-types and the uses of different rocks (see the extract 'Rocks' opposite, for example).

Best of all, they did not see the acquisition of such knowledge as 'difficult' or 'a bore', as evidenced by the fact that many weeks after the theme had finished, their enthusiasm had not diminished and they kept bringing samples to class and making collections at home.

A detailed analysis of the transcripts and written texts has since revealed that Fran's planning had in fact produced the kind of registers which we would associate with learning, the children engaging purposefully with a variety of modes from active through to reflective; experiencing a number of different roles within a supportive environment; and gaining an increasing control over the field in question.