The Challenge of Non-Fiction

Jeanne Biddulph and Fred Biddulph

Non-fiction - reading it, selecting it - can be tricky.

Jeanne Biddulph
School of Education
University of Waikato

Fred Biddulph
School of Education
University of Waikato

Non-fiction - reading it, selecting it - can be tricky. For example, two eight-year-old boys 'read' in a science text that the lead in their pencils was a kind of gold (Biddulph, 1986), a 14-year-old assumed that the stockbroker mentioned in a social studies text was a person who herded cattle around the countryside (Nicholson, 1984), and a 15-year-old wrote in a mathematics test that geometry teaches us to bisex angels. Clearly readers, and writers, bring their own prior ideas to text and these ideas influence the sense made of it or conveyed by it.

"New Zealand students performed better on narrative than expository text."

The tricky nature of reading non-fiction was confirmed by the results of the IEA (International Association for the Evaluation of Educational Achievement) Reading Literacy Study conducted in 1990-91 (Elley, 1992). These indicated that, relatively speaking, New Zealand students performed better on narrative than expository text. Perhaps that was not surprising. The authors' own observations over a number of years have suggested that few girls read non-fiction voluntarily and that many boys, while choosing more non-fiction to 'read', tend merely to skim the illustrations. This relative non-engagement of young learners with non-fiction is cause for concern, because effective use of non-fiction supports not only language/literacy development, but also cognitive development and growing critical awareness of, and control over, one's world. Stanovich (1992)

argues that exposure to print (both fiction and non-fiction) has specific and unique cognitive benefits, as well as social and emotional benefit, and Emmitt and Pollock with Limbrick (1996) note that much of later school learning is dependent on success with textbooks. Cambourne (1988) suggests that competent readers have a better chance of becoming competent writers, and that competent writers also have more control over their world, a concern echoed by Christie (1990). In Christie's view, anyone lacking literacy competence in the contemporary world is dispossessed, or 'locked out' from so much of the knowledge, information and ideas which are part of a literate culture - a culture in which forms of communication are constantly changing.

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The IEA Study mentioned above, raised another serious concern. It revealed that the gap between the reading literacy levels of minority and majority language speakers was greater in New Zealand than in any of the other countries surveyed. This finding was supported by Bardsley's (1991) research which showed that a disproportionate number of the reluctant readers in her survey were Maori and Pacific Island students, particularly male Maori students. Irrespective of family occupational background, the

proportion of reluctant male readers who were Maori was significantly higher than for other groups.

In recent years, curriculum requirements and changing trends in literacy education have ensured that more emphasis is now placed on various forms of non-fiction within classroom literacy programmes (Emmitt and Pollock with Limbrick, 1996) and the recent NEMP (National Education Monitoring Project) results (Flockton and Crooks, 1997) suggest that this changing emphasis is having positive effects on the ability of Year 4 and Year 8 students to engage with non-fiction texts. However, significant problems remain in helping children at primary level take a serious interest in non-fiction, and anecdotal evidence indicates that teachers in New Zealand and beyond are seeking more meaningful non-fiction texts, and more effective ways of helping their students with such material. The challenge is to find ways of addressing these problems, so that all students become more competent in using factual texts, and therefore more literate and more able to function fully in the society in which they live. We believe that these issues must be addressed at junior primary school level so that some of the current problems can be avoided.

Children's Relative Lack of Interest in Non-fiction

There are probably several explanations as to why many children prefer fiction to non-fiction. Most of their early experiences are with fiction - being read to regularly, and enjoying the humour and unexpected twists in narrative. In contrast, their growing encounters with non-fiction are often to gather information for some teacher-directed exercise, task or project.

Based on our experience as teachers and parents, we would like to suggest two important reasons why many children avoid non-fiction. First, traditional teacher-directed classrooms seldom provide children with purposes for reading non-fiction that they find

meaningful. When asked to investigate topics, children in these classrooms tend to latch onto a word associated with the topic and copy 'chunks' from whatever source of information is available to them. Many have little idea what the content is about; making sense of the non-fiction is not really part of the expectations they hold about such text, inspite of recent efforts to incorporate various forms of non-fiction more fully into literacy programmes.

"The result is that the non-fiction texts children are expected to read are often confusing, poorly written and beyond their current reading competencies."

Secondly, as revealed during the Learning in Science Project (Primary) at the University of Waikato, and reported in an earlier paper (Biddulph, 1986), non-fiction is often written by adult 'experts' from an adult point of view. There is usually little recognition of a need to address the ideas children bring to a topic, or the things they want to know about it. Paul Tillich once said, "The fatal pedagogical error [is] to throw answers, like stones, at the heads of those who have not yet asked the questions." That is what most 'factual' texts for children tend to do. Often too, text writers incorrectly assume that students have sufficient background

knowledge to comprehend the new material being presented (Freeman and Person 1998), and there also appears to be little attempt to meet children half-way with respect to language and sentence structure; non-fiction tends to be written in a somewhat 'formal' manner. The result is that the non-fiction texts children are expected to read are often confusing, poorly written and beyond their current reading competencies. Some materials possess very little recognisable structure, and even when some structure exists, children are not generally as familiar with these structures because their exposure to non-fiction books is limited (Emmitt and Pollock with Limbrick, 1996). Perhaps it is not surprising then that, as Freeman and Person (1998) note, textbook forms of non-fiction have 'consistently caused controversy and criticism' and that '... the attacks on them have intensified over the past decade' (p.12).

How can these two particular difficulties be overcome? That is, how can we encourage all children to read both fiction and non-fiction, and how can we provide non-fiction texts which are meaningful, manageable and rewarding for beginning readers?

Challenging Children to Want to Read Non-fiction

Several initiatives have been taken in New Zealand during the past two decades to help students gain more adequate meaning from increasingly varied forms of non-fiction. For example, Advisers and Reading Resource Teachers such as Fran Edwards and Sylvia Hill in the Waikato (see, for example, Hill and Edwards, 1991), and Margaret Cornish and Robyn Sutherland in Canterbury, worked closely with secondary school 'subject' teachers to develop learning and teaching strategies designed to give students more support with factual materials. Learning Media has extended the Ready to Read range to include more non-fiction titles, and has also provided guidance for teachers in the use of this non-fiction, for example in Using Non-fiction in the

Junior School (Biddulph and Biddulph, 1993), Reading and Beyond: Discovering Language through Ready to Read (Ministry of Education, 1997) and The Essential School Journal (Ministry of Education, 1998). The courses and resource materials developed by Gwen Gawith in New Zealand and a number of Australian literacy educators also offer strategies for providing support for readers of such texts.

In this paper we offer an additional way of overcoming the difficulties identified above. This involves the use of the Interactive Teaching Approach, developed as part of the Learning in Science Project (Primary) referred to earlier. This model provides a framework for child-focused teaching in which literacy development (as well as science or other learning) is enhanced.

The Interactive Teaching Approach

This approach, now described in a number of publications (for example, Biddulph, 1986; Biddulph, 1989; Biddulph, 1991; Biddulph, 1992; Biddulph, 1993; Biddulph, 1994; Biddulph and Carr, 1992; Biddulph and Osborne, 1984), is already used by some teachers in a variety of subject areas at various levels of the school. It consists of a number of components and several teaching roles. Briefly, the components are:

1. Preparation - during which the teacher gains some understanding of the topic and assembles resources.

2. Exploration - which is a time to clarify the topic with the children and provide them with exploratory activities to focus their thinking on important aspects of the topic. The children's prior ideas (before views) emerge during both this phase and the next.

3. Children's questions - when the teacher invites, clarifies and records the children's questions, and selects (in consultation with the children) questions that are suitable for their investigations.

4. Specific investigations - a component in which the teacher

helps the children plan and conduct investigations. These could include seeking the views of experts either first-hand or through reading what they have written.

5. Reflection - when the children are assisted to report their findings and evaluate the study.

These interrelated components are not necessarily a sequence of teaching steps. For example, children's questions can arise out of the preparation, investigation and reflection phases as well as the exploration phase.

The teaching roles include resource person, fellow investigator, listener to and challenger of children's ideas and strategies, provider of a supportive atmosphere, and co-evaluator.

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The approach emphasises the importance and value of the ideas, questions, language and experiences children have. Indeed they are at the heart of it. In this sense the Interactive Teaching Approach provides major support for language and literacy development, particularly with respect to non-fiction. Although developed in the context of science education, it is interesting to note that the approach offers practical teaching guidelines for principles proposed by various literacy educators - for example, Cambourne's (1988) conditions for learning, and Smith's (1985) emphasis on readers needing a real purpose when engaging with text. What makes Interactive Teaching significant is that the processes and teacher roles are part of a coherent approach to helping children make sense of their world beginning with, and building from, the questions, ideas and experiences they bring to a particular learning context. It is also

an approach which teachers and children find manageable, interesting and rewarding.

How does the approach support language/literacy development?

Interactive Teaching and Language/Literacy Development

Observations and feedback from teachers and students indicate that the Interactive Teaching Approach, when understood and used in the manner intended, can help overcome some of the problems which children and teachers usually experience when working with non-fiction because the approach provides a number of critical support systems.

1. Children's Questions

Smith (1985) suggests that good readers ask questions of the text as they read, seeking meaning and gaining understanding in the process, while Pressley (1998) concludes that 'there is a broad base of agreement that the most important goal of reading education should be to develop readers who can derive meaning from texts' (p.199).

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Within Interactive Teaching children approach text with their own question(s) and a genuine interest in finding answers. For instance, some five and six-year-olds wanted to know how mother flies give their babies milk, while some older children were very puzzled about why some heavy things float. When these children interact with text it is usually in a more sustained and meaningful way

than when the questions have been pre-determined by others, or purposes for reading remain a mystery. Within an Interactive Approach children frequently arrive at school with an assortment of reference books from home and the local library (often collected entirely on their own initiative) and glean ideas from them relevant to their investigations. Our experience confirms Nicholson's (1982) view that children derive a surprising amount of information from text that appears rather difficult for them, if they have a genuine interest. Such engagement is central to reading development (Guthrie, 1997, quoted in Braunger and Lewis 1998).

At the same time, it is true that such texts can present younger or less able readers with problems in gaining the author's meaning. For instance, recently a twelve-year-old read a mathematics problem in which a giraffe wanted three-fifths of its new triangular patterned scarf knitted in yellow wool. The pattern showed 10 identical triangles on the scarf but the student decided that the task called for three of them to be coloured yellow.

As with the mathematics problem above, there will be times when teachers require students to read particular texts for particular purposes, but students are more likely to cope with these imposed tasks if they also have many opportunities to read texts with their own questions and purposes in mind.

2. Activities and Discussions

The Interactive Approach helps children do more than establish personal purposes for reading non-fiction. Exploratory activities and accompanying discussions enable them to bring to text a range of relevant experiences and language, an awareness of their prior views, and ideas about how they might record and present their findings. The child who approaches a text about skeletons with an idea that one possible reason we have a skeleton is that, like a roll cage on a stock car, it protects our insides, but who is also wondering if there are other

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explanations, is likely to gain far more from the text than a child who has been told to read it for a project.

In Smith's (1985) terms, such experiences enable children to bring considerable non-visual information to the text; they should consequently find it more meaningful and readable, assuming that its content connects with the ideas they hold.

3. Control of Learning

Various educators, for example, Cambourne (1988), Emmitt and Pollock with Limbrick (1996), Goodman (1989), and Graves (1983) argue that a degree of autonomy is important if children are to become competent in the field of language and literacy. Within an Interactive Approach, children are much more in control of their learning than in traditional teacher-directed approaches. Even five-year-old children are capable of finding out for themselves that butterflies have to rest awhile for their wings to dry after emerging from the chrysalis, rather than flying off the instant they emerge. When students have such opportunities for success, challenge, choice and social collaborations, motivation is generally promoted (Morrow, 1996, quoted in Braunger and Lewis, 1998).

4. Children's Ideas and Language

Children's differing views are valued within Interactive Teaching. Teachers listen very carefully to and are genuinely interested in **each** child's ideas, experiences and questions because they recognise the importance and value of these as the basis on which children construct further ideas and make sense of their world. The focus is on the ideas, not on how 'fluent' or 'limited' the language appears to be. In any case there is a fascination about children's ideas, as illustrated by

some nine-year-olds who thought that it would be difficult to grow things on the moon because if you tried to plant them they would just float away. They considered the possibility of cementing the plants down and concluded that you would have to be 'awfully quick' otherwise the cement would float away too.

There is a subtle but significant difference between this process and that of many 'brainstorming' sessions where the statements offered by some of the more confident, articulate children are recorded then largely forgotten as the unit moves along the path already predetermined by the teacher.

5. 'Authentic' Contexts

Investigating their own questions and presenting their findings to others, allows allchildren involved to develop further both their ideas about the world, and their language/ literacy abilities. Such a process provides what Emmitt and Pollock withLimbrick (1996), and Goodman (1989) call 'authentic contexts and purposes for the forms of language and literacy which occur throughout the unit. They are authentic because they draw on the real and often immediate experiences of the children. For example, many younger children are taken aback when a large candle, which seems to be quite heavy, floats in water, and many older students (including adults) are confounded when a floating canoe made of plasticine pushes more water out of a full container than the same canoe when it has sunk. A question which arises from these experiences of course is, "Why do some things float?" Another mystery for many children is how ferries manage to float because they are made of metal and they have heavy cars and trucks on them.

Further, children are exposed to a range of language forms within these 'authentic' contexts and are able to experiment and use them for their own purposes. Different uses of language are demonstrated and utilised throughout the unit, a process which develops children's

ability to select the appropriate form for their purposes - an essential skill for a competent and confident language user (Braunger and Lewis, 1998; Emmitt and Pollock with Limbrick, 1996).

Interactive Teaching also provides frequent opportunities for reading to children ("I wonder what the author of this books thinks flies do in winter time? Let's find out."), for children to read and re-read their questions (recorded on charts around the room and sometimes on audio-tape as well) and for children to write about their own experiences and findings or record these in various forms. All these experiences help children develop the notion that written language, as well as spoken language, is a way of making meaning, a notion that Hammond (1990) believes is an important part of their learning.

respect for a particular species of this animal and valid answers will almost certainly come that culture.

This respect for the views, beliefs and practices of all students is of critical importance to the learning of children from minority groups whose language, ideas and experiences are not always recognised, accepted or catered for within the school context (Braunger and Lewis, 1998; Cazden , 1988; Cazden, 1992; Heath, 1982; Holmes, 1982; McNaughton, 1995; Tizard and Hughes, 1984; Wells and Wells, 1984). Interactive Teaching provides a supportive framework in which teachers can move beyond unhelpful perceptions that some students have 'language deficits'. These teachers are then able to cater more effectively for the diversity that individual students bring to the classroom.

7. Interactions in 'mini' groups

When children work in groups within the Interactive Teaching Approach they usually work in two's or three's, so that each child has more opportunities to contribute and consider the ideas of others. 'Mini-groups' of this size make it easier for all children of whatever gender or cultural background to participate, particularly when teachers actively monitor and guide these groups, ensuring that the processes are constructive and positive for all children.

8. Supportive Environment

The approach allows children and teachers to use a range of oral and written language forms in a meaningful, integrated way within varied, non-threatening environments in which risk-taking is encouraged and supported. For

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6. Catering for cultural difference

Interactive Teaching enables teachers to support the learning of all children, including children whose language, experiences and culture differ from those of the school. This is because the approach identifies and values what children bring to a topic and challenges them to extend their ideas and strategies through experiences which often involve their own communities. Children are encouraged to express themselves in forms that are appropriate for them and their culture, as well as traditional 'school' forms of expression. Some of their questions about rats, for instance, might reflect cultural

Reflecting this diversity and catering for it with appropriate non-fiction texts presents particular challenges, especially at a time when the publishing of children's literature is becoming increasingly globalised. In such an environment, material which is relevant to 'minority' groups may not be considered commercially viable.

Our experience in   recent years suggests, however, that carefully researched non-fiction, which meets the criteria outlined below, can capture the attention of children from a range of language and cultural backgrounds and be meaningful to them.

example, within any one unit children will be involved in many class and mini-group discussions for different purposes; they may negotiate (in oral or written form) visits to places of interest or visits from experts; they may interview one or more 'experts'; they may write letters of request or appreciation; they will record their findings in a range of forms. Such experiences contribute to their language/literacy development (Allington and Cunningham, 1996, quoted in Braunger and Lewis, 1998; Cairney 1992), as well as their understanding of the world.

9. Vocabulary development

Within Interactive Teaching,

vocabulary development is supported by the emphasis on identifying and clarifying meanings, extending ideas, and exploring these in both oral and written contexts. For example, during a study children can clarify the meaning for 'fruit'. They are often surprised to learn that scientists consider 'vegetables' such as tomatoes, pumpkins, runner beans and green peppers to be fruit. To develop further understanding of this, children generally need to explore flowers, their parts and functions, and the names associated with these. The importance of written texts in developing students' vocabularies and knowledge has been stressed by Stanovich (1992).

10. Involvement of parents, caregivers and community

Children's language/literacy is often further developed in the Interactive Approach through the involvement of parents and the community - for example, as assistant collectors of various animals, plants and visual/written resources, as experts on various topics, as assistants on field trips and visits, and as helpers and listeners in the classroom. Often there is a sense of children and parents finding things out together, with considerable discussion being generated as a result.

11. Use of Texts and other Resources as a Way of Learning

Interactive teaching provides ongoing opportunities for children to find their own answers in a variety of ways, for example, from

texts, experts, observations, investigations. Children have authentic, personal reasons to use library catalogues and other resources, seek experts in their community and beyond, and take responsibility for following through an investigation. For instance, some children asked an orchardist about fruit trees, others wrote to a soil science research station seeking answers to their questions about worms, and one boy was keen to contact a forestry expert to find out why trees don't grow square.

Texts are read to children, with children, and by children throughout the unit and these opportunities benefit both girls and boys. Girls read and use more non-fiction than they normally read, and boys actually read and use appropriate non-fiction, rather than merely browsing through the illustrations of difficult texts.

The approach also creates environments where those who can

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read, but usually choose not to, tend to read because they are genuinely interested in the topic being explored and are able to explore their particular interests in their own way - possibly without even realising that they are 'reading' or 'doing science'. This form of exposure to print appears to benefit both their scientific understanding and their language/literacy development. Stanovich (1992), for example, argues that print exposure seems to more than compensate for lack of 'general ability' in the domains of knowledge and vocabulary, while Elley (1988) demonstrated the benefits of reading to children in relation to their vocabulary development.

Interactive Teaching, Research and the selection of Non-Fiction

The Learning in Science research projects and the developments that have flowed from them have highlighted the need to consider more carefully the texts used by students at all levels of the school. Unfortunately, little research has been conducted on young children's reading and writing of genres other than story, and although interest in other genres has increased in the past decade, it is still the case that, as Freeman and Person (1998) note, 'theory and

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research on children's literacy development have focused almost exclusively on narrative' (p. 7).

Most current non-fiction for children in the domain of science fails to do justice to either children or science. It is usually written from an adult view of science, conveyed as scientific fact, and presented as the 'expert's' view of what children ought to know. For example, one book explains that a plasticine bowl floats because there is a strong force pushing against it. How many of us as adults can make sense of that? The book doesn't go further to explain why the bowl sinks if you hold it under the water.

Non-fiction also tends to overlook the psychology of children's learning in science, including language that children have at their command with which to access ideas, and it overlooks both the important processes of science and the perspective that scientific ideas are human creations and are therefore provisional in nature. For example, another book introduces 'sound' by stating, "Sound is energy made when something vibrates". This seems unlikely to capture the interest of

many children. In contrast, a third book does take children's learning into account when discussing stalactites and stalagmites, "It is tricky remembering which grow up and which grow down". There is even some non-fiction science material for children which, quite unscientifically, attributes human qualities to animals other than humans. For instance, a book about 'little monsters' describes how a vampire bat licks a few drops of blood from a sleeping animal such as a cow and, "Then it feels full".

Unless children approach such non-fiction through an Interactive Approach, many will find it boring. If they do engage with it, they can easily develop or reinforce ideas in science, and notions about the way of science, that scientists do not accept as valid. For example, many texts assert that small creatures such as butterflies are insects; children reading them then think that such creatures are not animals - but of course they are.

Through our involvement in writing a number of non-fiction books on science topics for young children we have come to the conclusion that such books need to meet a number of criteria if they are to assist children's learning in science and enhance their literacy development. Even then they are likely to be of most benefit when used in conjunction with the Interactive Teaching Approach or similar processes. As a guide to teachers wanting to select appropriate non-fiction for their children in science (and other curriculum areas), we propose the following criteria.

1. Research Base

It is essential that science books for children reflect research into:
  (i) children's ideas, particularly their 'misconceptions', about a topic;
  (ii) questions that children typically ask about the topic;
  (iii) the language that children use to explore and investigate the topic;
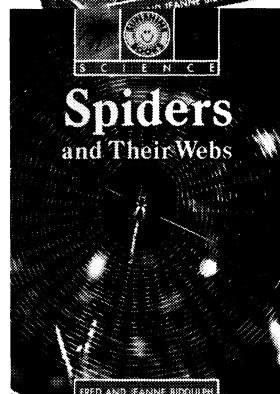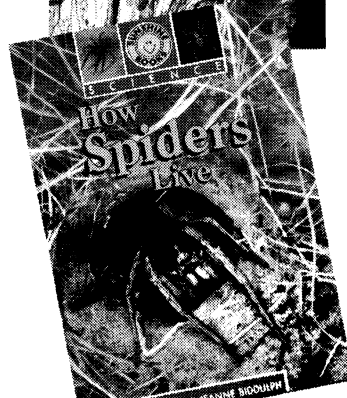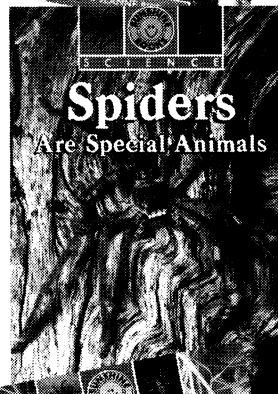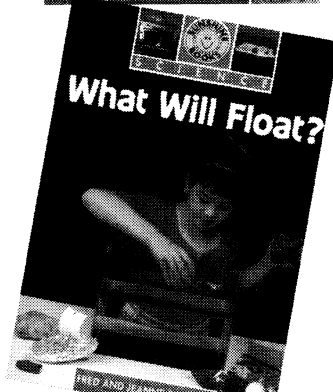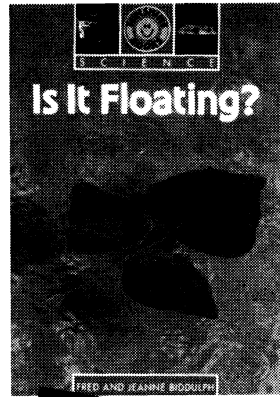
  (iv) current scientific ideas about the topic.

The findings of such research allow an author to address in the text, in language that is likely to be meaningful to the children, the children's ideas and questions. In this way the text is made relevant to the children's growing understanding of their world and challenges them to extend or reconsider their views. An example was a book that we wrote about 'floating'. Research revealed that many children have a narrow view of floating (thinking that things suspended beneath the water such as fish, or things on the surface of water such as pond insects could not be floating) but when challenged these children are keen to know when something can be said to be floating. Our book therefore provides various instances of floating and non-floating, invites the children to think about these and then gives the scientific view.

2. Vocabulary

Vocabulary used should be within the children's experience, or within their grasp, as the topic is explored. New vocabulary and the language of science should be introduced gradually in the context of things children can identify with and relate to. This is quite a challenging task for authors of non-fiction material for young children. For instance, we found that many young children think that we can see the moon because it shines its light at us like a torch, rather than that it reflects light from the sun. We tried to explain it this way,

> *What makes the light on the moon?*
> *The sun makes the moon shine.*
> *We can see the moon*
> *in the day and at night*
> *because the sun shines on it.*
>
> *(Biddulph and Biddulph, 1992a, pp. 7-8)*

3. Language and text structures

These should be sufficiently coherent, familiar and predictable to the children to allow them to construct the intended meanings. For example, when writing a book

for five-year-olds about how spiders live, we knew that most children think spiders live on their webs, so we wrote,

Where do spiders live?
Spiders live where they can find food.
Some spiders live on fences.
Some spiders live in the ground.
Some spiders live in the water.

(Biddulph and Biddulph, 1992b, pp. 2-4)

4. Photographs, illustrations and diagrams

With young children and less-competent older readers in particular, simple text alone may be insufficient to convey scientific ideas. In these cases carefully chosen photographs or other illustrations should support the text and present the ideas. For example, in the book about spiders mentioned above we also addressed the children's question of how spiders protect themselves from enemies.

How do spiders protect them-selves?
Some spiders run away from their enemies.
Some spiders hide from their enemies.
Some spiders use camouflage to hide from their enemies.

(Biddulph and Biddulph, 1992b, pp. 12-14)

In each case there is a photograph of a spider showing the particular means of protection. In this way we were able to use the word 'camouflage' instead of a much longer explanation.

5. Content should be true to science

We cannot emphasise strongly enough that the content of a science book for children should do justice to science in three important ways. It should

(i) reflect currently accepted scientific concepts about the topic (for example, that we lose heat from our bare feet onto a cold floor, rather than that the coldness of the floor gets into our feet);

(ii) convey the idea that scientific concepts and theories are human constructions, are tentative and are always open to improvement or revision. For example, scientists would not say that a shag crash-lands on a tree branch because... They are far more likely to say that a possible reason why a shag seems to crash-land on a tree branch is... This allows for some other possibility not yet considered;

(iii) indicate that scientific endeavour is an ongoing disciplined quest of trying to make better sense of the world.

6. Texts should capture something of the excitement of science

This follows from point (iii) just above. A science book for children should try to tell the 'story' of a topic by addressing children's questions in some sort of sequence, and gradually unravelling the mystery, or resolving the dilemma, of whatever questions are being addressed. Sometimes two or three mini-stories on different aspects of a topic have to be told within the book instead. For example, in our book Spiders and Their Webs (Biddulph and Biddulph, 1992b) we begin by exploring the kinds of webs that spiders make and then consider what spiders make their webs out of, and where the silk comes from. Children usually want to know, *Why don't spiders get stuck in their own webs? (pp. 14-15)* so we include that question in the text and then provide an explanation.

In our experience it is a challenge to find non-fiction material that meets this criteria, especially among texts written for young children.

7. A 'fresh' view is needed

Science books should be written in a 'fresh' way that captures the interest of readers, partly by including the unexpected, and partly by considering what may be familiar from new perspectives. Different

slants on things provide a fascination, an encouragement to wonder whether other things might be different too. For example, a new perspective on our need to maintain and regulate body heat may be gained when we realise that animals such as snakes and crocodiles need to eat a reasonable meal only once a month or so. They don't need food to generate body heat as we do; they get most of their heat directly from the sun. Of course it means that in cold weather they have great difficulty moving whereas we can move around in a wide range of temperature conditions.

8. Good models of non-fiction

Children's science books should provide children with good models of non-fiction writing, and enable even young children to begin to develop research skills associated with text. In the book about Spiders and Their Webs (Biddulph and Biddulph, 1992b) for instance, we provide a 'child-friendly' index on the back cover which includes such items as

Kinds of webs
Mending a web
Spider silk
Why spiders don't stick to their web

Providing good models of non-fiction does not mean, however, that the texts should be restricted to a specific form or 'genre', as defined by various educators (for example, Collerson, 1988; Derewianka, 1990; Emmitt and Pollock with Limbrick, 1996). Well written material for younger children in particular often combines, for example, 'reporting' and 'explaining', in order to create a text which addresses children's ideas and provides information in forms which are meaningful to them. To illustrate from the book about spiders mentioned above, and in response to children asking what happens if a web gets broken, we wrote,

If a web gets broken the spider can mend it.

(Biddulph and Biddulph, 1992b, p. 13)

We also explained, with respect to children wanting to know how

spiders catch their prey,

Some spiders throw their webs
like a net to catch their prey.
Some spiders poison their prey
with their fangs.

(Biddulph and Biddulph, 1992b, pp. 11-12)

Theory and Non-fiction

The theoretical basis for the Interactive Teaching Approach, suggested here as one way of helping children derive personal meaning from non-fiction, is described fully in Biddulph (1989). It is essentially the same as the theoretical underpinnings for the proposed criteria for selecting non-fiction for children. As we see it, these derive from several sources:

(i) The idea that non-fiction should take account of children's ideas and questions, and challenge them with the unexpected, stems from generative or constructivist learning theory (Bell, 1993; Biddulph and Carr, 1999; Northfield and Symington, 1991; Osborne and Wittrock, 1983). The main premise of this is that learners actively construct meanings from their experiences but these are constantly influenced by their prior conceptions and dispositions.

(ii) The use of children's questions, appropriate vocabulary and language structure enables children to take greater control of their own learning, and this relates to the humanistic-type psychological theories of people such as Hawkins (1974), Glasser (1986) and Rogers (1969). These indicate that meaningful learning is self-directed and marked by a quality of personal involvement (Biddulph, 1997; Biddulph and Carr, 1999).

Conclusion

Non-fiction that is based on children's ideas, experiences,

language, questions and interests, as well as 'expert' views, is more likely to engage children in reading non-fiction material than the texts they usually encounter. It is also more likely to make sense to children from various cultural backgrounds. Texts and approaches that actively seek to make connections between the child's world and the material s/he encounters, acknowledge the importance of both the cognitive requirements of the reading task itself and the child's social/cultural environment. Stanovich (1992) suggests that a model of reading which incorporates both is more helpful than a model which focuses on one and ignores the other.

A well written non-fiction science book will reflect a sound knowledge of how children learn, basic scientific views about the topic, scientific processes, and the current philosophical perspective of science. In addition, scientific non-fiction for young children needs to include carefully selected supporting photographs or other illustrations. Used within the framework of Interactive Teaching, or a similar classroom approach, such non-fiction material can enhance the development of children's knowledge and literacy learning very effectively.

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