

Chapter 2

Reading Comprehension

2.1 Chapter Overview

This chapter lays the foundation for an understanding of what reading comprehension is and how it is conceptualised in the literature. It develops the notion that reading comprehension is a flexible and ongoing cognitive and constructive process. It is asserted that there are both conceptually driven (top-down) and data-driven processes (bottom-up) that contribute to the construction of a situation (mental) model of text ideas. It is a two-way process that integrates information from the text-based model with information from prior knowledge using inferential processing. The chapter will examine how readers construct mental or situation models of text to enable reading comprehension.

The second part of the chapter will examine a number of factors that impede children's reading comprehension. By nature reading comprehension difficulties are complex and reader difficulties may be related to a combination of factors such as: biological, cognitive, or behavioural issues. These factors lie within the reader but other factors may also be found outside of the reader. What is important is the realisation that reading comprehension outcomes may be affected by a combination of a lack of reader proficiency, problems within the text, and heavy task demands. What is certain is that reading comprehension inherently involves a negotiation between the reader and the text. This negotiation involves top-down and bottom-up processes that consider a whole range of reader and text attributes.

It is important to note that without adequate support many students with reading comprehension difficulties may be unable to compensate for the many difficulties that they experience in understanding what they read. However, the right kind of support can make a difference despite the many difficulties that individual students encounter.

2.2 What is Reading Comprehension

Reading comprehension is the process of making meaning from text. The goal, therefore, is to gain an overall understanding of what is described in the text rather than to obtain meaning from isolated words or sentences. In understanding read text

information children develop mental models, or representations of meaning of the text ideas during the reading process. There are two classes of mental models: a text-based model, which is a mental representation of the propositions of the text and a situation model consisting of what the text is perceived to be about (Kintsch 1998; van Dijk and Kintsch 1983).

2.2.1 *Mental Modelling*

While reading, skilled readers normally develop a text-based model, which is a mental representation of the actual text discourse. The text-based model incorporates propositions extracted from the reading of successive sentences that are sometimes supplemented by inferences that are necessary to make the text more coherent. At a local level, comprehension of written text involves the processing of the symbolic representations of parts of words, phrases, and sentences. At the same time, at a more global level, a reader must link ideas across sentences and form a mental model that incorporates complex themes and story plots.

In contrast, situation models include elaborative inferences that integrate prior knowledge with text-based information. Unlike the text-based models, situation models do not normally retain the verbatim text information but support a more flexible knowledge structure that can enable the integration of both visual and verbal representations (Pearson and Johnson 1978; Snow 2002; Stull and Mayer 2007). Thus, the construction of a situation model is a dynamic constructive process that is determined by the interaction of the reader, the text structures, and the semantic content. It is a cohesive representation of the meaning of the text ideas (Kintsch 1998). In constructing a situation model the reader is required to search for coherence at the local and global levels and to infer meanings that are often implied by drawing from their existing background knowledge. While doing this, the reader actively constructs the situation model by using information within the text and also information from stored prior knowledge. Thus, the main difference between text-based and the situation model is assumed to be one of inference making, the text-based model is inferentially light while the situation model is inferentially dense.

In building coherent mental representations readers must also process meaning at literal, inferential, and problem solving levels of thinking. For these operations to be effective the reader must set reading goals, monitor meaning and reflect upon their own understanding (Cain and Oakhill 2007). Thus, reading comprehension is a complex interactive set of operations requiring complex cognitive functioning at a number of levels simultaneously.

2.3 Comprehension: A Cognitive Process

As comprehension involves the interaction of a wide range of cognitive skills and processes there are many occasions where difficulties arise that may lead to comprehension failure (Cain and Oakhill 2007). For example, during reading the

ability to derive meaning is normally enhanced when there is a reduction in the cognitive load of a reader's working memory, and the reader can decode the words and phrases fluently and bring meaning to the unfamiliar vocabulary encountered (Daneman and Green 1986; Manset-Williamson and Nelson 2005; Pressley 1998). The indications are that successful readers are more efficient at gaining unfamiliar word meanings from texts because they have a greater existing vocabulary, more experience using context clues, and greater background knowledge (Ewers and Brownson 1999; Goerss et al. 1999; Kuhn and Stahl 1998; Stanovich 1986). In contrast, less skilled readers are considered to have more difficulties integrating read text information (Goerss et al. 1999; Pressley 1997). Furthermore, due to the fact that strong contextual cues are not always found in many texts, less skilled readers may have more difficulty considering the writer's interpretations, and forming appropriate inferences from unfamiliar events or relationships (Andrews 1996; Goerss et al. 1999).

Cognitive theory, with its strong focus on the connection between language and thinking, places importance on the reader's ability to make appropriate choices between contextual cues and the ability to decode and comprehend read text (Linnenbrink and Pintrich 2003; Paris and Winograd 1990; Schunk 2004). Thus, cognitive psychologists have theorised that a balanced approach to the teaching of reading is one that combines a text-based approach and a discourse meaning approach in such a way that the processes are interactive and reciprocal (Farris et al. 2004; Pressley 2002e; Snow and Sweet 2003). Consequently, readers must consider the intention of the author as well as their own background knowledge and experiences that they bring to the text (Pearson and Raphael 1990). From this theoretical perspective both the reader and the text play critical roles in the comprehension process. The claim is that the reader's cognitive processing of the text information does not enter the reader's consciousness from one direction, rather the reader synthesises the text-based and prior knowledge information simultaneously (Dreher 2000). Decisions are based on the process of making meaning and they are subsequently altered as the reader accommodates further text information as reading progresses (Bowyer-Crane and Snowling 2005).

2.3.1 Meaning and Comprehension

Reading comprehension (understanding, gaining meaning and interpreting the text) depends on a variety of reader-related, text-related, and situational factors (De Corte et al. 2001). Meaning is formed in the reader's head, that is, a person's prior knowledge affects the kinds of meanings constructed from the text information (Fukkink and de Glopper 1998; Lipson 1983). From this perspective an individual's existing knowledge is a major determinant in acquiring new information (Ausubel 1968; Cain and Oakhill 1999; Griffin et al. 1995). Furthermore, the reader's comprehension of the text is considered to be linked to the reader's ability to construct hypotheses, rules, schemas, and mental models (Vipond 1980).

2.4 Comprehension and the Active Learner

Recent theoretical perspectives view skilled readers as being active and self-regulating learners (Harris and Pressley 1991). The notion that children actively construct new meanings by assimilating or accommodating old knowledge structures with new knowledge is related directly with their ability to reflect upon the reading task. A reader centred approach to making meaning is intrinsically motivating because it promotes the application of strategies that foster self-monitoring of reading comprehension (Gersten et al. 2001; Vaughn et al. 2000). This aspect will be discussed in more detail in Chap. 10.

2.4.1 *Comprehension and Organisation*

Kintsch (1982) suggested that individuals construct global or thematic understandings from lower conceptual levels, under the control of a schema. Thus, the reader's comprehension of the text will also be facilitated by the retrieval of information associated with a stored schema in long-term memory. This process of linking the words and text with the reader's stored background knowledge may be affected by the strength of connections between the more global or higher-level concepts and the words on the page at the more local level (Kintsch 1982). For this reason, a story or text structure is often one of the most important elements in the comprehension of the story or passage content (Marr and Gormley 1982; Pearson et al. 1992; Whaley 1981a, b). In particular, understanding the time order sequences in a text passage facilitates the reader's ability to logically organise and comprehend that text (Ashton-Warner 1963; Morrow 1985; Trabasso and Sperry 1985).

Illustrations used in association with text can also positively influence reading comprehension by enabling the reader to construct a more elaborated understanding of the passage (Duke and Pearson 2002; Levin 1981). For example, Glenberg and Langston (1992) encouraged readers to focus on illustrations and to use self-questioning strategies related to what was happening in the story. The researchers found that there was a connection between the visual mental models that the reader's construct and the visual information from the pictures in the text during comprehension. Thus, pictures can be used to elaborate on information not always fully provided by the written text (Schallert 1980). Good picture cues, in particular, enable less experienced readers to read with more understanding by enabling the linking of the reader's background knowledge to new text-based ideas (Goldstein and Underwood 1981). It has been found that older and more able readers rely less on illustrations than their less able peers most likely because they tend to naturally visualise story content as they read (Hibbing and Rankin-Erikson 2003).

2.4.2 Comprehension and Metacognition

Studies of children's reading and metacognition (planning and reviewing of strategies) suggest that skilled readers are dynamic readers who predict what is going to happen in the text. It is asserted that when readers predict before reading, they activate past memories and experiences and test themselves as to whether they have sufficient knowledge about the present topic in order to comprehend the text (Dole et al. 1991; Glazer 1994). Prediction strategies help promote overall story understanding and engagement with the text information during ongoing reading and enable readers to verify their understanding of the text (Block 2004; Duke and Pearson 2002). They usually verify their predictions by monitoring meaning and occasionally employing fix-up strategies, such as reading back or reading on when their predictions of events within the text fail to materialise (Kintsch 1982; Zinar 2000).

Teachers may support this verification process by asking questions, such as 'What clues helped you make this prediction?' After the story is finished readers may be asked, 'What part of your predictions came true?' These types of questions can become a framework to model the questioning process so that readers can eventually internalise self-questioning and self-monitoring strategies. The evidence is that self-questioning strategies help students develop metacognitive skills by monitoring their own responses (Block 2004; Pressley 2002a). Metacognitive processes are enhanced when readers are encouraged to take ownership of their reading strategies (Palincsar and Brown 1984).

The reader's conceptual understanding of the text also develops and changes over time as the reader progresses through the text (Pearson and Johnson 1978). For example, the reader's understanding of a zoo-based scenario, as described in a text passage is dependent on the reader's experience of zoos and the new information provided by the text (Kintsch 1993; Schank and Ableson 1977). New meanings are processed using the reader's prior experiences, imagination, and ability to absorb new information with the least amount of attention effort (Goodman 1996; Pressley 1998; Smith 1978). Successful readers lessen the amount of attention effort by constantly using what they already know to make inferences and to predict what they don't yet know (Collins et al. 1980; Goodman 1996).

Comprehension is, therefore, more effective when readers use what they already know about the text theme to conceptualise the gist of the present text (Goodman 1996; Smith 1978). This process allows the reader to construct a more appropriate situational model of the text. For example, what would it be like in the C. S. Lewis story, 'The Magician's Nephew' when Digory and Polly visited an attic in an old English home. Teachers may use questions to facilitate the development of this construct, such as, "Have you ever been in an old attic? What do they look like? Have you seen an old store room that you think may be like an attic but with a sloping roof and with exposed rafters covered in cob webs?" Thus, the reader's construction of an imaginal situational model of the text is thought to be crucial for comprehension (Yuill and OakHill 1991; Kintsch 1998; McKoon and Ratcliff 1992).

2.5 Comprehension Difficulties

There may be a multiplicity of factors that contribute to reading difficulties for many students with special needs and the underlying causes of their reading problems may be largely unknown (Lewis and Doorlag 1999). It has been found that the prevalence of children with reading difficulties is often linked with the economic and social circumstances of the home. For example, many children identified as having reading difficulties experience significant language and cultural differences between home and school (Elkins 2002a, b; McNaughton et al. 2004; Rohl and Rivalland 2002). This finding is supported by studies conducted in the mid-1970s where variables, such as social class, educational background of the parents, family income and the number of books in the home were consistently related to school reading achievement (Romeo 2002). The claim is that the respect for education, community standards and the value placed on education also influenced whether or not students have mastered basic literacy skills (Samuels 1978).

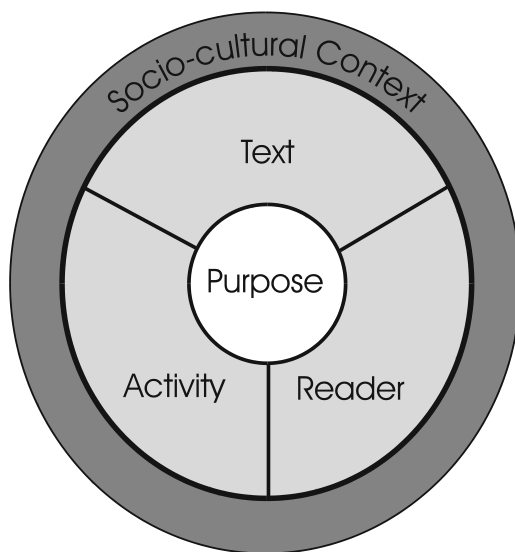
2.5.1 Why Some Students Are Poor at Comprehension?

Researchers have established that children's early attainment of decoding skill is a reliable predictor of later reading achievement (Juel 1998; Pressley 1998; Chapman and Tunmer 2003). It has been well established that skilled reading comprehension requires the reader to be able to process the written symbols of text at an appropriate level. This is reinforced by the fact that poor decoders, both in and out of school, read considerably less than average readers (Beck and Juel 1992). However, reading and the comprehension of text is a complex interactive process, and there is more to reading and comprehension than just decoding or word calling (De Corte et al. 2001; McNaughton et al. 2004; Rivalland 2000).

2.5.2 A Conceptual Framework

The term 'learning difficulty' implies that even normally capable students can fail to advance in reading, particularly if they receive poor quality instruction from their teachers (Cambourne 1999; Lerner 2003). Thus, it can be assumed that there are factors within the learner that impact on reading performance and there are ranges of influences that are often beyond the control of the learner. Thus, one would expect that there is a diverse range of factors inside and outside of the reader that can impede the normal progression of reading skill development. Snow (2002) has identified three broad areas that impact upon reading within the socio-cultural context (see Fig. 2.1). To this has been added the central role of purpose. This present model recognises that comprehension of text is the product of a complex combination of several interactive factors, and each of these factors, either individually or

Fig. 2.1 Variables that affect reading performance – after Snow (2002)



in combination need to be considered when designing reading interventions. While it is recognized that these factors are interactive, each of the variables will be explored in more detail in the following section.

2.6 Socio-Cultural Context

The socio-cultural context includes all of the cultural practices within which the learners and learning are placed. In part, the context of the classroom and the purpose of the lessons provide a socio-cultural context within which meaning is constructed. In addition to the socio-cultural context of the classroom learners are also shaped by their broader experiences, background knowledge, and social/cultural identities that they bring to a learning activity. Literacies involve an understanding of specific codes like alphabetic signs that have relatively little meaning outside of the context of the lesson or the social and cultural practices that the children bring to them. In recent times electronic text genres have changed quite considerably, they look different from traditional print-based texts but are still primary conveyors of meaning. New technologies, such as digital technologies that include combinations of sound, print, and images, provide a shift in the way we think about literacy at a school today. Alphabetic print must now be understood in the wider socio-cultural context as a partial conveyor of meaning along with other integrated modes. Thus, new literacies and new socio-cultural contexts promote new ways of reading, writing, interpreting, and interacting (Hassett 2006) but always within a meaningful socio-cultural context.

The claim is that the reader's cultural beliefs and values influence the comprehension of the text and by belonging to a particular socio-linguistic group, or

having a religious or political affiliation, will influence the way a reader views, thinks, and comprehends the text (Kendeou and van den Broek 2005; Lipson 1983; Pearson and Raphael 1990). Smith (1978, p. 79) referred to this world view when he said, "What we have in our heads is a theory, a theory of what the world is like, and this theory is the basis of all our perception and understanding of the world; it is the root of all learning...." Our theory of the world is influenced by the socio-cultural context within which students are situated and also by the ongoing life experiences (including language) that impact and form those beliefs. Those beliefs are shaped and nurtured by social interaction and by the language used in the social contexts in which children are situated.

When readers comprehend communicative material they apply their beliefs about the world and what they already know about the present topic as a lense through which to interpret and understand the message the writer is attempting to convey. By using this lens children are more able to integrate prior knowledge when required to make inferences about story information. Thus, the processing of information may be limited or enhanced by the knowledge base that one possesses. For example, even when skilled readers' have inadequate prior knowledge to apply to a reading task they tend to use the best available schema to organise the construction of meaning (Harris and Pressely 1991; Marr and Gormley 1982; Reid 1988). The reader will often rely on background knowledge of similar situations to form an analogy when relating to relatively novel story information.

This does not always work well in all situations. While navigating some texts readers may access background knowledge that may be in error, leading to difficulties with comprehension (Brown 1982). For example, Lipson (1983) reported that the influence of religious affiliation on children's memory for text information affected the quantity and accuracy of both explicit and inferential recall. It was also noted that young readers often rejected text information if they thought that it was in error, particularly if they believed that they had the correct interpretation.

For example, Elijah is a 6 year old who is reported to one of the best readers in his grade level at school. His bedroom is always spotless and all his toys have a place where they are always kept. He loves to go shopping with his mother. Recently, while helping his mother with the shopping at the local supermarket he said to her, "The shopping trolley is untidy and you might get into trouble."

His mother replied, "Elijah, What do you mean?"

He pointed to the sign on the wall and said in a rather matter of fact way, "It says, don't leave your vegetables untidy in your shopping trolley"

His mother, Janina, smiled and said, "No, Elijah, it actually says, do not leave your valuables unattended in your shopping trolley."

Thus, it follows that skilled reading comprehension is interplay between prior knowledge and monitoring meaning by recognising and reconciling inconsistencies (Vaughn et al. 2000).

There is a close association between background knowledge of language, vocabulary and appropriate reading comprehension strategies. Many less able readers have difficulty in utilising the grammatical and contextual meaning cues found in

book language (Bishop 1997; Catts et al. 2003). They tend to separate words into separate units rather than clustering them into larger meaningful wholes (Idol 1988). Often less able readers spend more time on the surface features of word identification where meaning is less evident (Robinson 2001). There may also be corresponding deficits in receptive language that have a negative impact on reading comprehension (Idol 1988). Many children with reading difficulties have also been found to have problems in expressive language in sentence completion and formulation; word discrimination, syntax, grammar, and phrase length. For example, less skilled comprehenders often have difficulties with figurative language, such as metaphors, similes, and alliteration (Block and Pressley 2002; Gambrell 2004; Kamhi and Catts 2002).

2.7 Task Variables

Cambourne (2002) maintained that when children are provided with a rich social literacy environment with a wide variety of genres, and text-based interactions with others, effective literacy learning could be enhanced. In a social learning model, meaningful dialogical interactions between the child and others are more likely to facilitate the children's understanding of the vocabulary, the content, and the structural features of the text.

Bos and Vaughn (2002) maintained that tasks that promote interaction and interdependence were important aspects of the learning environment. They suggested that learning could be perceived as a dynamic process in which the students play an active role, constantly interacting with the environment and people around them. For example, students who were given the task to discuss a story from a character's perspective, after reading a passage, had higher ratings on their retellings of the story and were better able to identify the story's central problem (Emery 1992, 1996). In contrast, it has been observed that students who have difficulty with reading are disadvantaged when they are instructed to merely read basal readers and fill in routine worksheets (Paris and Oka 1989).

Most students need some form of structure to their learning and to be actively and purposely engaged in their own learning process (Duffy et al. 1987). The problem is that a characteristic of many students with reading difficulties is that they typically become passive and unmotivated readers (Hay 1995a). In response to this, educators can better accommodate such students in the classroom by understanding how they learn and how learning experiences can be modified to encourage purposeful learning (Guthrie and Davis 2003; Krapp 2005; Pressley 2002e). Researchers have reported that high quality teaching is most important in children's literacy learning (Westwood 2004). Success in teaching students identified as having reading difficulties depends on the training, knowledge, and ability of teachers to develop appropriate tasks and strategies that provide good teaching environments (Duffy and Roehler 1989; Rohl 2000; Rohl and Rivalland 2002).

When direct instruction is used in conjunction with explicit explanations, low achieving readers have been found to become more conscious of strategic reasoning. For example, Yuill and Oakhill (1991) reported that less-skilled readers, who had been given specific instructions, recalled more of the main ideas from the read texts. Direct and explicit instruction has been demonstrated to have a positive effect on comprehension ability in learners with reading difficulties. A number of other researchers have found that when less able readers were given task direction in how to revise read text they demonstrated higher comprehension attainment on questions that addressed central aspects of the texts (Alfassi 2004; Duffy et al. 1987). Furthermore, less able readers tend to have more difficulty grouping ideas together, while skilled readers refine and revise their ideas continually while reading (Caccamise and Snyder 2005; Pressley 2002e). The evidence is that effective reading intervention necessitates teaching the reader how to monitor his/her use of reading strategies while performing a particular reading related task (Schunk 2005; Vaughn et al. 2000; Vollmeyer and Rheinberg 2005).

2.8 Text Variables

There are two elements that need to be considered when dealing with text variables that impact on comprehension. The first aspect is a top-down focus that involves what readers bring to the reading task in terms of their reading skill, language, cognitive processes, background knowledge, interests, goals, and understanding of the requirements of a reading task (Fletcher et al. 1990). A second aspect is a bottom-up approach whereby textual features play an important role in determining the comprehensible level of difficulty such as content, style, linguistic, and cognitive features (Fry 2002). The difficulty that a reader experiences while negotiating a particular text will be determined by the interplay of these elements.

There is a great deal of evidence to suggest that many students with reading comprehension difficulties have problems with word level processes such as phonological awareness, phonological encoding and naming speed (Leppanen et al. 2004; Robinson 2002; Tunmer et al. 2002). Thus, being able to quickly identify individual words within a sentence facilitates text processing along with an understanding of the syntax and semantic aspects of texts (Bishop 1997; Kintsch 1982). Furthermore, text conventions, such as full stops and commas help to organise text into relevant components (Clark and Clark 1977). At the local level of text coherence, pronouns may facilitate the formation of 'cohesive ties,' that form linkages between the propositions that are being formed as the reader processes the surface structure of the text.

Text organisational features, such as italics, underlining, and subheadings along with illustrations, figures, graphs, and maps also help readers process the text content into working memory more efficiently (Baddeley and Hitch 1993; Kirby 1991). Other helpful text features such as headings and subheadings, according to Armbruster and Anderson (1985), are labels for various frame slots, and can also

make it easier for the reader to cognitively organise information. However, badly written texts may cause confusion for less able readers because they require a large number of restatements of propositions in working memory when the meaning is unclear (Vipond 1980).

Pearson and Raphael (1990) suggested that readers who have a clear understanding of story schema and other types of genre structure are more successful in the comprehension of text. Often various types of text genres carry with them predictable text structures and readers need to be conversant with each style of text (Whaley 1981a). They may have expectations about what they are reading as they relate to structural elements and the sequencing of those elements in the text, for example, understanding the genre of an adventure novel, a travel story or play.

Kintsch (1982) posited the notion that larger segments of text could be structured in the form of content frames, which complement the larger whole. The larger units in a narrative might encompass the overall plot and include the organisational units of the orientation of the story, the complication of the plot, and the resolution of the conflict. Introductory paragraphs, for example, may help organise and introduce preceding frames and story lines. This helps the reader to relate narrative information to the reader's prior knowledge, making it easier for the reader to form links with pre-existing propositions about the story. Within the narrative framework there may also be several sub-plots or incidences that form elements of the larger whole and the inter-relationship of the main characters may provide story coherence. In contrast, Meyer (1975) found that information low in content structure (or further away from the main theme) was generally forgotten faster than information high in content structure. Thus, coherence within the text and the theme of the story are critical factors in the readability of text (Harris and Pressley 1991; Zhang and Hoosain 2001).

A significant problem for the child with delayed reading in the middle grades of primary school is the impact of increasingly unfamiliar vocabulary found in texts as they progress through the upper grades (Leach et al. 2003). Vocabulary is one element that contributes to text difficulty levels or ease of reading. According to Gunning (2003) high readability levels of reading material is one of the significant causes of students having reading difficulties. However, he maintained that most remedial reading materials do not adequately deal with this problem. Fromkin et al. (1996) posited that most remedial reading materials incorporate shortened sentence structures with a very restricted vocabulary such as the inclusion of mostly high frequency words. Readers generally have more experiences with high frequency words in low readability texts but they do carry less meaning because they are not as specific (Fromkin et al. 1996). For example, the word 'run' has a wider meaning than 'sprinted' and is not as specific as a word like 'jog'. Thus, lower frequency words, such as 'sprint' or 'jog', carry more meaning and promote comprehension better because they are more specific.

Text readability research has also been concerned with the relationship between a number of related text and non-text factors. For example, texts that contain complex propositions and embedded concepts may also cause problems with the reader's short-term memory capacity such that the conceptual information becomes

lost from the readers' short-term memory store (Baddeley and Hitch 1994; Yuill et al. 1989). Disjointed text units are also less likely to be remembered or understood by the reader (Kintsch 1982). For example, at the theme level, texts with missing topic sentences or an over abundance of pronouns can cause the reader to make inferences that may be in error. Consequently, the reader will be required to compensate for the missing information by applying extra effort to make connections with related information stored in long-term memory (Kintsch 1998). The retrieval of text information may also be affected by a number of factors, such as the strength of connections between the global themes in the text. For example, if the text theme is a visit to the beach words like waves, water, fish, and shells may be recalled easier because of their links to the passage theme. Semantic units are also more readily retrievable from a text when there are matching schemas already available in the reader's long-term memory (Schunk 2004).

The evidence is that successful readers can efficiently integrate text information, such that comprehension occurs in a seamless process where concepts are automatically processed from the word level into the thematic or discourse level (Anderson and Bower 1971; Baddeley and Hitch 1994; Idol 1988). Thus, for the reader, effective reading comprehension involves a combination of cognitive processes, many of which work simultaneously and automatically at the word and discourse levels of the text (Baddeley 1990; Chi and Rees 1983; LaBerg and Samuels 1974).

2.9 Reader Variables

There has been, over recent years, an understanding that learning difficulties are often composed of a complex interaction between underlying reader factors as well as the environmental influences mentioned above (Robinson 2002). Frith (1995) identified three factors that related to reader difficulties:

1. Biological
2. Cognitive
3. Behavioural

2.9.1 Biological

A genetic link has been suggested as one possible cause for the reading problems of some children (Bender 2008). For example, studies have shown that when reading problems exist in one identical twin those problems are more likely to exist in both identical twins in contrast to fraternal twins where the reading problem may only be evident in one of the siblings. Thus, indicating a possible genetic root cause of many reading problems (Wood and Grigorenko 2001).

A number of other studies have also shown a link between maternal smoking during pregnant pregnancy and birth-related problems in young children that impact

upon future learning ability (Bender 2008). An example of the damaging effects during pregnancy comes from studies of foetal alcohol syndrome that centres on the problem of mothers who ingest large quantities of alcohol during pregnancy. Foetal alcohol syndrome seems to be associated with children who typically have moderate to severe cognitive disabilities. The effects of both alcohol and smoking on unborn infants can have long-lasting effects on children's reading performance at school. A premature birth may be an example of another underlying cause of learning difficulties. The list of potential biological causes may be quite extensive.

Chemicals present in our modern technological environment may also contribute to certain types of learning disorders. For example, children with high levels of lead in their bodies have been found to score lower than other children on several important variables including verbal performance, language processing, and attention (Bender 2008). Moreover, many common substances such as food additives, refined sugars, eggs, corn, and milk can also cause reactions that may be associated with learning disabilities.

There is evidence that neurological and biochemical abnormalities will be influenced by other environmental factors, such as diet, food and environmental toxins, and bacterial or viral infections (Robinson 2002). For example, it is possible that an auditory deficit may be the distal cause of a phonological problem. This is because auditory deficits can be transient and thus may not be detected in older children (Bishop and Snowling 2004). A probability is that auditory impairments, such as glue ear, for example, may be the initial cause of a reading problem and will exacerbate a phonological impairment that is present in the individual even after the biological problem has been remediated (Bishop and Snowling 2004). Thus, a small percentage of disabled readers may be badly affected by basic cognitive deficits of biological origin that may become more complicated as time goes by (Vellutino et al. 2004).

It is asserted that no single medical cause has been directly related to a particular type of learning disability. However, knowing the possible medical problems that contribute to a reading difficulty may help to shed light on individual children's problems but may not directly help teachers design an appropriate intervention. In other words, knowing that the child suffered brain injury in an accident and that today's learning difficulties began at that time does not help the teacher decide what to do to help that child to read. Medical problems require medical solutions and the main responsibility for the treatment is with the medical profession, however, teachers can play a vital role in the identification and remediation of the associated learning problems.

There is also increasing evidence of the influence of the environment on the development of neural structures within the brain and the interconnections may be continually changing during a person's lifetime (Doidge 2007; Wolf 2008). The plasticity of the brain was, until recently thought to be mainly restricted to the early years of life, but more recent evidence suggests that the brain may continue to change throughout a person's lifetime (Bender 2008; Robinson 2002). The implication for educators is to shift the focus of their clinical activities away from emphasis on psychometric assessment related to direct cognitive and biological

causes of a child's reading difficulties in favour of assessment that would eventuate in educational and remedial activities tailored to the child's individual learning needs. It has been suggested that an initial approach to assessment should involve a well-balanced and individualised remedial intervention that builds upon a child's existing background knowledge and skills (Vellutino et al. 2004).

2.9.2 Cognitive

Many students identified as having reading or learning difficulties often have associated cognitive difficulties (Baker et al. 2000; de Lemos 2004). Variability in reading comprehension may, in some cases, be related to differences in student's cognitive and memory processing abilities (Guthrie et al. 1995; Kirby 1991; Paris and Winograd 1990; Schunk 2004). The etiology of these cognitive difficulties may have biological or environmental beginnings and may translate into visual, phonological, language, and/or memory deficits. At the cognitive level, many pre-requisite skills are also likely to be influenced by environmental factors such as parental encouragement of children to listen to sounds, opportunities to practise language, having a range of books in the home, attending preschool, and watching educational television programs that develop language and pre-reading skills (Robinson 2002).

It has been widely accepted that reading is a language-based skill. Word recognition depends on phonological and lexical knowledge while comprehension of larger text discourse requires syntactic, morphemic, semantic, and whole text structural knowledge. As a consequence children who have difficulties in one or more of these functions will have considerable difficulty learning to read (Kamhi and Catts 2002). Although reading difficulties may be the result of language deficits, for example, many children find it difficult to name objects with low-frequency names. Some children make phonological naming errors while others are more likely to make visually based errors or no response (Nation et al. 1999).

It has been found that skilled readers outperformed a range of less skilled readers on measures related to working memory, processing speed, and updating information (Nation et al. 2002; Swanson and Jerman 2007). Reading comprehension delays are also associated with problems in higher order comprehension skills, such as prediction and summarising, using background knowledge, and forming mental imagery. Many of the thinking processes involved in comprehension, such as integration and inference, anaphoric processing, use of context cues, monitoring comprehension, and structuring of narratives, are dependent on the storage and organisation of information in memory (Cain and Oakhill 2007).

It has also been widely acknowledged that working memory might be less efficient for less able readers (Truscott et al. 1995). For example, Swanson et al. (2006) found that skilled comprehenders outperformed a range of poor comprehenders on measures related to working memory. Some poor comprehenders exhibit poor verbal short-term memory spans while others perform well on simple memory tasks.

One of the most essential reading comprehension skills is the ability to use selective and focused attention (Bender 2008). Thus, a number of other researchers

have proposed that, during reading, the ability to comprehend text is enhanced when there is a reduction in the overall cognitive load in working memory (Daneman and Green 1986; Manset-Williamson and Nelson 2005; Pressley 2002a). It is asserted that memory load is affected by how attention is allocated within and between the different component subsystems of working memory during a particular reading episode (Achibald and Gathercole 2007).

2.9.3 Behavioural

Text difficulty for an individual is influenced by other factors within the reader such as: the reading skill level, age, gender, interests, background knowledge (Brown and Cambourne 1987), by socio-cultural variables (Freebody and Frieberg 2001), by the purpose in selecting the text (Burg 1977), and by how well it is written and organised (Keene 2002).

Children's attitudes to reading have a considerable bearing on their persistence and success in reading (Ashton-Warner 1963; Collins and Matthey 2001; Chapman and Tunmer 1997). Students with reading difficulties often have negative affective and motivational variables that impact upon the reading process (Hareli and Weiner 2002). For example, many less skilled readers have experienced failure over a considerable period of time, leading to low levels of future expectations and a reduced motivation to try (Coleman and Bornholt 2003; Covington 1984; Quandt and Selznick 1984; Schunk 2003).

If readers are involved in the selection of texts and are focused on their reading tasks, their approach to reading should be free from extraneous and competing distractions. Such focused attention usually results in deeper comprehension of the reading material (Rozendaal et al. 2005; Tunmer et al. 2002). In addition, when a book or story interests the reader an emotional response is often the result (Cole 2002/2003; Dipardo and Schnack 2004). This emotional reaction will also contribute to improved attitudes, engagement and enjoyment with reading. However, it should be noted that for a text to be motivating and involving, it is desirable that it should not be too difficult or too easy while at the same time providing choice related to the interests of the reader (Clay 1993; Deci 1992; Fountas and Pinnell 1996; Holdaway 1980). The motivational aspects of behaviour will be discussed in more detail in Chap. 9.

Normally, as readers progress, decoding skills become more automatised and comprehension increasingly draws on a broader range of different language skills presenting L2 language learners with greater challenges than their L1 peers (Droop and Verhoeven 2003; Perfetti 2007; Snowling et al. 2001; Van Gelderen et al. 2004). As reading becomes less about decoding, students will be able to encounter richer content knowledge, more complex grammatical structure and higher-level text processing skills such as inference generation and comprehension monitoring (Beal 1996; Cain and Oakhill 2007; Ehri and McCormick 1998).

Variability in reading performance is also influenced by the reader's engagement and attitude towards the activity, reading self-concept, and reading motivation

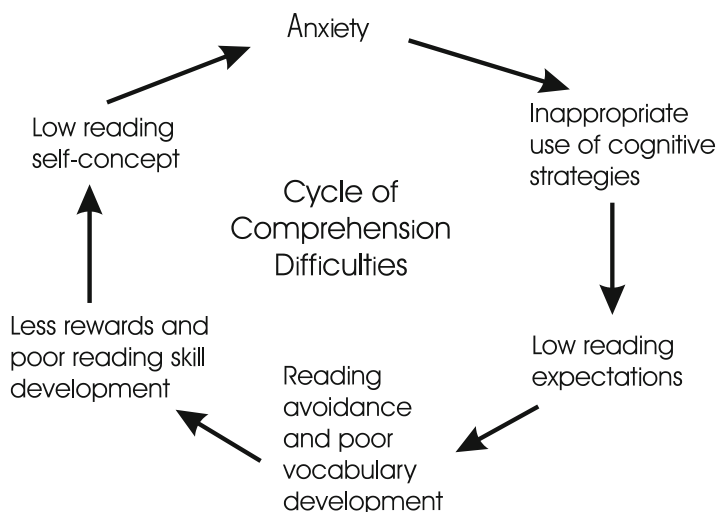


Fig. 2.2 The cycle of reading comprehension difficulties

(Bong and Skaalvik 2003; Chapman and Tunmer 1997). The concern is children experiencing reading problems over long periods of time develop negative attitudes and less effective reading practices (Ariel 1992; Pressley 1998; Tunmer et al. 2002). For example, a situation that has been labelled the ‘Matthew Effect’ is where the skilled readers make good progress while the less able readers make less progress and fall further behind when compared to their more successful peers (Stanovich 1986). The result is that children who have difficulty learning to read begin to dislike reading and consequently read less in and out of school.

Figure 2.2 above shows the complex nature of the reading difficulties and how this relates to reading progress. A child who has a reading difficulty may be unsure of his/her reading ability and may have anxiety related to reading tasks. This may contribute to the inappropriate use of strategies that are used during reading. A history of reading failure will contribute to lower reading expectations by the reader and also by the teacher. This in turn may lead to avoidance of reading and reading practice, resulting in reduced vocabulary development and a widening gap in performance as compared to other more successful readers.

Less reading and poor skill development generally leads to having less rewards and lower reading achievement. As comparisons are made to other skilled readers in the classroom the poor reader may develop lower reading related self-concepts. Thus, what may have started as a simple problem may over time develop into a complex cycle of reading failure (see Fig. 2.2).

In contrast, the effect of reading volume on vocabulary growth, combined with the large differences in reading skill, creates a cumulative advantage for those children who are successful readers (Brand-Gruwel et al. 1998; Stanovich 1986). This exposure to a greater volume of print facilitates their ability to decode and

derive meanings from unknown words (Worthy et al. 2002). The claim is that skilled readers learn new words from context with greater efficiency than do less able readers, even when differences in the knowledge base are controlled (Anderson and Freebody 1981; Carnie et al. 1984; Wharton-McDonald 2002). Vocabulary knowledge also facilitates children's reading comprehension; a principle emphasized in recent research on the importance of cognitive development in acquiring new information (Neal and Kelly 2002; Paris 2005; Stanovich 1986; Swanborn and de Glopper 2002; Worthy et al. 2002).

Reading and classroom instruction needs to be seen as both cognitive and as social behavioural activities (Paris and Oka 1986a; Pressley 2002a). For example, within the context of a group reading session in a classroom there may be cultural and social procedures associated with the reading task such that all the less able readers read in one group, or all the less able readers read with the teacher aide, or less able readers do remedial decoding activities while the rest of the class do extension reading. The claim is that all of these social and cultural activities directly and indirectly influence their self-perceptions as readers and their motivation to read (Pressley 2002c). Thus, the features of 'reading' need to be understood within the classroom cultural context so that appropriate procedural processes can be clearly identified. Teachers need to consider their reading program for all children in the classroom so that all aspects are relevant to the literacy needs of every student (Freebody and Frieberg 2001). For example, having all children do extension reading, not just the so-called better readers in the classroom.

Some reading strategies focus more on students' own thinking processes and own knowledge of what is involved in performing a set task (Johns et al. 1994). For example, the development of adequate self-management skills by a child with a learning disability or learning problem seems to be one of the most important behavioural factors contributing to the successful social integration of that child into a regular classroom (Westwood 2007). Teaching students to use self-monitoring and think-aloud strategies encourages students to become more efficient and independent in their learning (Ernsbarger 2002) and in reading to elicit inferences from texts (Bos 1999; Vaughn et al. 2000). Self-regulation and self-monitoring techniques are examples of self-regulation strategies. Self-regulation relates to the learners monitoring thinking processes, often through dialogue by focusing on the meaning of read text (Schunk 2005; Zimmerman 2002). For example, the verbalising of thinking strategies is a self-monitoring and self-regulation strategy that enables the reader to build metacognitive understanding (Palincsar and Brown 1987). Instructional strategies that support self-monitoring and self-regulation are important in promoting independent and efficient learning (Schunk 2004; Vaughn et al. 2000; Zimmerman and Schunk 2001). Aspects of self-regulation and the development of independence in reading comprehension will be discussed further in Chap. 9.

There is strong evidence to suggest that most early reading difficulties may be the result of experiential and instructional factors (Vellutino et al. 2004). Thus, a critical issue for the learner relates to the quality of instruction and the level of support provided in the classroom (Harris and Pressley 1991). At a behavioural level, consistent support and encouragement to read, supplemented by early and intensive

remedial assistance is likely to reduce the impact that any underlying neurological or biological factors may have on academic achievement (Robinson 2002). The social learning environment is a significant aspect that influences the reader’s emotional reactions and self-beliefs related to reading achievement (Carrie and Skinner 2003; Hay et al. 1997; Pintrich et al. 1993). For example, the interpersonal one-on-one nature of parent tutoring reading programs have been shown to improve the academic reading self-beliefs of students, and indirectly have had a positive effect upon the enhancement of reading skills (Neuman 1995; Wilson and Moon 1991). This important social aspect will be discussed in more detail in Chap. 13.

2.10 Purpose

Freebody and Luke’s (1990) model of literacy (see Fig. 2.3) considers the reader as having four different roles or purposes when engaging in literacy practices: (1) a code breaker, (2) a text-participator, (3) a text-user, and (4) a text analyser. Breaking the code emphasises the decoding of the words, and encoding of information, understanding the conventions of written, spoken and visual multimodal texts by recognising, and using the surface features of print. Text-participation involves the making of meaning by drawing from the readers’ social and cultural backgrounds and prior knowledge within literate contexts. As text-users, students understand the purposes of using texts in different ways for different cultural and social functions. The text-analysing role focuses on the ideas within the literacies. Ludwig (2004) supposed the underlying assumption of the Freebody and Luke (1990) Four Roles

| | |
|--|--|
| <div>Code Breaker</div> <div>Code breaking practices that seek to crack the code of semiotic systems within the text, picture, film, etc..</div> | <div>Meaning Maker</div> <div>The extent to which the reader can bring to and apply their meaningful experiences to engage with the text.</div> |
| <div>Text User</div> <div>The types of literacy practices are determined by the purposes of the user.</div> | <div>Text Analyst</div> <div>Readers make informed decisions concerning the value that they will place on the text and the authority that they will afford it.</div> |

Fig. 2.3 The four roles literacy model (Freebody and Luke 1990)

taxonomy is that literacy is a complex process and is influenced by the diversity of the literacy practices within the home, the school and the community.

Generally, if the purpose of the reading task is organised, systematic and well understood by the learner, reading progress will be fostered (Alfassi 2004; Duffy et al. 1987; Wertsch 1979). To enable more purposeful reading educators need to set appropriate, meaningful and achievable reading goals for an activity (Goodman 1996; Pearson and Raphael 1990). Pearson and Raphael (1990) reported that learners are aided in the comprehension of what they are reading if there is a prior goal or reason for the reading task. Setting goals for instruction helps students to know where they are going with the task and to know when they have been successful in achieving that goal (Schunk 2005). Moreover, comprehension will be improved if the reading is related to an authentic and meaningful activity for the reader (Brown 1982; Durrant and Green 2000; Goodman 1996; Pearson and Raphael 1990; Pressley 2002b).

In setting goals affective aspects need to be taken into consideration, such as motivation to read, reading self-concept, reading attitude, and reading interests (Quandt and Selznick 1984). In other words, the purpose of the reading task and the nature of the text, in part, determine how the reader will approach the reading/comprehension process, and determine which strategies he/she may employ when reading. More importantly reading purposes have more of an impact on learning outcomes when readers take ownership of the reading goals. Thus, reading will be enhanced when individuals set their own purposes and goals with the expectation that they will take responsibility for selecting and applying their own reading strategies while reading to determine what will be extracted from the printed text (Brown 1982; Johnson et al. 1997; Kavussanu and Harnisch 2000).

The indications are that if reading is not purposeful readers will have more difficulty preventing unimportant information from confusing working memory. This may force them to consume more working memory capacity than their skilled peers, who are more likely to inhibit or resist potential interference from superfluous information (Bayliss et al. 2005; Kendeou and van den Broek 2005; Swanson et al. 1996). To reduce this confusion, educators need to guide and focus the readers' attention on relevant text information and to assist readers by clarifying the purposes of the reading task that they are engaging with (Alfassi 2004). Thus, not only are less skilled comprehenders unaware of superfluous text information but they may also be unaware of the relevant prior knowledge that they can apply to the reading task (Pearson and Johnson 1978).

2.11 Summary

Reading comprehension is a very complex cognitive activity. Comprehenders are not viewed as merely passive recipients of information but as active constructors of meaning. Skilled comprehenders use a wide repertoire of language skills to gain meaning from text by constructing a text-based model while at the same time

they draw upon and use their own background knowledge to construct a situation model of the understandings related to the text passage. To be effective, readers need to be actively engaged in the reading process by using their metacognitive skills to monitor and regulate their own meaning making processes.

Some of the factors that impinge on comprehension are situated either within the reader or are found outside of the individual. There are four main reader variables within the socio-cultural context that impact on the efficiency of reading comprehension for any individual: (a) the text, (b) the task (c) the reader characteristics and (d) the purpose of the activity. This chapter highlighted the notion that comprehension difficulties are affected by a combination of these variables. Each of these factors may work together in such a way that children with reading difficulties may find themselves in a continuous cycle of reading failure. What is certain is that reading comprehension difficulties are often seen as a complex combination of related problems. These problems are often interconnected and difficult to isolate. However, it is asserted that the right kind of support can remediate many of these difficulties and initiate an upward spiral of achievement. Many of these issues will be explored in much more depth in the following chapters.

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