6
THE ROLE OF CONTENT KNOWLEDGE IN THE USE OF READING STRATEGIES

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INTRODUCTION

Many studies have been carried out to determine the causes of difficulty in comprehending texts. Among those frequently cited as factors that either inhibit or enhance text comprehension are the reader's content knowledge, the medium of language used to convey the content, the reader's L1 reading ability and the reader's level of education.

When reading subject-specific texts which are heavily-laden with facts, content knowledge is undoubtedly one of the biggest factors that determine a reader's success in reading comprehension. Readers would face great difficulty in comprehending such texts if they do not possess a sufficient level of content knowledge. The level of content knowledge one possesses influences the quality of reading as it activates the quality of questions raised by the reader (Scardamalia and Bereiter, 1991).

Apart from generating higher-quality self-generated questions, does high content knowledge also activate the use of more effective reading strategies among readers? This paper thus aims to study the role of content knowledge in the reading of subject-specific texts and to determine if good content knowledge leads to more effective text comprehension. The study also seeks to investigate the role of a reader's level of content knowledge in determining the frequency and types of reading strategies that are employed by the readers.

Thus, the researcher sought to find answers to the following research questions:

1.1   What types of reading strategies do readers employ when reading subject-specific texts?
1.2   Do readers with good and poor content knowledge differ in the quantity of reading strategies they use?
1.3   Do readers with good and poor content knowledge differ in the types of reading strategies they use?

2.0   A REVIEW OF THE LITERATURE

2.1   The Role of Content Knowledge in Reading

The role of content knowledge in reading comprehension cannot be denied as the role of schema has been proven to be critical in top-down reading models. Schema theory research has provided evidence for the importance of background knowledge in reading (Carrell and Eisterhold, 1988). While there have been reading theorists (e.g. Phelps, 1989) who suggest that a reader's schema does not play as important a role as other factors, in a reader's reading comprehension, other researchers attest to its significance in reading success.

Bransford and Johnson (1973, in Kinzer and Leu, 1997) discovered that a reader's content knowledge plays an especially important role when comprehending texts that are complex, ambiguous and texts which are highly dense with information (Tyler and Voss, 1982, in Kinzer and Leu, 1997). Prior knowledge of the content leads to a greater frequency and higher quality of self-generated questions (Scardamalia and Bereiter, 1991). This indicates that prior knowledge leads to a more enhanced reading process.

Foltz (1996), too, views content knowledge as an important variable in comprehension. According to Foltz whose view supports the interactive theory of reading, text processing occurs at many

levels, ranging from recognizing words and sentence structure to higher-level processes such as extracting the summary of the text. In his view, all these processes need to be orchestrated simultaneously for the text to be processed effectively, otherwise causing failure in text comprehension.

Schank (in Costanzo, 1994) argues that content knowledge is a significant contributor to reading comprehension and is more important than any other factor, such as the language used to deliver the content. Several studies which have confirmed the positive influence of content knowledge on reading comprehension include that carried out by McGivney-Burrell (1999). In his study which compared readers with different levels of content knowledge in Mathematics, McGivney-Burrell concluded that expert readers who were PhD holders with good content knowledge exhibited efficient meta-cognitive skills while the novices who were college Math majors, with lower levels of content knowledge, did not. This shows that meta-cognitive skills are dependent on one's level of content knowledge.

Cote (1998) too, confirmed the importance of a learner's content knowledge when reading she discovered that prior content knowledge influenced the outcome scores of the reading task given to the subjects of her study.

2.2   Reading Strategies

Strategies, as defined by Block (1986), are moves consciously made by second language learners intended to be useful in either learning or using the second language. Reading strategies are defined as the strategies that are taken when readers conceive a task, the textual cues utilized, the moves taken when readers make sense of a text and when they do not understand what they are reading (Block, 1986).

Block further categorizes reading strategies into two: general strategies and local strategies. General strategies are used to monitor one's comprehension such as anticipate content, recognize text structure, integrate information, question information in the text,

interpret the text, use general knowledge and associations, comment on behaviour or process, monitor comprehension, correct behaviour and react to the text. Local strategies, on the other hand, comprise strategies that help readers deal with the difficulties arising from the language of the text. The local strategies identified by Block in her study are paraphrased, reread, question meaning of a clause or sentence, question meaning of a clause or sentence, question meaning of a word and solve vocabulary problem.

2.3   Content Knowledge: Its Influence on the Use of Reading Strategies

Dickerson (1998), in her investigation on the effects of subject matter knowledge, found that science and non-science majors were distinguishable in the frequency and type of reading strategies employed when reading. This shows that the lack of content knowledge among the non-science majors affected their use of reading strategies and is thus further evidence of the influence of the reader's content knowledge on one aspect of the reading process, i.e. the use of reading strategies.

In a study comparing expert and novice readers who differed in their level of content knowledge, the expert readers who were graduate students were reported to have employed the use of more effective and a greater frequency of reading strategies than the novice readers who were undergraduate students (Pinkerd, 1995). This displays the fact that content knowledge influences the use of reading strategies as graduate students who possess better knowledge structures than undergraduate students who were still pursuing their understanding of the discourse knowledge, displayed the use of appropriate reading strategies.

Kinzer and Leu (1997) again confirmed the influence of the amount of prior knowledge on reading. In their study, readers with a high level of prior content knowledge were found to have out-performed those with low prior content knowledge.

As a conclusion, a reader's level of content knowledge is a determinant of his reading success as well as the frequency and type of reading strategies utilized.

3.0 RESEARCH METHODOLOGY

This study involved 18 subjects who were all learners of an engineering faculty at a higher learning institution. The subjects were selected using the purposive sampling technique. These learners were all taking the *Mekanik Pepejal 2* course, a Mechanical Engineering subject, during the time this study was carried out. The researcher, with the help of a content specialist, identified respondents of the Mechanical Engineering Faculty who were registered for the *Mekanik Pepejal 2* course in that particular semester. This was to ensure that all subjects had taken the pre-requisite course, which is the *Mekanik Pepejal 1* course. This meant that all subjects had the content knowledge required to process the text.

However, the content knowledge possessed by the learners varied, and their level of content knowledge was determined by their scores obtained for the *Mekanik Pepejal 1* course. The learners were then categorized into learners with high content knowledge and low content knowledge depending on the results obtained for this *Mekanik Pepejal 1* course.

The text used was on 'Strain Gages', a topic which is very important to learners of Mechanical Engineering (Faizah, 2002). The research instruments included the use of the think-aloud protocol, observation and interviews. The 18 subjects were required to read the text individually and to think-aloud while reading the text. The think-aloud protocols were later transcribed, segmented, coded and categorized as reading strategies.

The data obtained from the think-aloud protocols were validated against those gauged from observations and interviews with the subjects. These data were analyzed qualitatively as well as

quantitatively to determine if a reader's content knowledge has any significant influence on the use of reading strategies.

4.0   FINDINGS AND ANALYSES

This section presents the findings and analyses of the research questions raised earlier. The findings are organised into the types of reading strategies the readers used, the frequency of reading strategies used by the two categories of readers: those with good and poor content knowledge, and finally, the differences in reading strategies frequently employed by the two categories of readers.

4.1   Types of General Strategies and Local Strategies

The findings revealed that the readers who participated in this study employed a total of 27 different General Strategies and 11 Local Strategies. As classified by Block, General Strategies are those used to monitor one's comprehension while Local Strategies are those employed to help readers deal with the difficulties arising from the language of the text.

     The General Strategies observed among these readers are Anticipate content (G1), Integrate information (G2), Question information in text (G3), Interpret the text (G4), Use content knowledge and association (G5), Monitor comprehension (G6), Correct behaviour (G7), React intellectually to text (G8), Keep ideas in your head while reading (G9), Identify organization of ideas (G10), Identify a definition (G11), Learn something new (G12), Try to push ahead when blocked by comprehension difficulty (G13), Try to specifically remember parts of text (G14), Reread (G15), Reformulate parts of text (G16), Aim first for general understanding (G17), Skip the difficulty in question (G18), Study illustration (G19), Clarify ideas (G20), Summarize key information (G21), Find motivation for reading (G22), Confirm predictions (G23), Skim (G24), Self-

talk (G25), Overview text (G26) and Relate reading to professional purpose (G27).

The eleven Local Strategies identified are Paraphrase (L1), Question meaning of clause/sentence (L2), Question meaning of word (L3), Solve vocabulary problem (L4), Find it necessary to know the pronunciation of word to understand text (L5), Feel it was necessary to understand every word (L6), Analyze the word in itself (L7), Compare word with word in L1 (L8), Translate (L9), Pronounce the word/expression (L10) and Want to use a dictionary (L11).

This shows that the readers employed a wide variety of reading strategies in their effort to make meaning of the text. And when they could not make sense of some parts of the text due to the language difficulty, they also compensated for their inefficiency by adopting eleven different local strategies.

4.2 Frequency of Reading Strategies Used by Readers with Good Content Knowledge and Poor Content Knowledge.

Readers with good content knowledge (RGC) used a total number of 536 reading strategies, i.e. 462 General Strategies and 74 Local strategies. On the other hand, readers with poor content knowledge (RPC) used a total number of 468 reading strategies which consist of 383 general strategies and 85 Local Strategies.

This shows that readers with good content knowledge

Frequency of Reading Strategies	RGC	RPC
Reading Strategies	536	468
General Strategies	462	383
Local Strategies	74	85

Table 1: Frequency of Strategies used
by RGC and RPC

(RGC) used a higher number of reading strategies than readers with poor content knowledge (RPC). The RGC also employed a higher frequency of general strategies compared to the readers with poor content knowledge (RPC). However, the use of local strategies is higher among the RPC than the RGC.

This indicates that due to their higher level of content knowledge, the RGC are able to activate their content schema to interact with the text they were reading. Because of their well-formed content schema, the RGC were able to employ a greater variety of general strategies such as anticipate content, integrate information, question information in the text and monitor their comprehension.

The RPC, on the other hand, because of their lack of content knowledge, displayed fewer general strategies compared to the RGC. Their lack of content knowledge hindered them from interacting actively with the text. These readers relied more on their knowledge of the language to compensate for their lack of content knowledge. Thus, the RPC displayed a higher count of Local Strategies as a result of having adopted more strategies to deal with the linguistic units of the text.

4.3 A Comparison of the Reading Strategies Most Frequently Used by Readers with Good Content Knowledge (RGC) and Poor Content Knowledge (RPC).

The findings revealed that readers with good content knowledge and poor content knowledge used different reading strategies, as are displayed in the following table:

Ranking of RS	RS used by RGC	Freq	RS used by RPC	Freq
1	Identify organisation of ideas (G10)	105	Identify organisation of ideas (G10)	135

2	Monitor comprehension (G6)	63	Translate (L9)	61
3	Reread (G15)	36	Reformulate parts of text (G16)	43
4	Interpret the text (G4), Self-talk (G25)	28	Integrate information (G2)	25
5	-		Study illustration (G19)	21
6	Integrate information (G2)	27	Reread (G15)	20
7	Use content knowledge and association (G5)	26	Monitor comprehension (G6)	19
8	Study illustration (G19)	21	Interpret the text (G4)	18
9	Question meaning of word (L3)	17	Try to specially remember parts of text (G14)	14
10	Overview text (G26)	15	Summarise key information (G21)	14

Table 2: A Comparison of the Ten Most Frequent Reading Strategies Employed by Readers with Good Content Knowledge and Poor Content Knowledge

The table above shows that readers with good content knowledge (RGC) used reading strategies which were different from those employed by readers with poor content knowledge (RPC). There is however, only one similarity between the reading strategies used by these two groups of readers. What is similar is that the reading strategy most frequently employed by both groups, regardless of their level of content knowledge, is identifying organisation of ideas.

Other than that, the two groups of readers differed in their choice of reading strategies. The RGC found the following strategies useful: Monitor comprehension, Reread, Interpret text / Self-talk, Integrate, Use content knowledge, Study illustration, Question meaning of word and Overview text while the RPC focused on the following reading strategies: Translate, Reformulate, Integrate, Study illustration, Reread, Monitor comprehension, Interpret, Remember and Summarise.

The strategies which were frequently used by RGC but not by RPC are Self-talk, Use content knowledge and association, Question meaning of word and Overview. On the other hand, the strategies which were frequently used by RPC but not by RGC are Translate, Reformulate, Remember parts of text and Summarise information. This looks as though the RGC made use of higher-level reading strategies whereas the RPC employed lower-level reading strategies. Strategies like remembering and summarising are at the lower hierarchy of cognitive skills compared to questioning strategies which indicate a more active participation in the reading task.

Nine of the reading strategies most frequently used by RGC are general strategies, while the other is a local strategy. The same observation is gauged on the RPC, indicating that these readers prioritized the process of monitoring their comprehension and maintaining a steady in-flux of information rather than focusing on the difficulties arising from the language of the text.

However, both groups differed in their use of local strategy. The RGC employed the strategy 'Question meaning of word' but the RPC were heavily relying on the local strategy of translating. The RPC appeared capable of merely translating the phrases and sentences in the text which are written in English into Bahasa Malaysia. The RGC were at least asking themselves the meaning of specific terms in the given context. This again shows that the RGC employed higher-level reading strategies compared to the RPC.

5.0   CONCLUSION

This study concludes that content knowledge does have an influence on the types and frequency of reading strategies which a reader employs. As described earlier, readers with good content knowledge used a higher frequency of reading strategies, more higher-level reading strategies, more general strategies but fewer local strategies compared to readers with poor content knowledge. Apart from that, this study also concludes that readers utilised more general strategies compared to local strategies, when interacting with the text.

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