What is Difficult to Read, Why Might This be So, and What Could, or Should, be Done About It?: An Overview of Section Two

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This chapter will indicate some of the literature dealing with reading difficulties and draw the discussion comprising section two together. It will also report some contemporary research that makes use of tools for the quantitative prediction of text difficulty (Zakaluk & Samuels, 1988) and exposure of actual student difficulty with particular texts (Alderson, 1983; Taylor, 1953). The chapter will close with suggestions of potentially fruitful areas for future development. These suggestions will distinguish between the two groups most concerned with text comprehensibility: teachers who select, modify and use text resources and authors and publishers who produce them.

Reading

Reading has long been recognized as a complex interaction between text and reader (Klare, 1988). The ability to access information from a particular written source will depend on overall reader competence (Engen & Høien, 2002), which interacts with motivation to read the particular text (Breen & Lindsay, 2002), background knowledge of content, of which the source presents a sample (McNamara, Kintsch, Songer, & Kintsch, 1996), control of the specialist style within which the source is written (O’Toole, 1998) and the general readability level of the material (Daniels, 1996). Successful episodes of access to the information in various sources will progressively build up the reader’s overall competence. Reading is an important skill in its own right, but
it is also a vehicle for the acquisition of a great deal of knowledge, the development of many important skills and the growth of significant attitudes. This mix of intrinsic importance and instrumental utility may go part way toward explaining the amount of controversy that can surround reading issues (Krashen, 2002).

This section has dealt with reading issues in a variety of contexts. Peacock and Murila have written concerning primary (or “elementary”) schooling, Leahy, Cooper and Sweller have discussed research based on a range of reader ages and Rollnick writes from a multilingual tertiary (or “college”) context. Some data from original research with secondary (or “high”) school students will be presented later in this chapter. The section’s focus on reading in science is in line with wider concerns. The movement for text simplification associated with the development of quantitative measures of readability grew out of recognition of children’s difficulties with the language of their junior secondary science books (Lively & Pressey, 1923) and student access to text through reading has continued to be of concern (Bowen & Roth, 2002; Humphreys, 2002; Koch & Eckstein, 1995; Paterson, 1996; Peacock, 1996; Peterson & Van Der Wege, 2002). Concerns for student language access and production are often expressed as discussions of “literacy” (Anstey & Bull, 1996; Cope & Kalantzis, 2000; Kirkpatrick & Mulligan, 2002; Wellington & Osborne, 2001). Much previous literacy work (Robinson, 1980; Swales, 1985) was prompted by concern for the progress of various types of “nontraditional students” such as domestic language minority students, international students for whom English is one of a number of languages in which they are variously competent and domestic students from social groups with traditionally low access to tertiary study (Rosenthal, 1996). These concerns are reflected in the present collection. However, this recognition of the needs of the “disadvantaged” (Borland & Pearce, 2002) can obscure the difficulties that specialist language styles can cause for supposedly adept monolingual “mainstream” students. All students are expected to read as part of their education and reading in specialist areas can be problematical for a very wide range of people for a variety of reasons (O’Toole, 2000; Swales, 1993; Sweller, van Merrienboer, & Paas, 1998).

Earlier in this section, Peacock, Rollnick, Murila and Murphy and Holleran all noted the central role of the textbook at various levels of schooling and in various national and linguo-cultural contexts. This echoes the findings of much wider studies such as those by Valverde, Bianchi, Wolfe, Schmidt and Houang (2002, p. 3).

Textbooks are artifacts. They are a part of schooling that many stakeholders have the chance to examine and understand (or misunderstand). In most classrooms they are the physical tools most intimately connected to teaching and learning. Textbooks are designed to translate the abstractions of curriculum policy into operations that teachers and students can carry out. They are intended as mediators between the intentions of the designers of curriculum policy and the teachers that provide instruction in classrooms. Their precise mediating role may vary according to the specifics of different nations, educational systems, schools and classrooms. Their great importance is constant.

Recognition of the importance of textbooks is not a recent phenomenon and it is continuing (Farris, Kissing, & Thompson, 1988; Harris, 1990; Kearsey & Turner, 1999; Lively & Pressey, 1923; Morris, 1989; Swales, 1981; Taylor, 1979; Wellington, 2001).
A number of other issues come into focus once textbooks are recognized as an important part of schooling. The ease with which students access information in textbooks is often discussed under the label of readability (Binkley, 1988; Daniels, 1996; Kerr, 1972; Long, 1991; MacInnis, 1979). An account of an empirical investigation of the use of some readability formulae follows. All such formulae depend on counts of surface features of the text and this limited approach is not sensitive to features such as graphic use, which can cause significant reading difficulties for students (Henderson, 1999; Pintó & Ametller, 2002). Peacock, Leahy, Cooper and Sweller, Murila and Murphy all referred to the role of graphics in this section. Readability formulae are also too crude to recognize differences in specialist language styles (Anderson, 2003; Henderson & Wellington, 1998; Kaldor & Rochecouste, 2002; O’Toole, 1996; Rollnick, 2000), which were considered in the chapters of this collection.

Formal instruction in reading has been a source of great controversy and the papers by Peacock as well as Leahy, Cooper and Sweller have both dealt with it in different contexts (see also Allington, 2002; Krashen, 2002; Rivard & Yore, 1992; Scott, 1995).

**What is Difficult to Read?**

Readability formulae were developed in an attempt to determine an answer to the first of our questions, and avoid a situation where according to Zakaluk and Samuels (1988, p. xi),

… people (in evaluation committees) argue and counter-argue, trying to decide whether materials are of a certain difficulty or appropriate for certain children. At the end the issue is resolved on the basis of personal opinion, having in mind some abstract child selecting texts that are too difficult for children and forcing them to suffer frustration …

Such discussions as these still occur. The relevance of the formulae, and the importance of understanding their scope, is enhanced by their inclusion in many widely used word-processing packages. Earlier in this section, both Peacock and Rollnick remarked on the limitations of quantitative approaches to readability. The potential and limitations of a quantitative approach to reading difficulty can emerge quite clearly if they are closely examined in use.

**An Empirical Comparison of Quantitative Approaches to Text Difficulty**

The study made use of three parallel passages, each of approximately 200 words. The original (passage 1) describes an Australian innovation in sewage treatment, and is taken from a government information book prepared for use by schools and industry (CSIRO, 1988). This book was revised, expanded and adapted for use in science classrooms. The first adaptation produced a typescript that was subsequently revised before publication (O’Toole, 1995). This revision process produced two more portions of text parallel to the first, but with different apparent readabilities (passage 2 and passage 3). The readability of the passages was determined according to seven readability formulae (Gilliland, 1972). FOG, Flesch and Flesch/Kincaid are built into the grammar module attached to WORD5 on Macintosh and Fry’s Graph, SMOG,
Rix and Flesch 1948/58 were applied manually. The readabilities obtained appear on figure 12.2.

A cloze test (Robinson, 1981) was constructed from each of the passages, and administered to secondary science classes. Five schools in Sydney, Australia, were involved in the study, providing 18 intact science classes and a total of 447 students. The cloze tests all involved the deletion of every fifth word, and all were marked under the “strict regime,” which accepts only exact replacement. This marking regime allows the use of criterion scores regarding predicted student access to the text (Bormuth, 1965). Figure 12.1 includes an indication of Bormuth’s suggested boundary between the frustration and instructional levels at a group mean of 37 percent and shows each of the individual class means. Classes from the same school are indicated by the use of identical typeface.

The cloze tests all proved to be highly reliable. The following, and all subsequent statistical descriptions, were obtained by use of SPSS Version 4 (Macintosh). Cronbach’s Alpha on the test based on passage 1, used with 119 students, was 0.95, the test on passage 2 (117 students) yielded 0.79 and that on passage 3 (221 students) gave an alpha value of 0.93. Comparison of the intact class means by ANOVA techniques yielded an F score of 61.64, with a significance level of 0.0000. These statistical details indicate that the data on Graph 1 is interpretable. Notwithstanding the optimism of some of the formulae, the cloze scores indicate that none of the classes involved in this study would be able to use any of these passages independently. The formulae do provide a relative indication of difficulty, and some may be of use for particular purposes. The machine Flesch grade seems to give a reasonable prediction of use in more able classes, while Fry’s Extended Graph may be useful if the classes concerned are of lesser ability. SMOG could be used instead of machine Flesch if the computing facility is not available.

Although the trend in difficulty shown in figure 12.2 was the same in all cases, different readability formulae yielded different scores for the same text. That is, every

![Figure 12.1](image-url)
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Formula scored the difficulty of the passages in the same order (passage 1 as most difficult, followed by passage 2, then passage 3) but each formula gave different grade levels for the individual passages. The readability scores can differ by one to nine grade levels. This latter grade range (on passage 1) is greater than the entire span of secondary schooling. However, differing calibrations are not necessarily fatal to an instrument. Celsius and Fahrenheit temperature conventions differ by up to 112 units for the same phenomenon. Although this does not mean that we stop using thermometers, the variation does mean that the convention should be chosen with care and clearly indicated.

The trends in cloze score results are not as neat as those in readability scores. These irregularities in the trends underline the interactive nature of reading. Readability formula may give half the story, but the class concerned gives the other half. The difference in the cloze scores for classes 9 and 10 represent the effect of science ability and the difference between the average cloze scores on passage 1 for classes 1 and 4 reflect a similar effect compounded with a difference in ethnic composition. The question of the readability of a text does not mean very much without the focusing questions: readable by whom and for what purpose? The cloze tests seem to be responding to some of these wider issues. Cloze tasks may be more effective predictors of reading difficulty, as they allow particular texts to be tested against particular groups of readers.

The readability formulae used for the passages read by these groups can provide a prior indication of possible difficulty. This is useful, but it should form only one part of the decision process. Factors inside and outside the reader’s head are both important (Zakaluk & Samuels, 1988, p. 121). When reading is used instrumentally, “inside head” factors are sometimes beyond the control of the person designing or choosing the text, while at other times dealing with them represents a return to fundamentals, which that person does not wish to make. In situations such as public health, advertising, journalism and technical popularization, focus will shift to the “outside head” factors. Competence and motivation do not cease to be important, but emphasis shifts to the readable communication of content. The readability formulae may be of use at such

Figure 12.2. Readability score by formula

*fls = machine Flesch; f/k = Flesch/Kincaid; fry = Fry’s graph (ext); sm = SMOG; fl/ = Flesch 48/58 manual.

formula scored the difficulty of the passages in the same order (passage 1 as most difficult, followed by passage 2, then passage 3) but each formula gave different grade levels for the individual passages. The readability scores can differ by one to nine grade levels. This latter grade range (on passage 1) is greater than the entire span of secondary schooling. However, differing calibrations are not necessarily fatal to an instrument. Celsius and Fahrenheit temperature conventions differ by up to 112 units for the same phenomenon. Although this does not mean that we stop using thermometers, the variation does mean that the convention should be chosen with care and clearly indicated.

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times in much the same way as a simple thermometer is of use in health care. A change in temperature is only one factor in an accurate diagnosis but it is a useful one, so long as the characteristics of the thermometer are understood. Some things are clearly more difficult to read than others and an appropriate readability formula can provide a useful prediction of relative difficulty when access to the actual readers is not practical. However, it also seems from this study that most of the formulae can underestimate the difficulty readers may have.

**Why are Some Things Difficult to Read?**

The second of our questions also involves “inside head” and “outside head” factors. John Sweller and a succession of co-workers have developed answers to this question on the basis of human cognitive architecture. This section contains an account of this work, which might be grossly simplified as “some things are hard to read because they make too great a demand on the reader’s short term memory.” Sweller and his co-workers have identified a number of implications of this deceptively simple idea. The most relevant to our present discussion is the notion of “interactivity,” which refers to the number of elements that must be held in short-term memory while a concept is processed for movement into long-term memory. This provides a cognitive base for the impact of background knowledge and the control of specialist language style (both of which provide long-term schemas that reduce the cognitive load of highly interactive text) and the increasingly recognized difficulty students have in interpreting graphics (which are composed of elements that must be simultaneously interpreted if the graphic is to be interpreted).

**Background Knowledge**

Groups of students possessing greater familiarity with the content of a passage could be expected to have less difficulty reading it and this emerged in the cloze means for classes 10 and 11 in the readability study that was described earlier. Other workers have found background knowledge to be important in student response to the organization of instruction (Schönwetter, Clifton, & Perry, 2002) and it has long been recognized as central to student comprehension (Finley, 1991). However, the background knowledge possessed by readers is often beyond the control of those who prepare educational resources and, at its widest, a concern for background knowledge is indistinguishable from a concern for education within particular subject areas.

**The Role of Graphics**

Graphics are a paradoxical feature of text. They are usually included to make the meaning of a passage clearer (Cheng & Shipstone, 2003), but may be problematical in themselves (Flugelman, 1986). As we move deeper into the digital society, some are signaling the triumph of the graphical representation of information. Whether such enthusiasm is warranted or not, it is very unlikely that graphics will become less important! The
following discussion will use “graphics” to mean nonlexical elements of a text, such as photographs, diagrams, graphs, tables, drawings and page layout.

The most disturbing, although potentially the most easily addressed, difficulties arise when the graphic contains factual errors such as misleading labelings (Soyibo, 1994) or incorrect representations (Gauld, 1997). Student tendency to read a graphic as a narrative (Pintó & Ametller, 2002) is more difficult to address. The workers in the multinational study that Pintó and Ametller bring together found that students had difficulty with incomplete or contextually loaded diagrams, which echoes the earlier findings of both Soyibo and Gauld. The students seemed to apply real-world interpretations, or emphases, to graphics that were not intended to be so interpreted, which echoes the comments of Peacock, over the last of whom indicated that use of diagrams was a strong indicator of reading ability and content knowledge in students participating in Murila’s Kenyan study. Other workers have noted the modifications graphics undergo as they move from specialist to pedagogical publications (Bowen & Roth, 2002) and that even such ubiquitous features as tables may be more problematic than anticipated (Eshach & Schwartz, 2002). On the other hand, others have provided guidance toward the more effective use of graphics in instruction (Lowe, 1993). Reader difficulties with graphics may be appreciated by reference to the wide range of illustrative figures in this book.

Specialist Language Styles

Graphic use is a central part of several of the specialist language styles that students encounter but they are not the only feature. A description of an empirical study of the difficulties posed by the language that is characteristic of secondary science textbooks follows.

This investigation used a language test based on an enhanced version of cloze technique (McKenna, 1976) to identify the features of the language of science that were causing difficulty for 870 junior secondary school students from schools in four nations. Three schools in Australia were involved as were two schools each in Singapore and the Philippines and one school in Britain. The students were asked to replace every fifth word deleted from a passage from a secondary science textbook. Their entries were coded so that conceptually correct entries were accepted and only clear errors were counted. Each deleted word was coded by its traditional (or dictionary) classification and its modern grammar category.

The distribution of total scores for both conceptually correct replacement of deleted items and error scores were both adequately normal to allow the use of multivariate statistical tools. The data also satisfied the other assumptions implicit in such tools, such as linearity, independence and absence of influential outliers or leverage points. The conceptually scored results of the cloze test at the core of this investigation exhibited a reliability of 0.94, enabling some confidence in the interpretation of the data. The reliabilities of the language feature subtests extracted from the cloze test were lower but still allowed meaningful comparison of the scores. MANOVA techniques (taking language category as the dependent variable and heritage language as the independent
variable) indicate that there is a less than 5 in 1,000 probability of the differences between the means shown in table 12.1 being due to chance. The results are robust enough to allow meaningful discussion.

Students' results on the cloze test described earlier were compared on the basis of the status of the school they attended, their age and the language they specified as being spoken in the homes from which they came. In general, it appeared that students from higher-status schools had less difficulty with all language features than those from lower-status schools and older students had less difficulty than younger students. These results are fairly predictable. However, the results that emerge when students claiming linguistically diverse backgrounds were compared with those admitting to monolingualism are more surprising. Many people would expect the monolingual students to have less difficulty than their more linguistically diverse fellows. However, the two groups experienced the same level of difficulty for four of the eight categories (articles, verbs, passive voice and cohesion) and a greater degree of difficulty with nouns and word stacks.

The result cells on table 12.1 represent the percentage of category deletions that students who claimed the particular heritage language could not process correctly. For example, the 167 English language background students in this sample got 44 percent of the noun-deletions clearly wrong on the particular cloze test, compared to a total group mean difficulty level of 43 percent, yielding a comparison score of +1 for noun difficulty. Students who identified English as the only language spoken in their homes were unable to conceptually replace correctly, an average of 36 percent of the deletions making up this cloze test and that percentage also indicated the total mean level of difficulty (the error total) for this cloze test.

Students' difficulties with nouns and technicality are predictable but difficulties with verbs, prepositions and cohesive devices may come as more of a surprise to mainstream science teachers. The relatively high degree of difficulty experienced by students who indicated they came from monolingual English-speaking homes is particularly notable (comparatively: nouns +1, technicality +4, word stacks +5). Such difficulties can have real consequences for student learning and their demonstration of it: after sifting markers' comments on almost 9,000 Physics scripts, Australian examiners remarked, “Candidates did not always observe the instruction of the key verb in each question. This omission often resulted in a loss of marks, for example if a candidate only provided a description when an explanation was required” (BoS, 2002, p. 5). Table 12.1 indicates a mean verb difficulty of 39 percent, ranging from 24 percent to 57 percent. The monolingual difficulty level of 38 percent leaves scant room for complacency. The difficulties identified thus far in this ongoing study seem to be reflected in responses to high-stakes testing.

Much resistance to direct treatment of language issues in mainstream classrooms rests on arguments of “majority equity”: “Most of my students are ordinary regular English-speaking children (meaning monolingual speakers of the local prestige dialect of English), why should I slow them down for the sake of the few who are having trouble with the language I use?” This data (and that presented in O'Toole, 2000) demonstrates that even the supposedly linguistically adept are having trouble with the language of science. It is likely that action designed to help those students who are
### Table 12.1. Who is having trouble with what?

| Student specified heritage language | No. (% of sample) | Noun % wrong comp. sample d’faculty | At’cle % wrong comp. sample d’faculty | Verb % wrong comp. sample d’faculty | Prp’n % wrong comp. sample d’faculty | Tchty % wrong comp. sample d’faculty | Word stacks % wrong comp. sample | Pa’se voice % wrong comp. | Cohsv device % wrong comp. | comp. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| English | 167 (19.2) | 44 | 28 | 38 | 40 | 36 | 24 | 35 | 40 | 834 | 43 |
| Patwa (spoken by Londoners of W. Indian ethnicity) | 12 (1.4) | 56 | 43 | 48 | 57 | 49 | 43 | 44 | 54 | 834 | 43 |
| Greek | 9 +7 | 50 | 38 | 57 | 47 | 46 | 33 | 70 | 48 | 834 | 43 |
| Mandarin | 166 (19.1) | 33 | 18 | 26 | 37 | 22 | 13 | 18 | 35 | 834 | 43 |
| Cantonese | 19 (2.2) | -10 | -10 | -13 | -9 | -10 | -9 | -10 | -3 | 834 | 43 |
| Hokkien | 32 (3.7) | -9 | -7 | -10 | -5 | -11 | -9 | -8 | -3 | 834 | 43 |
| Other | 48 | 34 | 18 | 24 | 35 | 24 |
| Chinese | 369 (5.5) | -11 | -10 | -15 | -11 | -8 | 36 |
| Pilipino | 48 (42.4) | 48 | 33 | 48 | 55 | 36 |
| Other | 369 | 48 | 33 | 48 | 55 | 36 |
| Philipino | 12 (1.4) | 43 | 43 | 54 | 63 | 30 |
| Average feature difficulty | 328 | 48 | 33 | 48 | 55 | 36 | 19 | 36 | 45 |

**Notes:**
- Table 12.1 is based on analysis of student responses on a single cloze test. Student data was recoded so that a clear error test deletions were classified by language category. Two SPSS routines were written (“dictionary categories” +
- These did the following:
  1. Count number of items representing a particular language category (e.g., nouns) a student got wrong.
  2. Divide that number by the number of items representing that category (e.g., nouns) deleted (in this case, 18) to give the mean category (in this case
  3. Multiply that mean by 100 to yield a percentage.
experiencing greater difficulty will be of assistance to those of their classmates who might be expected to experience less.

**Formal Instruction**

The role of formal instruction in language, and in reading in particular, has been an area of much conflict. As the preceding comments indicate, this writer sees a place for direct intervention to help students gain control of the specialist language styles that can act as a barrier to access for many of the students in our classes. As some of the heat comes out of the controversy, teachers will be able to locate resources that might be able to help their students expand their life options by increasing the access that reading can give them (Hennings, 1982; Koch & Eckstein, 1995; Morris & Stewart-Dore, 1984; Peterson & Van Der Wege, 2002; Rivard & Yore, 1992; Sutton, 1989; Valleley & Shriver, 2003; Wellington, 2001).

Students in our classes seem to be having difficulties that can be predicted, noted and described. These difficulties affect more of our students than we may have previously realized. Strategies exist to allow us to help our students to gain greater access to text than they have at the moment. It would seem strange if we chose to ignore their difficulties. Many people deeply involved in the conflicts have indicated the need to look closely at the needs of specific contexts, from both whole language (Krashen, 1991; Turner, 1991) and systemic (Mohan, 1986; Moore, 1987) viewpoints. It might be time to listen to them.

**Prospects for Change**

A number of the contributors to this section have commented on teachers’ stated dissatisfaction with published reading resources and their tendency to modify commercial material for use in their particular contexts. However, Peacock and Rollnick both indicate that such teacher modifications are not always easier for students to access than the original text from which the teacher worked! Teachers are part of the communities that produced the texts they use (although they may not be considered full members), so it is not surprising that the text they produce should show signs of their own training. Such modified text is rarely shared with anyone but their own class, so it is not surprising that students are attempting to use it without any of the editing steps that are applied to commercial material. Consequently, teacher modified text will often avoid some barriers to student access while erecting others. Teacher-written worksheets may not necessarily remove “outside the head” reading difficulties, but when teachers deal communicatively with language issues they can be of great assistance with “inside the head” student difficulties (Warwick, Stephenson, & Webster, 2003).

Murphy and Holleran have referred to the hope some people place in technological change. This hope connects with Peacock’s call for changes in teacher education (Knezek & Christensen, 2002), although there is no indication that he would welcome a move to virtual education. Recent work points to the use of multimedia (Cannings & Talley, 2002), email (White & Cornu, 2002) and the virtual library (Gibson & Ruotolo,
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2003) in teacher education. However, Murphy & Holleran are not alone in their concern about developments such as these (van Weert & Munro, 2003).

In the present context, it is worth noting that students will still be reading, even if the book (or worksheet) is replaced by a screen. Some have argued that the change in mode represents a fundamental shift in task (Gardner, 2003) but such assertions are not persuasive. The screen is a highly flexible page, allowing animation, illustration and rapid reader control of the experience but users still need to read and Murphy & Holleran’s work indicates that students may find pages easier to read than screens. If that is the case, the change from ink stains on paper to light emerging from a colored screen will increase the difficulty of the reading task. This would make increasing the comprehensibility of the text that is common to both modes even more urgent, leaving aside the fact that such technology is beyond the reach of many students in contexts from which contributors to this section wrote.

It seems that change remains in the hands of those who prepare commercial teaching material and those who select, modify and use it. Teachers have access to both “inside-” and “outside-head” factors affecting comprehensibility and therefore would seem to have the greatest power (and responsibility) to bring about change, which is in the long-term best interest of their students. Indeed this realization can be sensed as an unstated thread running through the writings of most of this section’s contributors.

What Could, or Should, be Done About Reading Difficulties?

It seems that access to information contained in specialist text is being hampered by student difficulty in reading it. It may be that this gate-keeping function is legitimate and that using reader competence as a filter to select those who will move through the educational system and into particular specialist communities is efficient and defensible. However, reading competence seems a less equitable filter than understanding of the intellectual products of those communities. It would seem hard to defend a position that supported exclusion on any basis other than lack of potential to make a real and ongoing contribution. Using reading as the barrier to communal access is quite likely to keep out some students whose potential contributions could be very valuable.

Thomas Hardy, who was the penultimate contributor to this section, clearly laid out the process that leads to provision of commercial resources for educational institutions. The complexity of the task of educational publication explains the cost, in time and money, of these books of which teachers can be so critical. The process, however, does allow the time for the editing that can move a text so much closer to the needs of the student who will read it.

Specialist teachers, and other people interested in text comprehensibility, need to take control of the text that they put before their clients. Teachers do not have the time to rewrite all the resources of which they make use. However, they choose resources and they need to carefully control the level of those documents that they do prepare. As recognized earlier in chapter 6, some text prepared by teachers and trainers can be
as difficult as many textbooks. If such people have access to their target groups, they would be well advised to construct cloze tasks based on “typical” samples of the text they are considering. When they are used with the particular group for whom the text is intended, such tasks give a direct indication of difficulty, and they seem to be sensitive to both inside and outside head factors. If such access is not available, appropriate readability formulae may be useful. We need to decide what is important in what we expect of our classes, and then use tools such as appropriate readability formulae to indicate whether we are expecting more than we realize. Different formulae will be appropriate for different groups, just as different thermometers are appropriate for different circumstances. They are rather blunt instruments, but there are times when blunt instruments are useful. One would not want to play cricket with a rapier!

The formulae are also useful as an aid to editing. Use of the appropriate formula should send the writer back to the text in a quest for greater clarity. A competent nurse would not treat a patient’s fever by chilling the thermometer, and a competent writer should not treat inaccessible prose by simply splitting up sentences. However, both would be unwise to abandon the instrument because its uses are limited. Figures 12.1 and 12.2 may provide some guidance as to which formula is most useful in a particular context.

However, the formulae will only identify difficulty, they will not explain it nor suggest ways in which it could be surmounted. Recognition of the difficulty of particular texts should lead to an examination of them to identify features that might contribute to student problems. The impact of graphics and specialist language styles can both be explained in terms of the burden interactivity places on finite components of the human cognitive architecture. The information on table 12.1 would therefore have a number of uses. Teachers could use it to provide advance warning of the features of scientific English, which might cause difficulties for students in their classes. For example, the results for the small number of students from Greek-speaking homes suggest that such students might have difficulty with the Passive Voice in English (70% of Passives wrong, comparative +34) and so teachers might choose to use the structure less or to teach it directly in science classes containing significant numbers of students from Greek-speaking homes. The fact that monolingual students were unable to correctly replace an average of 35 percent of these items indicates that such direct treatment would do them no harm either!

This raises the choice between simplification and formal instruction. There will be occasions where a language feature or graphic convention is not necessary for a group of students in a particular place, at a particular stage in their education. In such cases that feature or convention should be removed so that the simplified material may be better understood. There will be other occasions when the teacher decides that the feature or convention is necessary to students’ effective understanding of the work at hand. At such times, the feature or convention should be directly taught.

Difficult features such as graphical and stylistic conventions may well benefit from direct treatment in commercial resource material. This often makes use of questions and activities and the inclusion of language development tasks would provide both help and guidance for busy teachers. Explicit instruction in features that have been identified as both difficult and important will increase the students’ access
to more widely available material, their chance of successful reading experiences, their background knowledge within the subject and, consequently, their reading competence. The reading cycle that began this chapter will act as a productive spiral, as our students move toward membership of the literate communities that they have chosen.

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