

**Helping Children Learn to Read:
Evaluating the programs from *Essential Skills* in the context of
current research**



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Over the last 20 years, no aspect of education has generated as much argument, debate, and research as reading. The debates have been there for many years, but it is only in the last 20 years that educational research has begun to settle some of the issues. Researchers are trained to be cautious, to avoid saying they are certain, partly because in science we aim to *disprove* rather than *prove*, but also because it is impossible to anticipate what developments the future may hold. However, the research on early reading is very consistent and clear, so researchers are *almost* willing to say they are certain. Some of the recent syntheses of the research literature are found in the following references: Adams, 1990; National Reading Panel, 2000; Snow, Burns & Griffin, 1998; Rayner, Foorman, Perfetti, Pesetsky & Seidenberg, 2001. My purposes in writing this paper are to:

- review what is known about effective instruction in reading, particularly with regard to children who experience difficulty learning to read,
- develop a research-based framework for evaluating instruction, and
- apply this framework to evaluate the *Essential Skills* program.

The Problem

Learning to read in English is no trivial matter. Unlike the writing systems of many other languages, English is phonetically *opaque*, meaning that the sounds associated with particular letters are not entirely predictable. One has to look beyond the individual letter to obtain more stable pronunciations (for example, the letter *a* has a variety of sounds, but when it occurs before *t* at the end of a word, as in *cat* or *pat*, it is very consistent). This means that more attention has to be devoted to larger units and more units; instead of learning 26 letter-sound pairs (as in more regular or *transparent* writing systems), one has to learn these plus several alternatives for some letters (the vowels are particularly ambiguous), a fairly large number of predictable with-word units (such as *-ight* and *-at*), and of course a large number of words with irregular or unusual pronunciations (*of*, *one*, *two*, *know*, *yacht*, *answer*, and so on). The unpredictability of English pronunciation at the letter level also places a great deal of stress on the phonological processing system, because alternative pronunciations have to be tried for unfamiliar words. All of this makes learning to read in English slow and difficult. Whereas children in more transparent writing systems often master reading in one year (having had little pre-school coaching

from parents), children in the English-speaking world have often not mastered reading after three or four years, in spite of having had more out-of-school help.

The result is that school is less pleasant and less profitable than it should be for many children. Children, parents and teachers are frustrated by the slow progress made by many, and by the inability of some children to make full use of their intelligence because of difficulty in reading. Early difficulties in reading are likely to result in later school difficulties (Cunningham & Stanovich, 1997; Juel, 1988), and put the student at increased risk of dropping out, social problems, and failure to find rewarding work (Perrin, 1990; Willcutt & Pennington, 2000; Willms, 1999). Recent OECD/Statistics Canada results indicate that as many as 40% of Canadian adults have serious literacy difficulties (OECD/Statistics Canada, 2000).

Of all the skills taught in school, reading is the most critical to success. With this in mind, it is imperative that parents and teachers provide students with the best possible foundation in reading, and that they are particularly concerned with those who struggle to gain even basic competence in reading and reading-related skills. Classrooms contain a staggering degree of diversity: for instance, a regular grade 3 classroom will typically have one or more students who have barely begun to read (they may know the letters and but only be able to read a few words) and others who are reading 2 or more years above their grade level, not to mention all the levels in between. This diversity presents a huge challenge to teachers, particularly those with less teaching experience or specialized training. Many school systems have also reduced the availability of out-of-class resources such as special education teachers or curriculum consultants. It is not surprising that many parents are concerned about their children's progress in reading. Many teachers and researchers believe that even the achievement levels of the "normally achieving" are lower than they could be with more optimal instruction.

Knowledge about reading and reading difficulties

In thinking about the skills involved in reading, it is useful to see them arranged in a hierarchy, with the more basic skills at the bottom and the more developed or higher level skills at the top (see, for examples, Kirby, 1988; Kirby & Parrila, 1999; Kirby & Williams, 1991). The skills at the bottom are usually *necessary but not sufficient* for those higher up. The higher skills depend upon the lower ones being able to operate relatively automatically (without much conscious attention). Consider the hierarchy shown in Figure 1. Each of these skills listed has been shown to be important in reading, in the sense that they are inherently involved and are correlated with reading success. Instructional research, in which children with initially low levels of certain skills have been taught those skills, has demonstrated that these skills can be taught, and that if they are, reading improves.

Before addressing each of the layers in the pyramid, there are a few cautions that should be offered about diagrams such as Figure 1. First, even though a series of distinct skills is listed, it must be remembered that these processes are interdependent in reading. The separate skills may be taught in isolation, but they must also be integrated in practice. There are useful analogies here to other learning that children and their parents value, such as sport and music. It is helpful to practice independent skills, such as shooting in hockey or scales in music, but it is also important, even essential, to integrate them in practicing the complete task (playing hockey games or pieces of music).

Second, unlike a physical pyramid, the reading sub-skills can be built from the top as well as from the bottom. Reading draws on many skills that are already well developed in oral language, such as knowledge of sentence, structure, grammar, comprehension and metacognition. So, even while children are struggling with the lower level skills in reading, they can be relying upon their higher-level oral language skills for assistance. In hierarchical terms, this means that processing is both bottom-up (information being processed from lower levels up to higher, meaning-oriented levels) and top-down (in which higher-level information is used to help identify lower-level information). Thus the best way to see the relations among the levels of reading represented in the Figure 1 pyramid is as *interactive*.

Third, there is more to successful reading than the cognitive processes shown in Figure 1. Two critical ones are motivation and prior knowledge. Children need to want to read, and to see reading as a reasonable and even rewarding activity, or they will not carry out the practice that is necessary to develop any high level skill. One way to have motivation undermined is to fail; children need to be guided so that their early attempts at reading are at least moderately successful, otherwise they are at risk of entering a downward spiral of lowered self-esteem, lowered motivation, and increased failure. Prior knowledge is important in reading because reading required the application of what is already known to the interpretation of the new information coming in. Texts for reading need to be chosen carefully, to ensure motivation and adequate prior knowledge. The exception, of course, is in drills with single words, in which comprehension is not the issue.

Finally, it is important to recognize that this is *not* a stage theory: children do not exist *in* one of the types of processing and then move on to another. This is part of the interactive nature of the processes. In normal reading, processing involves all or at least most of those listed in Figure 1, with conscious awareness being devoted to whatever level is just above whatever level is automatic. As the text becomes more difficult, processing at the lower levels becomes more effortful and therefore takes up space in conscious awareness. As text becomes easier, or as the readers decides to skip the details, the processing moves up the hierarchy. The danger of moving down is that meaning will be lost, though this can be regained with repeated reading; the danger of moving up is that essential details will be lost, perhaps rendering comprehension illusory.

Next I examine each of the levels in Figure 1, describe what is involved at each, and discuss the implications for instruction.

Levels of Processing in Reading

Basic processes

At the base of the pyramid we have the basic processes on which reading is built. The two I have shown are naming speed and memory; there are of course many other more basic capacities, such as adequate vision, that lie even below these. *Naming speed* indicates the process by which an external stimulus (such as a letter or an object) is recognized and named. To be recognized, the stimulus must *access* its representation in long-term memory; to be named, the long-term memory representation must be associated with name information, and that information must be used to form a motor program to instruct the speech muscles to make the appropriate sounds (Wolf & Bowers, 1999). The process is even more complex when series of stimuli must be named (for instance, a list of numbers or objects), because the eyes will have moved on to the next stimulus before the mouth has finished pronouncing the first, and there are complex eye movements involved in sweeping from the last item of one line to the first item on the next line. These processes must be efficient (fast and accurate) for reading to work, and they must be well orchestrated for reading to work well.

Efficient naming speed is thought to be the basis for reading speed, the basic aspect of reading fluency. While little research exists to teach naming speed, there is a great deal of evidence that children with slow naming speed are poor readers (see for instance, Kirby, Parrila & Pfeiffer, 2003). It seems clear that a major consequence of slow naming speed is slow reading speed, which is in turn one of the primary characteristics of very poor or disabled readers (in transparent orthographies, such as German, it is the prime characteristic; see Wimmer, Mayringer & Landerl, 2000). There is a growing amount of research showing the value (and the challenge) of teaching reading fluency (Wolf & Katzir-Cohen, 2001). How can naming and reading speed be taught? Both require extensive practice to build up *automaticity*, the quick and efficient recognition of presented stimuli. Automaticity can be helped through practice, and also through the recognition of the parts of what is being recognised. To illustrate the last point, many larger words are built up from smaller words, prefixes and suffixes. By understanding this, what would otherwise look like huge words can be broken down into more manageable chunks, and many of those chunks occur in other words.

The second basic process is memory, or more specifically *phonological memory* (Wagner, Torgesen, Laughon, Simmons & Rashotte, 1993). This skill allows one to remember sequences of sounds in order, and later recognize or repeat them. Again this is a basic skill on which subsequent ones depend. It is required for learning new words (vocabulary), for phonological awareness (see below), and of course for remembering the

words of sentences (so that the sentences can be understood). Typical measures of phonological memory include word memory, digit span, etc. Phonological memory is one aspect of a more general ability called successive processing (e.g., Das, Naglieri & Kirby, 1993; Kirby & Williams, 1991), by which information is kept in sequential order. Children with reading difficulties are particularly poor at successive processing (Kirby, Booth & Das, 1995), and this seems to interfere with their reading. Even more children seem to have difficulty applying their successive processing to reading; Das and his colleagues have carried out a number of intervention studies showing that successive processing training has a positive effect upon training (Boden & Kirby, 1995; Carlson & Das, 1997; Das, 1999; Das, Mishra & Pool, 1995; Parrila, Das, Kendrick, Papadopoulos & Kirby, 1999). The key elements in training successive processing are paying attention to the bits of information in sequence, perhaps by naming them, rehearsing the sequence, and remembering to use this strategy in new tasks. It is not enough to remember individual items, but rather sequences of them.

The naming and memory components are very basic skills; real deficits in them are probably beyond the reach of a regular teacher to improve. But regular teachers can show how these skills are applied in reading (see Kirby & Williams, 1991). Both of these skills involve paying attention to the details of what is presented; children with reading difficulties may try to use higher-level skills (such as using context to guess words) to avoid dealing with their problems. For this reason it is necessary to present tasks that are fairly stark, stripped of their meaning so that the children *must* deal with the difficult aspects. The analogy here is to an athlete who practices drills to improve a weak skill.

Phonological awareness

Phonological awareness may be the most critical element in the hierarchy. It is defined as being sensitive to the sound structure of words and being able to manipulate those sounds. Phonological awareness can be divided according to the level of phonological unit involved and according to the phonological task performed. Words (orally presented) have three types of unit comprising them. The easiest level is the syllable; all words have at least one syllable and some have more. All syllables are composed of two parts, the *onset* and the *rime*. The onset is the consonant or consonant cluster that comes before the vowel (“c” in “cat”, or “pl” in “please”); some syllables have their onsets missing, that is those beginning with a vowel (such as “each”). The rime is the vowel and any following consonants (the “at” in “cat” and the “ease” in “please”). The third, lowest, and most difficult level is the *phoneme*, the minimum unit that can change meaning; it is important to remember that phonemes are sounds, not letters. “Come” has 4 letters, but only 3 phonemes.

Phonological awareness tasks are of two basic types, analysis and synthesis. In analysis tasks, the child’s job is to take a given word apart; for instance a child may be asked to count the phonemes (or syllables, etc.) in a word, identify the first or last sound in a word, delete a given sound in a word, add a sound, or rearrange the sounds. In

synthesis tasks, the child is asked to assemble a word from given sound units; component syllables (or onset and rime, or phonemes) are given, and the child must blend them into a word.

Here are some examples. In an analysis task at the syllable level, we might ask a child to identify the “first part” of a word (and provide examples). Most 6 year-olds can tell you that the “first part” they hear in “cowboy” is “cow”, and many can do it at a much younger age. An example of synthesis at the onset-rime level is to ask what word an onset and a rime make, such as “c”-“at”. This blending task is clearly important for reading. A difficult example at the phoneme level would be: repeat these two words, switching the first sound in each – “high, low”; the answer should be “lie – hoe”. The last 20 years have seen a vast amount of research on phonological awareness; the evidence is very strong that a reasonable level of it is required for learning to read, that it continues to influence reading development through much of elementary school, and that teaching phonological awareness contributes importantly to the reading development of children who would otherwise be at risk of reading failure (see for instance Adams, 1990; Goswami & Bryant, 1990; National Reading Panel, 2000; Rayner et al., 2001).

Letter Knowledge

It should be obvious that letter knowledge is crucial for learning to read, but its importance can be overlooked or misinterpreted. There are at least four critical features of letter knowledge for learning to read: letter names, letter sounds, the alphabetic principle, and automaticity. Knowledge of letter names is mainly helpful so that children and adults can communicate about written language, and in most cases the letter names give strong clues about how the letter is pronounced (this is helpful at the beginning, but can cause confusion if a child persists in thinking that “B” is the appropriate way to write “bee”). Knowledge of letter sounds is absolutely critical in understanding the code nature of written English. Like all alphabetic scripts, and unlike those of languages such as Chinese, written English is a code, in which the written characters *stand for* sounds. Of course English is far from a perfect code, in that the same character can stand for several distinct sounds and the same sound can be represented by several distinct letters or letter patterns. As said previously, English becomes more regular in pronunciation when larger units (onset-rime or syllable units) are looked at, but this is little help for the real beginner who does not have extensive experience of written English. Many letter sounds are not ambiguous (especially consonants), and many letters with ambiguous sounds can still help in identifying the word. Over time, the child must learn the most common letter sounds, and the phonic rules (for instance, the silent –e rule, or the effect of doubling a consonant).

The alphabetic principle is a notion championed by Adams (1990) indicating that letters represent sounds, and changes in letters imply changes in sounds and therefore in words. This sounds straightforward, but it is not to all beginning readers. There is real

value in having children experiment with letters making up words, both to see common patterns and to hear the effects of minimal changes.

Automaticity in letter recognition and letter-sounding is essential – we do not want children to have to think (use limited mental resources) about the identity of letters, as then this capacity cannot be used for deeper purposes. They have to exert effort thinking about letters at the beginning so that they can develop the automaticity that will allow them later to devote their attention elsewhere, for instance to sentence structure and text meaning.

Contrary to the tenets of whole language approaches, time devoted in instruction to letter knowledge and letter play is valuable and certainly not wasted. Many fortunate children begin their exposure to letters and letter knowledge long before they enter school; children who do so arrive at school very well prepared to begin reading instruction.

Phonics and Word Attack Strategies

Letter knowledge is not the end of what children need to know about sounding out words. Actually using letter knowledge to identify words is a complex process, especially in English, and even accomplished readers will sometimes struggle to figure out how a new word should be pronounced (what is the correct pronunciation of pneumonia?). First of all, there is more to word pronunciation than simply blending the letter sounds together: “kuh-ah-tuh”, no matter how quickly you say it, does not sound like CAT. Secondly, some letters and letter patterns have alternative sounds; in identifying an unknown word, you may have to try several alternative pronunciations to see which sounds more like a word you know. Finally, there are numerous phonic rules, many with their exceptions or complications, that help disambiguate pronunciation; for instance, the double b in “zabbing” tells you that the preceding vowel is short, even though you do not know the word. Some of this information is learned by direct instruction (e.g., the silent – e rule) and the rest is picked up through experience. For the skills picked up through experience, the keys are the amount of practice and the types of examples encountered. If you encounter too many difficult-to-sound-out words, you may give up on that strategy; if you encounter too few, you may not learn how to try alternative pronunciations. For the skills that are deliberately taught, the question is *how*?

There has been debate in English about the teaching of phonics for several hundred years (see Crowder, 1982). The preponderance of evidence has consistently shown that programs that include phonics are more successful than ones that do not (e.g., Adams, 1990; Chall, 1967; National Reading Panel, 2000; Rayner et al., 2001; Snow, et al., 1998). Although some die-hard opponents remain, the scientific reading research community has moved on to consider *how* phonics should be taught, not *if* it should be. The debate has focused on two questions: should instruction be of *analytic phonics* or of *synthetic phonics*, and what *unit of analysis* should be the focus of instruction? The analytic-

synthetic debate is about whether phonics instruction should be systematic and complete (starting with the letter sounds and working through all the frequent patterns) or more haphazard and responsive to events (only analyzing the sounds of words when difficulties are encountered; this was the suggestion of some whole language teachers who were not entirely opposed to phonics). Although the debate is not settled, my reading of the literature (summarised by Pressley, 2002) is that analytic phonics is the more successful way to go, particularly for children who may encounter difficulties. These children are more likely to benefit from a firm, structured foundation, perhaps because they have not already acquired one. The children who have acquired a firm foundation, perhaps at home, may already know enough about the alphabet to no need further structured experience; as long as it is provided carefully and kindly, as all instruction should, I do not see that it can cause any harm.

The question of the unit to focus on, specifically phonemes or onset-rime units, may sound esoteric to the uninitiated. Some of the debate can be found in the exchange between Bryant (1998) and Muter, Hulme and colleagues (Muter et al., 1997; Hulme et al., 1998). Muter and colleagues argue for the phoneme being the focus, whereas Bryant (1997) and Goswami (2002) suggest that larger units, specifically the onsets and rimes, are a better starting point. I think the implications for practice are that both foci are important, and it may be the timing that is critical. Bryant and Goswami have considerable support in saying that the rime is a very stable and helpful unit – as I said above, rimes such as *-at* have more consistent pronunciations than individual phonemes. Stable pronunciations are almost certainly the best way to get reading started, before introducing greater complexity and uncertainty. These rime units are also the basis of word families (those ending in the same rime unit); once a particular rime has been learned, that (plus knowledge of a few consonants) allows access to large numbers of words. That advantage of may come to more skilled readers. In other words, the rime units may have advantages both earlier and later in reading. (I discuss other large units (morphemes, including prefixes and suffixes) in the next section.) But that does not deny the importance of phonemes; as the basic building block of the alphabetic code, it would be foolish to ignore them. My sense is that they can be learned alongside the larger units, and provide the ultimate fall back system. More generally, the complexity of English orthography suggests that readers need to be able to deal skillfully with information at various levels, and the key to those skills is lots of structured practice.

Word Structure and Spelling

Spelling is a very important relative of reading, a great help in directing the attention of beginning readers to letters. Spelling and reading should have a mutually helpful reciprocal relationship. Learning the phoneme-to-letter correspondences in spelling strengthens the letter-to-phoneme relationship required in reading. Spelling provides students with practice in breaking down words into their component sounds. Explicit practice in spelling is another avenue through which the alphabetic principle may be learned. Successful reading acquisition is dependent upon sensitivity to the phonological

features of language; learning to spell helps develop and nurture this sensitivity. It is upon this sensitivity that orthographic knowledge and skills develop, making decoding a less effortful process as words are then analyzed into orthographic units without the “systematic use of phonological conversion” (Gombert, Bryant, & Warrick, 1997, p. 224). Efficient reading depends upon the relatively automatic recognition of larger units than the individual letter. Efficient (fast and accurate) word recognition is the base on which reading fluency depends.

All models of reading and spelling recognize that larger chunks of information than the individual letter or phoneme are used as development takes place (e.g., Ehri, 1998). There is of course disagreement over when and how this occurs, but the important practical conclusion is that it has to be fostered and taught. Instead of a stage-like model, in which readers move from using letters to using larger chunks, my sense is that most beginning readers use both, depending upon the word and the chunk concerned (Varnhagen, McCallum & Burstow, 1997). For example, a beginner may learn the word IT early, and thereafter recognize it in other words (SIT, FIT) even before learning the entire alphabet; similarly, one could learn the rime unit *-at* and recognize it in words such as CAT, HAT, SAT, and MAT. At the same time as recognizing those larger chunks, the child may be working at the letter/phoneme level in reading or spelling other parts of the same words.

English words are of course not entirely arbitrary sequences of letters. In addition to following rough (sometimes very rough) phonological rules, words have structure at the orthographic and morphological levels. Orthographic regularities are consistent spelling patterns, such as *-tion* to represent the “shun” sound at the end of words like ATTENTION. Some orthographic chunks are also morphemes, or units of meaning; *-ed* indicates the past tense, *re-* means to do again, and *-tion* indicates a noun formed from an action or condition. Other orthographic chunks, such *-at* are merely spelling regularities, and do not carry meaning. And of course some chunks are morphemes in one word, merely spelling units in another (EAT in EATING vs. SEAT; *-er* in PAINTER vs. CORNER).

There is increasing recognition of the importance of orthographic and morphemic units in reading and spelling (e.g., Cunningham, Perry & Stanovich, 2001; Deacon & Kirby, in press), but very little research describing systematic attempts to teach them to beginning readers.

Sentence Structure and Grammar

There are regularities and patterns beyond the word level. At the sentence level, grammar is a structure for word order, and provides critical information for extracting meaning. Grammar is what allows us to remember and make sense of language. Our memories are very constrained when it comes to remembering individual units; typical estimates are that we can remember 4-7 units of unrelated information. When those

units are words, we can remember 4-7 words, but that is usually not enough to interpret a sentence. Grammar allows us to form individual words in higher-level units, such as phrases or clauses. Remembering 4 phrases is usually enough to interpret a sentence, and if it isn't, we can join phrases into yet higher-level units. In this way grammar patterns act like orthographic patterns, allowing us to stretch the capacity of our processing system.

Being able to process the syntax of a sentence allows the information processing system to make sophisticated predictions about what words are next to be seen – it is important to emphasize that this is usually not enough to identify the actual word, but it does narrow down the syntactic possibilities. This speeds reading up, and allows for increased comprehension. Understanding the grammar of the sentence also contributes to prosody (“reading with expression”).

Grammar has been relatively ignored in the recent research about learning to read and reading difficulties; mostly this is due to seeing it as a “higher level” skill, and not the primary difficulty that children encounter. However true this may be for most beginning readers, grammar is valuable for children to understand once they begin to comprehend what they read. There is also the problem of the relatively small group of children who show comprehension problems, in spite of normal ability and adequate word reading (Oakhill & Yuill, 1996). Written grammar is more formal than spoken grammar, and may give rise to some problems. There has been some recent research on what has been termed *grammatical awareness*, which is more the ability to apply grammatical rules or recognise errors than it is the ability to state the rules (Blackmore & Pratt, 1997; Deacon & Kirby, in press). The findings have shown that knowledge of grammar contributes to reading and spelling ability, even after taking into account the phonological and word recognition skills described above. Grammar is a worthy topic for instruction.

Comprehension and Appreciation

In carrying out or reviewing the extensive research on word reading and its profound role in reading development and reading difficulties, it is easy to forget that the ultimate purpose of reading is comprehension, including learning and appreciation. Forgetting that, or perhaps just forgetting to emphasize it, may have contributed to the impetus behind the “whole language” movement. While there is little firm evidence that comprehension processes are responsible for reading *disabilities*, there is no shortage of evidence that many children’s reading comprehension is weak. Some children may have particular difficulties in comprehension, in spite of normal word reading ability and adequate general mental ability (Oakhill & Yuill, 1996).

Comprehension is a complex topic, because it relates to intelligence and our highest human cognitive capabilities (e.g., Kintsch, 1998). The topic is largely beyond the scope of this review, but two key characteristics deserve mention, motivation and strategies. Once children have acquired the basic skills of word reading, there is no guarantee that they will *want* to read. Teachers and parents need to be concerned about creating a

motivating context for reading (showing that reading is a valued and enjoyed by them, helping children see how they can benefit from reading) and by providing reading material that the particular child finds interesting (see for example Baker, Afflerbach & Reinking, 1996).

Reading comprehension strategies are mainly what reading comprehension instruction concerns. Some of the most useful comprehension strategies are: (a) Determine what is most important, (b) Summarise, (c) Make inferences (in text and to prior knowledge), (d) Construct knowledge structures (mentally, and on paper) such as notes or diagrams, elaborating as needed, (e) Challenge the text (assess whether it is accurate), (e) Challenge your own knowledge (self-testing, comprehension monitoring), and (f) Determine what you need to know (self-regulate) (see Dole, Duffy, Roehler & Pearson, 1991, for more on such strategies).

Evaluating *Essential Skills*

The preceding review of what is known about early reading and how to teach it provides a framework for examining any instructional approach or system. I use it to evaluate the *Essential Skills* computer-based learning materials. This evaluation is based on an examination of the software listed in Table 1, and on a “field trial” of the materials.

General Comments

The program modules form a set of independent but related units, any of which can be used without the others. Each module consists of a number of distinct tasks, at various levels of difficulty. Instructions explaining each task or some of the concepts used is available on the screen, though in most cases this requires considerable reading skill. Most tasks are entirely visual, with some auditory information provided (such as a word to recognize). Responses are made by typing or clicking the mouse. We found the modules easy to load and operate.

The tasks are presented in a manner that is attractive, focused, and motivating. The visual displays are clear, and are not cluttered with all the “bells and whistles” that programmers can provide – those bells and whistles may entertain, but they distract the learner from the focus of instruction. This will be a help for children with attention difficulties, and for those with reading difficulties. Each activity has motivation built into it in two ways. First, each response the child makes has an extrinsic, reinforcing consequence. These are of three types. In some tasks an underlying picture is revealed as words are matched – the pictures are interesting and colourful. In others, a correct response is rewarded with a picture in place of the word or letter that was correctly chosen. In the earlier modules, the response is followed by an oral reinforcement (“that’s great”, “You’ve made my day”). These verbal rewards are varied enough to keep most children’s interest, and should be effective with most children. Second, and more

importantly, most children will develop a sense of accomplishment as they proceed through the tasks; even tasks that appeared daunting at the outset will be a source of satisfaction as they are mastered. This should help children build their self-concept as a reader, and it will do so in the most effective manner, through real accomplishment. The most important feature is that the rewards and the feeling of success come from succeeding in authentic reading and spelling tasks. All in all, the programs are designed as very good instruction, and should be effective in keeping the attention of learners.

The focus of the modules is on the middle levels of the framework shown in Figure 1. There is nothing specifically targeting the basic processes level, which is appropriate because children experiencing serious difficulties at this level may require specialist help, for instance from a clinical psychologist. At the same time, however, children with mild basic process problems would probably derive benefit from carrying out the tasks that were within their reach, because most of the tasks require the use of memory and rapid naming/identification skills. Although there are comprehension modules, these focus on the more basic aspects of comprehension. Again this seems appropriate, in that the higher levels of comprehension would require the evaluation of more extensive written or oral responses.

The modules are intended to be used by individual children under minimal adult guidance. Most children would require some instruction to get started, especially very young children, but most would also understand what was needed very quickly. I think that they could be used by children in a classroom while the teacher and other children were doing other things, or by a child at home with a parent or more able child available for help from time to time. The modules appear particularly useful for practicing skills that have been introduced elsewhere (for instance in class), but I would hope that an able tutor (parent, teacher or older child) would be close at hand. Even with a more able older child I found it useful to be nearby, to answer the odd question that emerged, explain new concepts (for instance in grammar). Each module provides hours of distinct activities, each of which would benefit from repetition. Repetition is made attractive by changes in the words used, and by the intrinsically interesting tasks.

The tasks appear to be at the right difficulty level for children in the target range, say age 6-10. Some would be too daunting for children at the early ages, especially those requiring keyboard responses (the time required to search for a letter could interfere with performance, and could be frustrating). Each module has a mix of tasks, some of which would suit a broad age and ability range, but there is no guidance provided about what levels or what tasks would suit which learners. Presumably teachers or parents would preview the tasks to determine what was best, but some guidance might help. Beyond the earliest age and ability levels, children could benefit from exploring the modules and choosing their own tasks, but this might allow them to gravitate to easier tasks or those that avoided key content. There is room here for different instructional philosophies, but I think users would benefit from more guidance.

Something that is not included in these tasks but which could be is *time*. Speed of processing is not the critical factor at the beginning, when it is more important to have the child understand the task, learn the relevant codes, and begin to develop confidence in the task, but it becomes more important as competence develops. Automaticity is the goal, and it is measured by speed. Users of these modules should be encouraged to become faster and faster in responding correctly; this could be done by the program keeping track of speed, and displaying some sort of speed indicator on the screen, at least for some tasks. Since most computer games have some speed component, this might be an attractive and motivating factor for many children; and, of course, the speed component could be turned off if preferred. On the same note, some of the activities have a word pronounced after the child clicks on it – for children who are fast, the pronounced words often come after the next word has been clicked. This may not be a problem for many children, but it could stop the programs being used in some circumstances.

The program modules are extensive, and it would take far too long to discuss every level of every task of every module. Instead I will use the framework developed in the first part of this paper, and discuss individual modules as they are relevant.

Phonological Awareness

Phonological awareness is only addressed directly in the Phonemic Awareness module, though of course it could also be boosted by the activities at the other levels. The term *phonemic* is a bit of a misnomer, since this module also deals with syllables (for instance, syllable counting) or rhyme (for instance, indicating whether *men* and *mad* rhyme, or picking the odd word out of *tip*, *rip*, *sip* and *mop*), but the major emphasis is on phonemes (different units address vowels, consonants, digraphs, etc.). This module does a good job of linking phonemes to letters, but also has some picture-sound activities (for instance, picking the picture that has a characteristic such as an initial *th*-). If as is likely some children with reading difficulties still have basic phonological awareness problems, more specific work at the sound level may be required before letters are introduced. I would have liked to see more tasks that addressed sounds alone, and some indication that these may be good places to start. Avoiding written words may seem counterintuitive when reading is the goal, but some children may need to focus exclusively on the sounds before dealing with the additional dimension of written words.

Much of this module reinforces the sounds letters make, and how they can be combined to form words. This is an excellent set of activities for basic phonics. As such it is very much in keeping with the research literature. There are also many activities that work at the sound level, but there is no guide about when to use these. My suggestion is that there may be need for more guidance about when to do what tasks, so that children who needed it could work primarily with sounds alone until the child was comfortable working with the sounds alone. There could even be a new module added that addressed *phonological* (as opposed to phonemic) awareness more fully.

The specific activities, most of which are seen in other modules, include searching a matrix of letters (for instance, for a syllable), building words from letters or digraphs, picking words out of a list that have a given pattern (such as an initial *th-*), indicating whether two orally-presented words share a given characteristic (for instance have the same sound), typing the word that results when a particular phoneme replaces a given word, and concentration (finding pairs of words that match with respect to a given characteristic). These activities appear interesting and motivating. Of the standard activities that are found in measures of phonological awareness, most are found here (adding, deleting and replacing of phonemes; oddity detection; matching). The only area that I was surprised not to see was blending (or *synthesis*) in which presented sounds have to be blended to form words. This is an easier task for most children than the deletion or addition of phonemes (usually labelled *analysis* tasks), and could be a valuable stepping-stone for struggling early readers. For example, a series of sounds could be presented orally, and the child's task could be to click the picture represented by the correct word.

All in all, the Phonemic Awareness module contains valuable activities for children, ones that are well justified in terms of the current research literature.

Letter Knowledge

Letter knowledge is addressed directly in the two Super Phonics modules, and indirectly in every module in the course of other activities involving letters. A series of basic (hearing letter names or sounds) to advanced (selecting which letter is the first one in the name of a pictured object, recognising correct letters among common reversals) activities is presented. The variety of tasks is a real advantage for reinforcing this knowledge. These activities are very consistent with the best practices in the research literature.

Phonics and Word Attack Strategies

These skills are also addressed by the Super Phonics modules. There is an impressive variety of tasks available, ranging from matching to word games such as forming correct words from jumbled letter sequences. Again, all of these activities seem attractive to children and useful for learning phonics. My only suggestion is that more use could have been made of onsets and rimes, and even syllables, as frequently occurring letter patterns. For instance, in the Word Families task, in which the user selects an initial letter and then two standard letters to form a word (clicking on C, R, S, or J, followed by O and B), the O and B could have been in a different colour, and linked so that only one click was needed – this would reinforce the rime spelling pattern, and make the task even easier for beginners. Overall, however, these are fine activities, consistent with the research literature.

Word structure and spelling

There are a number of modules that address word knowledge and spelling, including Sight Words and the six Spelling modules. There are a great many opportunities for practice here, tasks ranging from word matching to spelling words that have been heard. The range of tasks is impressive, and should help keep children focused on one of the aspects of literacy that can be most difficult. Words are grouped according to sounds, especially those that cause problems. Some of the tasks, for instance one in which the letters of a hidden word must be guessed, are moderately challenging, and should interest even more able children. Doing these activities will give children a great deal of practice in recognising and producing correct spellings, and the typing activities will help develop knowledge of the keyboard. The eight spelling modules should keep children of all ability levels engaged.

With respect to word structure, there are many opportunities in the modules to learn the ways to spell particular sound patterns (e.g., long vowels, blends, common word endings of word families), practice unusual letter combinations (e.g., the initial *wr-*), and learn the rules for adding prefixes and suffixes (e.g., whether to drop or keep a final *-e*). The only aspect of word structure that I did not see presented here in a systematic way was the use of semantic morphemes (the “little words” inside words) to determine meaning and spelling; this may be a topic to add in the future. With that one exception, the activities are certainly consistent with the best practices found in classrooms and in most research studies.

Sentence structure and grammar

These processes are addressed in the Grammar and Writing modules directly, and more indirectly in the Reading Comprehension modules. The Grammar and Writing modules have a number of activities addressing basic grammatical concepts and rules. As in the other modules, tasks range considerably, from word searches to categorisation. Each seemed interesting and attractive. The Rules that can be accessed on the screen are useful, though some reading is required. Although there is little research linking grammar difficulties to reading difficulties, and none that I know of showing that the teaching of grammar will overcome reading difficulties, grammar is a critical component in oral and written language. These seem like good tasks to facilitate both the learning of grammar and the increasing of consciousness about it. I would not say that the activities provide a complete foundation in grammar, as that would require oral and free writing activities, but they are appropriate for what is possible in this medium.

Comprehension, metacognition, and appreciation

The various Comprehension modules employ various tasks (multiple choice questions after reading a passage, cloze) that should be familiar to most children. I found some of the additional tasks (word shapes, unscrambling words, word matching) to be interesting,

but of limited relevance to comprehension. Most of the tasks in the comprehension modules address relatively basic aspects of comprehension; higher levels, such as summarizing, questioning, and constructing of main ideas, are not feasible within the scope of these modules, and are probably not the primary focus for the children using them. These are appropriate basic level activities to help establish and practice comprehension in reading.

Conclusions

The programs from *Essential Skills Software* are well designed to support and foster the development of reading skills. They incorporate systematic and comprehensive activities that provide learners with the opportunity for extensive, private practice. The activities are entirely consistent with the research literature in terms of type and content and are presented in a way to encourage and motivate the student.

Essential Skills' programs are based in a skills-oriented conception of reading, in which there is value seen in practicing specific skills. Although more holistically inclined teachers may object to this orientation, the research literature would support it whole-heartedly. The holistically inclined would prefer to see only "real reading" employed, that is the reading of actual books. It would be an error to see *Essential Skills* (or any other analytic program) as being opposed to "real reading"; their purpose to establish and strengthen the basic skills on which "real reading" is based. Breaking reading down into skills and working on those in isolation is the way to help those children who are most at-risk for reading failure.

Overall, I was impressed with the focus, methods and scope of the activities in the *Essential Skills* modules. I have no hesitation in recommending them for use by classroom teachers and parents. For parents some additional guidance should be provided in terms of the appropriate sequences of instruction. It would also be useful to emphasize, to parents, that these exercises should be seen as *practice* that needs to occur in conjunction with the complete target activity of reading interesting and valuable books.

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Table 1. Essential Skills modules examined.

Program
Phonemic awareness
Super phonics
Super phonics 2
Reading comprehension 1
Reading comprehension 2
Reading comprehension 3
Writing fundamentals
Sight words
Grammar
Spelling 1
Spelling 2
Spelling 3
Spelling 4
Spelling 6

Figure 1. Hierarchy of skills involved in reading.

