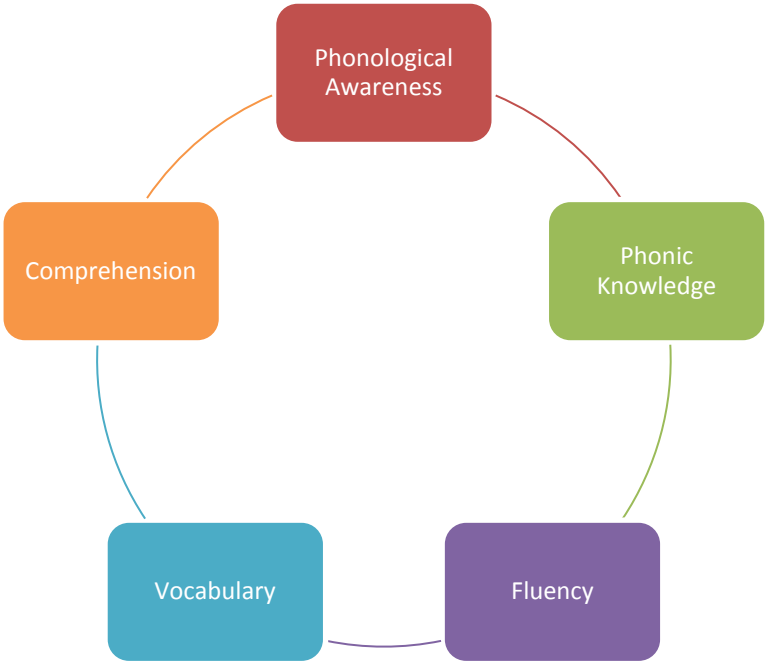
Introduction

Steps is a research-based literacy software programme for learners of all ages from 5 years of age to adult. It covers all key aspects of literacy and language development and covers the processing skills involved in literacy as well as the 'knowledge' aspects.

Steps provides a structured, cumulative approach to literacy, which encompasses and develops the five key elements often referred to as the Five Big Ideas in Beginning Reading (*USA National Reading Panel, 2000)*. These are:



Clearly a computer programme cannot replace all of the functions of a knowledgeable and skilled teacher. Nor should it try to. However, a well-designed computer programme can provide or reinforce many of the core foundation skills and knowledge. It is always important to supplement this with 'real book' reading, discussion, direct instruction and opportunities for the learner's own ideas to be expressed (both verbally and in written form).

A well-designed computer programme can be used to free up a teacher, enabling him or her to provide the above elements in a more personalised and effective manner. It also provides the

additional, often very considerable amount of reinforcement which learners need to develop true automaticity. This is done in a structured and cumulative fashion, but still in a way which provides variety and enjoyment.

The home edition of **Steps** can be used to directly reinforce what the learner is doing in school. This is done in a way which is educationally sound and will not conflict with whatever literacy methods and materials are being used in the school.

Phonological Awareness

There is considerable research from all over the world into the importance of different aspects of phonological awareness. Phonological awareness is often a major weakness in learners with dyslexia or similar processing difficulties.

Background information

Phonological awareness is often referred to as phonemic awareness, but there is a crucial difference between these terms.

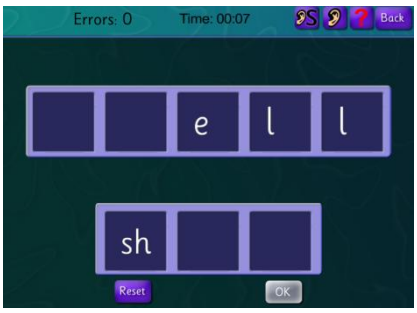
The term 'phonemic awareness' comes from the word 'phoneme', which is a single sound in language. This includes the following individual skills:

- Identification of initial, final and medial sounds in words
- Segmentation (breaking words into individual sounds)
- Blending (blending individual sounds to make words)
- Phoneme transposition (ability to 'swap' sounds)

The term 'phonological awareness' comes from the word 'phonology', which is the sounds and sound patterns of language. Phonological awareness is therefore a broader term than phonemic awareness and encompasses the following:

- All of the above aspects of phonemic awareness ***PLUS***
- Onset + rime
- Rhyme
- Syllabification
- Word Retrieval
- Auditory discrimination

Phonological awareness is purely processing the sounds and sound patterns in language, not understanding how those sounds map onto text, which is referred to as **phonic or orthographic knowledge**. However, it is an essential precursor to phonic knowledge. There is no point trying to learn what letters represent what sounds if you are unable to process those sounds in language in the first place.



How does Steps develop Phonological Awareness?

The following activities are specifically designed to develop phonological awareness. Some of these activities only involve processing the sounds or sound patterns themselves (phonological

awareness) and some make the link with the written word (phonological awareness + phonic knowledge).

Chunks – onset + rime awareness
Word Building – onset + rime awareness
Initial Sounds – onset + rime awareness, phoneme transposition
Sound Tiles – phonemic awareness + phonic knowledge
Sound Boxes – phonemic awareness + phonic knowledge
Vowel Sounds (game) – phonemic awareness, auditory discrimination and phonic knowledge
Clear the Skies (game) – phonemic awareness, auditory discrimination and phonic knowledge
Vowel Ladder (game) – phonemic awareness, auditory discrimination, phonic knowledge, blending, decoding/encoding skills
Alphabet (General Section) – phonic knowledge, phonemic awareness
Spelling (General Section) – auditory discrimination, phonemic awareness, decoding/encoding skills

Phonemic Awareness Research

"The majority of preschoolers can segment words into syllables. Very few can readily segment them into phonemes. The more sophisticated stage of phoneme segmentation is not reached until the child has received formal instruction in letter-sound knowledge." Predicting reading and spelling difficulties (Snowling & Backhouse 1996)

"The best predictor of reading difficulty in kindergarten or first grade is the inability to segment words and syllables into constituent sound units (phonemic awareness)" Lyon, G. R. (1995). Toward a definition of dyslexia. Annals of Dyslexia, 45, 3-27.

"The ability to hear and manipulate phonemes plays a causal role in the acquisition of beginning reading skills". Smith, Simmons, & Kame'enui, 1998

The effects of training phonological awareness and learning to read are mutually supportive. "Reading and phonemic awareness are mutually reinforcing: Phonemic awareness is necessary for reading, and reading, in turn, improves phonemic awareness still further." Shaywitz. S. (2003). Overcoming dyslexia: A new and complete science-based program for reading problems at any level. New York: Knopf.

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Phonic Knowledge

Phonic knowledge is the understanding of letter/sound correspondence. In other words, it refers to the learner understanding which letter(s) make which sounds. The learner can then use that knowledge and phonological awareness to encode (spell) and decode (read) regular words.

The ability to acquire and apply phonic knowledge depends on satisfactory phonological awareness, but both can be developed together. It is important to incorporate activities which only process sounds or sound patterns, and also activities which they teach the learner to 'map' those sounds onto letters or letter patterns.

How does Steps develop Phonic Knowledge?

Chunks – onset + rime awareness
Word Building – onset + rime awareness
Initial Sounds – onset + rime awareness, phoneme transposition
Sound Tiles – phonemic awareness + phonic knowledge
Sound Boxes – phonemic awareness + phonic knowledge
Spelling – phonemic awareness, phonic knowledge, visual memory, sequencing
Spelling Test - phonemic awareness, phonic knowledge, visual memory, sequencing
Vowel Sounds (game) – phonemic awareness, auditory discrimination and phonic knowledge
Clear the Skies (game) – phonemic awareness, auditory discrimination and phonic knowledge
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Vocabulary

An understanding of vocabulary is crucial if the learner is to gain meaning from text. There is a difference between oral vocabulary and reading vocabulary. Oral vocabulary refers to the words which the child uses in speaking and listening. Reading vocabulary refers to the words the learner recognises in print. Children enter school with a large oral vocabulary, estimated to be about 6,000 words. The average high school pupil knows about 45,000 words by Years 11 *(Stahl, 2004).*

Vocabulary can be developed through both direct and indirect instruction. Indirect instruction includes the student's own reading and oral language practice/interaction. Direct instruction involves teaching words using a range of word-learning strategies.

"Most words require 20 exposures in context before an adequate grasp of their meanings is acquired." *(McKenna, 2004)*

The National Reading Panel *(2000)* concluded that computer programs are helpful in teaching vocabulary. It also noted that the process of teaching vocabulary before reading the text is helpful. Note: this can be achieved by creating pre-reading, customized vocabulary lists in **Steps** before tackling the printed passage.

How does Steps develop Vocabulary?

The range of activities in Steps ensures that every word which is taught as a reading/spelling word is also seen and used in context, often in a variety of ways. The following activities specifically develop vocabulary:

Choose the Word – sight vocabulary, using/choosing words in context
Sentence Builder – sight vocabulary, sequencing, using words in context, syntactic awareness
Word Search – sight vocabulary, visual recognition, visual discrimination, visual sequencing, using words in context (when doing printed cloze activity)
Homophones – Lists in Wordlist section (all activities)
Pick the Word – Homophones activity which develops language awareness and vocabulary
Everyday Topics Wordbank – 1,000 words divided into topic lists (all activities provided for every list)
Personal Lists – ability to enter lists of words relevant to each individual learner, enabling teachers/parents to pre-teach vocabulary and reading words. Learners can see and use the words in a variety of contexts, utilising all of the above activities.
Stargame – printable set of materials which can be used for games requiring the learner to generate their own sentence for each word.
Four in a Row (game) – homophones option
Word study lists, including prefixes, suffixes and word roots

References

"Learning, as a language based activity, is fundamentally and profoundly dependent on vocabulary knowledge. Learners must have access to the meanings of words that teachers, or their surrogates (e.g., other adults, books, films, etc.), use to guide them into contemplating known concepts in novel ways (i.e. to learn something new)." (Baker, Simmons, & Kame'enui, 1998) See References

"The importance of vocabulary knowledge to school success, in general, and reading comprehension, in particular, is widely documented." (Becker, 1977; Anderson & Nagy, 1991; see References)

"Children who enter with limited vocabulary knowledge grow much more discrepant over time from their peers who have rich vocabulary knowledge." (Baker, Simmons, & Kame'enui, 1997; see References).

Ogle, D. (1986). K-W-L: A teaching model that develops active reading of expository text. The Reading Teacher, 39, 564-570.

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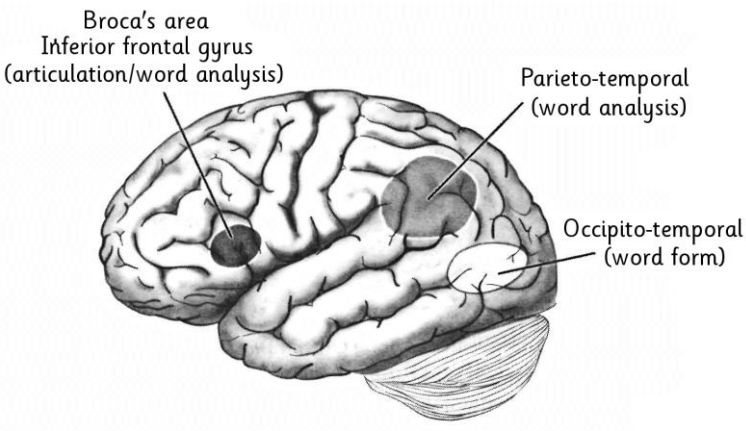
Fluency

Reading fluency is the ability to read connected text rapidly, effortlessly and automatically (Hook & Jones, 2004; Meyer, 2002; National Reading Panel, 2000). Readers must develop fluency to make the bridge from word recognition to reading comprehension (Jenkins, Fuchs, Vandern Broek, Espin & Deno, 2003).

"Many poor readers have difficulty reading fluently because they do not possess an adequate sight vocabulary and must labour to decode many of the words in the reading passages. With their energies focused on recognising words, their oral reading is filled with long pauses and many repetitions, and it is characterised by monotonous expression. Fluent reading requires that most of the words in a selection be sight words. When a selection contains too many difficult (nonsight) words, the reading material will be too arduous and frustrating for the reader (Burns, Roe & Smith, 2002; Jenkins et al., 2003).

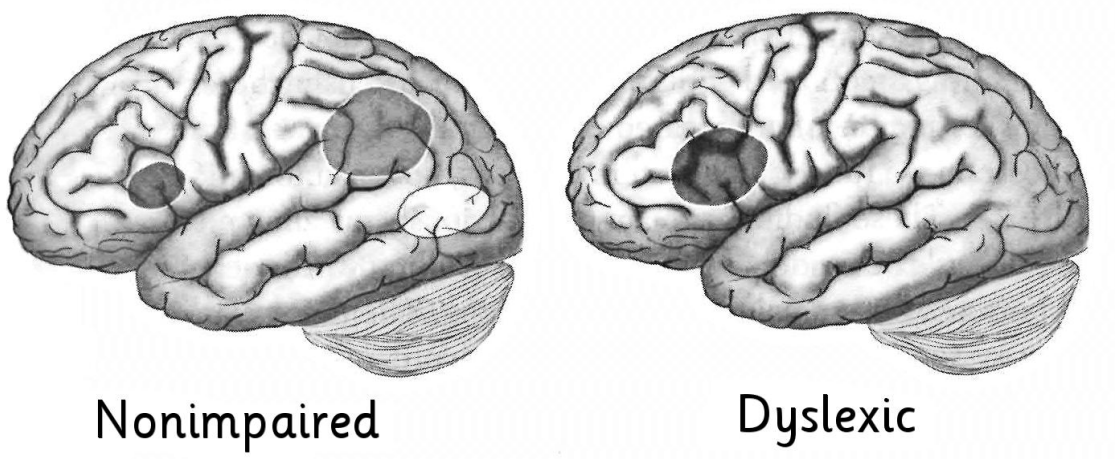
Brain processes in Reading

Recent research by Sally Shaywitz using fMRI scanning has identified that there are three key areas of the brain for reading. These are all in the left hemisphere. Broca's area and the Parietal Temporal are involved in decoding (word analysis) and the Occipito-Temporal is involved in recognising the word holistically from its visual pattern. To read fluently, the occipito-temporal must be functional.



When a word is first met, Broca's area and the Parieto-temporal are employed to decode it. This may happen several times. However, after several repetitions, a neural model of that word is created, which is then stored in the occipito-temporal. Once this has happened, the word can now be accessed automatically and reading fluency has been attained.

Sally Shaywitz's research has also identified that dyslexic learners have an impaired occipito-temporal and are unable to develop the same fluency and automaticity. As a compensatory measure, Broca's area overdevelops – in other words, the wrong strategies are being employed.



Illustrations from Overcoming Dyslexia, Sally Shaywitz, 2003

From the very beginnings of literacy, teachers need to incorporate enough activities to activate the occipito-temporal. They also need to ensure that each learner has enough repetitions of each word to create and automatically retrieve the neural model of that word.

It is important to be aware that, although the Occipito-Temporal is a visual recognition area of the brain, instant visual recognition also depends on an understanding of the phonological structures of the word. Phonic knowledge and phonological awareness are therefore also key factors in this process.

How does Steps develop Fluency?

All of the word activities in Steps develop fluency, since it is through repetition of words that automaticity develops. However, there are a number of activities which specifically target this aspect.

Choose the Word – sight vocabulary, using/choosing words in context
Word Flash – instant word recognition. Note: This activity (together with the speed reading activities in the workbook courses) is specifically designed to activate the occipito-temporal.
Visual Memory – word recognition, visual and spatial memory

References

"To gain meaning from text, students must read fluently." (Kuhn & Stahl, 2000)

Fluency refers to the ability to read words automatically, with no noticeable cognitive or mental effort. In other words, it implies that the learner has developed word recognition skills which enable

the word to be recognised as a whole unit, rather than having to be decoded. (Juel, 1991, see references)

Fluency is essential if vocabulary and comprehension are to develop. If a learner has to concentrate on the decoding process, he/she cannot simultaneously follow the sense of the passage effectively. Fluency depends on an area of the left hemisphere of the brain, known as the 'occipito-temporale', which research shows is inactive in many dyslexic learners. (Shaywitz. S. (2003). Overcoming dyslexia: A new and complete science-based program for reading problems at any level. New York: Knopf.)

"Proficient readers are so automatic with each component skill (phonological awareness, decoding, vocabulary) that they focus their attention on constructing meaning from the print." (Kuhn & Stahl, 2000)

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Comprehension

Comprehension is described as the 'active and intentional thinking, in which the meaning is constructed through interactions between the text and the reader (Durkin, 1973, see References). It is described as a complex cognitive process, which depends on all of the other four Big Ideas in addition to the prior knowledge and engagement of the reader.

The key causes of reading comprehension difficulties (Kame'enui & Simmons, 1990) are:

- Inadequate instruction
- Insufficient exposure and practice
- Deficient word recognition skills
- Deficient memory capacity and functioning
- Significant language deficiencies
- Inadequate comprehension monitoring and self-evaluation
- Unfamiliarity with text features and task demands
- Undeveloped attentional strategies
- Inadequate cognitive development and reading experiences

How does Steps develop Comprehension?

Choose the Word – sight vocabulary, using/choosing words in context
Sentence Builder – sight vocabulary, sequencing, using words in context, syntactic awareness
Word Search – sight vocabulary, visual recognition, visual discrimination, visual sequencing, using words in context (when doing printed cloze activity)
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Stargame – printable set of materials which can be used for games requiring the learner to generate their own sentence for each word.
Four in a Row (game) – homophones option
Word study lists, including prefixes, suffixes and word roots

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