Finding the right words - a systematic approach to word selection for a special purpose science dictionary

T.Winchester-Seeto, **A.A Jones**, **H.J Caldon** and **E.Deane**, Macquarie University
twinches@laurel.ocs.mq.edu.au

Background

First year undergraduate science students frequently report difficulties grappling with the technical and semi-technical vocabulary of academic science. Most first year science students undertake studies in several scientific disciplines (e.g., Biology, Chemistry, Geology, Physics etc.), each with their own set of technical vocabulary. Yet the students not only deal with specific and obvious jargon, but must also tackle more indirect jargon where commonly used words may have a different and special meaning in the scientific context (e.g., control, contract)

Inability to master scientific language represents 'a major barrier to learning' for a significant number of students (Wellington and Osborne 2001), or a 'lexical bar' to be overcome (Corson 1995). Such problems are exacerbated when the students come from non-English speaking backgrounds (NESB), whether they be local or international students.

Design

The 'Living Dictionary' is being developed by an interdisciplinary team of science educators and linguists to address this problem. It is designed as an online, searchable dictionary, with a sound-bite to give the Australian pronunciation for each word. This is important for NESB students who often cannot connect what is heard in lectures or practicals with the written version of the word. Students frequently report that this lack of connection severely hampers their comprehension of lectures and they often are embarrassed to seek help.

Each entry or headword has a simple, short, plain English definition, or, if the word has several meanings, a series of definitions (e.g., cell which has different meanings in general usage, in Biology and in Physics). The various forms of the word are listed (e.g. verb, noun, adjective etc.), as well as any antonyms. Examples of sentences which use the terms are extracted from the texts to show how the words can be used correctly. Where word combinations or phrases have specific meanings (e.g., messenger RNA), these are listed separately.

Word Selection

There are several subject-specific glossaries or dictionaries freely available to students on the internet, but the 'Living Dictionary' compilation differs because the word selection has been rigorously based on the student course materials, thereby ensuring relevance to these students. Moreover the definitions have been tailored to reflect the usage of the words in context.

Practical constraints limit the number of words to 3000. A basic proficiency in English is assumed and the first 2000 words from West's General Service List (West 1953) are thus excluded. However, we could not assume that all students would comprehend the core academic vocabulary to a sufficient depth, so half the words on the University Word List (UWL) will be included to give students a fairly broad basis to build upon. The University Word List (Xue and Nation 1984) was in fact developed from a concern with the reading abilities of tertiary level students, and built on the work of previous researchers such as Praninskas (1972) who shared these concerns. These researchers catalogued the most commonly used words in academic texts across a number of

disciplines and compiled a frequency based list of some 835 word families. Words included in the first half of the UWL include acquire, analogy, consequent, fluctuate and inhibit.

Biology is the first completed segment, and words were selected from course materials of three different units (e.g., lecture notes and graphics). A master list of about 2000 words was compiled by experienced science educators, comprising all potentially difficult words and phrases, and the number of separate uses of the words was tracked and recorded. Any words that occur in the UWL or words used in several disciplines such as 'cycle' or 'subatomic' were removed to separate lists.

The final decision on which words to incorporate and which to cull was based on:
- frequency of usage i.e. how often the word was used in the course materials;
- how important the word is to clear understanding of key concepts; and
- teaching experience, isolating which words commonly cause problems to students.

Conclusions

The 'Living Dictionary' has the potential to be a powerful adjunct to student learning in first year undergraduate science. The mastery of technical and academic vocabulary is crucial to carry learners 'across the lexical threshold' (Cobb and Horst 2001) and thus to ensure successful learning experiences in science.

Plans for the future include the possible production of a hardcopy version of the dictionary. The online version will be used to track usage and thus assist in narrowing the selection to the most used words. This process will provide a rational and empirical basis for more selective hardcopy versions. The online dictionary also has the potential to facilitate further research into usage patterns.

References
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