Title: Embedding Language Learning Strategies within a Foundation Chemistry Course using the FOCUS project.

Abstract: This article outlines the development of a corpus of good quality student texts in chemistry (The FOCUS project) and how it has been used to develop language understanding within a foundation chemistry course. The functionality of the concordancing tool is explained with practical examples of teaching activities that have been developed.

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The article by Gillway in the April 2012 issue of Inform (Gillway 2012) provided an excellent insight into the multiple language challenges faced by students during a chemistry lecture. It is these subject specific language challenges have been the focus of our own teaching research for the past two years. During this time we have explored a variety of teaching and learning resources to help students and lecturers develop their understanding of subject specific language (Rees et al. 2013). This article outlines the development of a corpus of good quality student texts in chemistry (The FOCUS project) and how it has been used to develop language understanding within a foundation chemistry course.

The FOCUS project

The combined the skills and knowledge of a chemistry specialist (Simon) and an EAP specialist (Megan) has led to the development of a suite of resources entitled the FOCUS project (www.durham.ac.uk/foundation.focus). The FOCUS project (abbreviated from Foundation Corpus) is a substantive and growing collection of high quality Durham student writings from Foundation level (level 0) to Ph.D. in Chemistry (and now expanding in to other subject areas). The intention has been to develop this as a teaching resource to enable students to participate in data driven learning activities as described by Johns (1991). The corpus contains over 1000 individual texts and figures and these can be searched by students to examine the usage of specific words in context. For example if the user searches for the word “molecule” they will obtain results displayed as below.

Fig. 1. Results for a search for the use of term “molecule”.

Aside from displaying the word in context, the corpus search also reveals the level of work that the example was obtained from e.g. level 1- 1st year undergraduate, the type of writing e.g. laboratory report and the subject e.g. chemistry, earth sciences. Users can also sort the data alphabetically using the “Before” or “After” tabs to identify common collocations, wild card entries can be made and there is also a word cloud feature that displays words most commonly associated with the search term (see Fig. 2.).

Fig. 2. Word cloud displaying words most frequently associated with the search term “molecule”
Teaching with FOCUS.

Having built the collection of texts and the concordancing tool, the next challenge has been to develop teaching activities to make use of the tool within the chemistry course. These have included:

*Spontaneous searches.*

On a regular basis, classroom discourse can involve discussion of the meaning of new and unfamiliar terms and the availability of FOCUS has enabled the chemistry tutor to spontaneously search for terms that come up during lessons to illustrate the different contexts in which they are used. For example, the usage of the term “homologous” was explored and very quickly its usage in three different contexts was identified (homologous series, homologous genes, homologous evolutionary features). The embedding and repeated usage of the resource within class helps familiarise students with the resource and its value and in developing their understanding of scientific language.

*Personalised glossaries of specialist vocabulary.*

As the term has progressed, international students have developed a bank of explanations and examples of difficult terminology that they have come across. For example a student did not understand the meaning of the word “contract” so he was asked to look up a definition of the word (which he does on his smartphone). This revealed many different meanings of the word for different contexts. By then searching for the word in FOCUS, an example in context is identified and then the most appropriate meaning of the word can be established (see fig. 3). This example illustrates the linguistic complexity of this challenge where the word is polysemous in its usage in science. This activity has enabled us to explore how students seek definitions of new vocabulary and the suitability of the dictionaries or other tools they are using.

Fig. 3. The student was asked to find the correct definition for the word “contract” in relation to an example in context obtained from FOCUS (final column)

*Self-study activities*

The FOCUS project is designed to be student orientated so that students can explore language usage in their disciplines. Early on, however, it became clear that students were struggling, (understandably) to perceive exactly what the concordance programme could do and how they could use it in their learning. The tool can be used effectively in class with the tutor leading the discussion and exploring the results with the students but we wished to encourage and enable students to undertake explorations independently.

Consequently, a range of self-study activities have been developed to explore different aspects of scientific language. For example, an affixes activity
(http://www.dur.ac.uk/foundation.science/?q=node/606) enables students to follow a screencast with associated documents to explore the use of affixes in science.

**The benefits of the FOCUS project to teaching and learning.**

- Authentic student texts are used to illustrate to the students’ how language is used within their undergraduate programme.
- This enables the reuse of student writings to illustrate appropriate language usage without compromising academic integrity or the potential for plagiarism.
- The user is exposed to a large number of uses of the word so that they can deepen their understanding of correct language usage.
- The tool encourages students to develop their independent research skills through data driven learning.

The FOCUS project is continuing to develop and we are expanding in to other subject areas. We would welcome enquiries from colleagues in other institutions who would be interested in trialling and evaluating its use.

**References**


Rees, S., Bruce, M. & Nolan, S. (2013). Can I have a word please – strategies to enhance understanding of subject specific language in chemistry by international and non-traditional students. *HEA: New Directions* (in submission)