WikHyperGlossary (WHG)

1. Overview

The WikiHyperGlossary (WHG) is a project of the NSDL ChemEd DL (U.S. National STEM Distributed Learning Chemical Education pathway (Digital Library)). The WHG automates the mark-up of digital text documents including, but not limited to web pages, by converting into hyperlinks terms within the submitted documents that match the database of a glossary containing those terms. Such hyperlinks can then be used to further enhance those terms in a nearly limitless fashion. Unlike the IUPAC Goldify or the MSDS Hyperglossary, both of which automate the markup of text to a specific glossary, the WHG is not only a glossary but also a glossary-generating program. The WHG has four basic types of data fields and can associate a glossary term with up to a total of five definitions. These four types are.

1. Textual non-editable fields (appropriate for canonical definitions like those of IUPAC).
2. Textual editable fields (wiki fields appropriate for socially developed content). These fields can be edited/developed in multiple language fonts.
3. Image/Multi-media.
4. Chemical Identifiers (InChI) which interact with various software agents (Jmol, JChemPaint) and search engines (ChemSpider).

An automated workflow has been developed for uploading any English-based glossary in MS Word to the WHG if the glossary terms are formatted as “headings,” and the subsequent definitions are formatted as plain text. Images and some characters require extra work.

2. Information Literacy Issues, the Internet and Non-linear Information Acquisition.

Reading comprehension requires prior subject domain knowledge and educators scaffold content to maximize learning by providing content appropriate to a learners “fringe knowledge” or “Zone of Proximal Development” (ZPD). With the internet it is easy to acquire documents in one’s “distal knowledge space,” beyond the reader’s ZPD, for which there is inadequate background knowledge for adequate comprehension.

3. Targeted Extension of ZPD by Coupling Social to Canonical Glossaries

Canonical definitions like those of IUPAC are designed for experts and not novices, with a primary purpose of promoting science through enhancing expert to expert communication through standardization of terms. A social glossary could be developed through the wiki-functionality of the WHG that could target an identified ZPD. By coupling a social glossary containing multimedia elements to a canonical glossary the WHG may be able to provide a targeted scaffolding of one’s ZPD appropriate domain knowledge to enhance reading comprehension of a document that would otherwise be in one's distal knowledge space.

For example, the IUPAC definition of entropy, s=klnW would not help the typical 15-year old in understanding a document involving thermodynamic concepts like entropy. But if associated with the canonical definition, the WHG provided ZPD-appropriate socially generated definitions, animations and videos, the fifteen year old might get the idea of the document. It is important to note that it is not just the definitions of the words that are needed, but also the missing words, and their implicit meaning (which the author assumed was part of the reader's prior domain knowledge). As Ed Hirsch points out, the statement "In 1862 the North fought the South" makes sense to anyone familiar with U.S. history, but otherwise, the meaning is incomprehensible.

The question is, can developing ZPD-appropriate social definitions that are coupled to IUPAC canonical definitions provide a "term density" sufficient to scaffold adequate background knowledge to enhance reading comprehension?