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Mind your language! An investigation into the semantic gravity and semantic density in GCSE, A-level and university-level textbooks.

Chemistry has a hierarchical knowledge structure, where the basics must be learnt before higher-level concepts can be mastered. Accordingly, the language used within the chemistry classroom increases in complexity as a student progresses.

Legitimation Code Theory (LCT) is a tool used to separate abstraction from complexity in oral discourse. Semantic gravity is related to how abstract a concept is; a concept with stronger semantic gravity is termed SG+ and is taken to mean something that is less abstract, for example it is factual or can be observed. A concept with weaker semantic gravity is termed SG- and is taken to mean something that is more abstract or generalized.

Semantic density relates to the degree of complexity contained within a term. Stronger semantic density (SD+) means that there is more complexity i.e. more meanings are condensed into a word or symbols, whereas weaker semantic density (SD-) condenses fewer meanings. Semantic density and semantic gravity are independent of each other.

Language used in textbooks when explaining a range of chemistry concepts at GCSE, A-level and university-level was analysed for semantic density and semantic gravity using an instrument based on that disclosed by Cranwell and Whiteside (2020). Initial results show that across all levels studied the semantic density is strong, and students are exposed to a number of new technical words and phrases at each stage. Semantic gravity weakens as a student progresses through their education, and students are expected to link more concepts and ideas and apply knowledge that is less context-dependent and uses more general laws and rules.

There are some implications from this that will be discussed further during the talk.

Key words

Semantics, LCT, textbooks, complexity, abstraction

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