Teaching and Learning Science Concepts: A Corpus of Metaphors and Analogies Used In Romanian Secondary Education Physics and Chemistry Textbooks

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Abstract

Metaphors and analogies are efficient and attractive ways used in science teaching to explain abstract ideas in familiar terms. Science textbook authors and teachers rely on metaphors and analogies to explain abstract scientific concepts and convey them to young learners. In this paper, we discuss a corpus of metaphorical expressions found in Romanian Physics and Chemistry textbooks for lower secondary education (5^{th} to 8^{th} grade) and classified based on target domains (i.e., the core scientific concepts presented in unit lessons from Physics and Chemistry textbooks) and source domains (i.e., the more concrete, more familiar concepts used to explain scientific concepts from the analyzed textbooks). Furthermore, we explore the way in which the identified and annotated metaphors may provide the basis for understanding core concepts from Physics (e.g., light in terms of 'waves') and Chemistry (e.g., links between molecules as chemical 'bonding'). This study is part of a larger research project whose aim is to examine how metaphors and analogies used in Romanian science textbooks are understood and misunderstood by young learners and the implications that (mis-) understanding complex scientific ideas might have for pupils' preparedness to make sense of the world we live in and, ultimately, for their future engagement with and interest in science.

Keywords: learning abstract concepts; science metaphors and analogies; science teaching; STEM education; textbook research