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Title	Science reading: The elephant in the science classrooms?
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# Science Reading: The Elephant in the Science Classrooms?

By *Seah Lay Hoon*

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As science teachers, we often find ourselves reading a variety of materials, whether they are textbooks from various publishers or websites. Reading helps to clarify and extend our understanding of the scientific contents that we teach in the classroom. Will our students also do the same should they encounter similar situations that require them to read to be able to understand certain scientific concepts?

While my research is not designed to provide a definitive answer to this question, it nonetheless suggests that the opportunities for students to do so can be quite limited in some classrooms. The same applies to the instruction provided for students that will allow them to engage in independent science reading. Within the classrooms that I have observed in both primary and secondary schools, support for reading science texts is often limited to just highlighting important information and clarifying key terms. Grammatical and structural language features distinctive to science are seldom unpacked for students. During science lessons, students are more often exposed to “truncated” texts—in which information are presented in point form or disparate short sentences in the form of PowerPoint slides or worksheets—than extended form of texts such as textbooks, magazines and articles—in which the scientific content are presented in a coherent and integrated manner. With limited support and opportunities provided for students, it comes with no surprise if their capacities to make sense of extended form of science texts are compromised.



## The Role of Reading in Science Learning

Students' limited capacity to make sense of scientific texts can be constraining to both their learning and performance in the science subject. Outside of classroom, students who have difficulties making sense of scientific texts lack the vital tool required for them to revise, refine and extend what they learn in class.

More importantly, science texts provide students with multiple exposures to academic language at their own individual pace. This is especially so for text structures that is less likely to be heard in conversational language (Zwiers, 2014). Indeed, spoken language and written language entail different language features. These differences relate to the different contexts in which they arise and purposes they serve. In fact, written language exists “because it fulfils functions and purposes that the oral mode cannot” (Hammond, 1990, p. 35).

In classroom contexts, teachers often engage in co-constructed discussion with students. The shared physical setting contributes to the meaning of the speech in the form of contextualisation cues (Gumperz, 1982) such as physical artefacts, gestures and intonation. By contrast, written texts including students'

writings are not supported by these cues. A common grammatical resource that is employed distinctly between spoken language and written language is pronouns (e.g., “it”, “this”). Use of pronouns is often taken for granted in speech as their meanings can often be easily derived from the contextualisation cues. But this is not the case in writings as the readers do not share the same space and time in which the writings are conducted (Hammond, 1990). Hence, pronouns have to be employed in writing in ways that “build coherence within the text” (Christie, 2005, p. 51). Unfortunately, science students are often found to use pronouns indiscriminately in their science writings making what they intend to construe unclear (Seah, 2013; 2015).

There is therefore a need for students to recognise the differences in the way language works in speech and in writing. Reading is an important means by which students can be exposed to how language is used differently in writings. Lacking the awareness of such differences can impede one's ability to express intended meanings accurately in writing even if he or she is able to do so orally.

## Reading is Disciplinary-Specific

Recent research has also shown that reading practices are distinctive across

▶ disciplines. Shanahan, Shanahan & Misischia (2011) have shown that chemists, mathematicians and historians differ in the way they interpret, respond to, and make use of information presented in the written texts specific to their field. Imagine what our students can achieve through inquiry-based and self-directed learning if they are equipped with the skill-set that allows them to approach texts in ways that mirror how a scientist would. For a comprehensible review of the literature on disciplinary-specific reading, readers can refer to the Research Digest Vol 1, Issue 2 produced by the English Language Institute of Singapore.

### Implications for Science Instruction

Given the many rationales for students to be able to read scientific texts effectively, there is thus an imperative to support students in science reading. Certainly, this does not involve reading line by line with students or simply highlighting important content in the relevant sections. Rather, it requires teachers to be knowledgeable about the distinctive features of scientific texts (see for example, Fang, 2005) and to provide contingent support to their students when such features are present and relevant to the topics being learnt. It also demands teachers to be aware of how scientists read differently from other disciplinary experts and to equip students with similar reading strategies.

Such reading support needs to be ongoing, progressive and started young. In recent years, there has also been an expansion in focus beyond single-text reading to multiple-text coordination. Within the context of inquiry-based learning, multiple-text reading involves coordinating “diverse—and sometimes contradictory—information and perspectives from multiple texts, accounting for authors’ intent, evaluating evidence presented in the text, and judging the relevance and usefulness of each text for the task at hand.” (Goldman et al., 2016, p. 222). In the Internet era where information are freely and widely available, the ability for such reading skills

will only gain importance as students learn to tap on these resources to expand their understanding of the world around them.

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