

Science text comprehension: Investigating the role of text structure strategy, motivation, and metacognitive calibration

Reading English scientific text can be challenging for students who learn English as second language/foreign language. Two main strategies have been proposed to enhancing L2 learners' science text reading. The first, text structure instruction (TSI), is an explicit and research-based method to teach expository reading. It involves teaching text structure strategy which is a cognitive and metacognitive approach to enhance science text comprehension. The second, drawing on self-determination theory (SDT), suggests that reading performance can be enhanced by providing motivational support and engagement components to learners by fulfilling the three basic psychological needs for autonomy, competence and relatedness. While research has demonstrated that the two strategies (i.e., TSI and SDT-based motivational strategies) are individually effective in enhancing ESL learners' reading performance, there have been no studies, to the best of our knowledge, investigating whether the two strategies can be integrated to produce more positive synergistic effects in enhancing students' reading performance. Furthermore, understanding is also needed to shed light on how to make the TSI more effective and, in the present study, we focus on metacognitive calibration which is not yet examined in text structure instruction.

The primary goal of the present study, then, is to evaluate an intervention that enhances Chinese learners' English scientific text comprehension by incorporating motivational support in TSI intervention. The second goal is to test whether metacognitive calibration, the association between the subjective judgment of one's performance and one's actual performance in metacognitive monitoring, is a moderator of intervention effects. Given the positive relationship between the two strategies (text structure and motivation) and text comprehension, we expect that the integrated intervention (engaged TSI) would enhance students' science text comprehension more so than simply employing TSI. We also hypothesize a significant moderating effect of calibration on outcomes because students who have accurate judgment and are better at monitoring their comprehension performance will benefit more from strategy instruction.

A randomized controlled trial in which students will be randomly assigned to three conditions will be conducted to compare the effects of the three web-based interventions delivered in blended learning mode (engaged TSI, TSI, and business-as-usual instruction) on improving English science text comprehension. Around 210 Cantonese-speaking students in Grade 7 will be recruited from local secondary schools in Hong Kong. Each intervention program will last for around 12 weeks with 24 instructional hours. To examine the intervention effects, a pretest, posttest, and three-month delayed posttest will be conducted. Measures on use of text structure, science text comprehension, fulfilment of three basic psychological needs (SDT; competence, relatedness, and autonomy) and reading motivation will be administered. Prior knowledge, word reading and working memory will be measured as covariates and metacognitive calibration will be measured as potential moderator at pretest. The findings can have important implications in the teaching of science text reading, as well as in the role of motivation in reading outcomes.