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19. IMPROVING SCIENCE LEARNING THROUGH WRITING-TO-LEARN STRATEGY: WRITING CLAIM AND EVIDENCE IN CLASSROOM TEACHING

ABSTRACT
This paper draws on an action research into the use of writing-to-learn strategy and claim and evidence in the teaching of science lessons on the human circulatory system, and the cell system. This study seeks to qualify and quantify the effects of using writing-to-learn science for a lower and middle performing group of students. The research describes how writing claims and evidence statements support learning of science concepts. Students were taught to organize claims and evidence in their writing. Pre-and-post tests were conducted to assess students’ performance in topics taught and applications of writing strategy. Interviews were conducted with teachers on how the writing strategy was implemented and the challenges they encountered. The study found that young students can develop complex understandings using claims and evidence writing-to-learn science method. The rhetoric and writing structures used by the teachers in real-life examples were important. The study points to a relationship between writing-to-learn science and students’ learning of life science topics.

KEYWORDS
Primary Science, Life Science, Writing-to-Learn, Claim-and-Evidence

INTRODUCTION
Writing has been advocated as a tool for science and mathematics concept learning by researchers and educator (Koeller, 1982; National Council of Teachers of Mathematics (NCTM), 1989; Sturtevant, 1994). However, there is also a need to improve the kinds of writing experiences of students, not just in the amount of writing students produce (Rillero et al., 1995). According to Kober (1993) when students are asked to write about their observations, results, reasoning processes or attitudes, they pay attention to details, organize data more logically, and structure their arguments in a more coherent way. In so doing, they clarify their own understanding of science and hone their communication skills. However, there is

Mijung Kim and C. H. Diong (Eds.), Biology Education for Social and Sustainable Development, 187–196. © 2012 Sense Publishers. All rights reserved.
anecdotal evidence to support the learning through writing-across-curriculum (Moore, 1993). No doubt that history, science and mathematics educators have supported that writing activity does contribute to students’ learning in these content subjects (Wadlington et al., 1992; Audet et al., 1996) and language educators believed that students can think critically and even construct new knowledge through writing to understand the difficult content (Emig, 1977; Spivey, 1990; Newell, 1998), there is still a lack of information on the cognitive processes of students when they learn by writing. There is a need to research on the links between writing-to-learn, conceptual change, and critical thinking before any assertion on the effectiveness of using the writing-to-learn strategy in learning scientific concepts can be made.

There are research results that show positive relationship of writing on students’ recall and comprehension of text and lecture materials (Horton et al., 1985; Hinkle & Hinkle, 1990; Wiley & Voss, 1996), but the question of how writing contributes to learning has only been addressed by few researchers (Newell, 1984; Marshall, 1987; Penrose, 1992). In the humanities and social sciences disciplines, the impact of literacy on students’ cognitive processes has been controversial (Goody & Watt, 1968; Harris, 1989; Olson, 1996). There are inconsistencies in the empirical results of studies on writing-to-learn, with some research reporting positive results and others, positive and null findings (Newell, 1984; Langer & Applebee, 1987; Boyles et al., 1994).

The writing process helps shape ones thoughts. A review of writing-to-learn in science indicates that writing can enhance science learning when: (i) teachers plan for lesson goals, (ii) students have the requisite meta-cognitive knowledge, and (iii) the teaching environment encourages promotes scientific literacy and conceptual understanding (Rutherford & Ahlgren, 1989). Students are usually encouraged by teachers to be engaged in a writing task or to pen down something they have learnt. In most cases, writing is done for either data recording or for assessment purposes. By doing this, students attempt to integrate new information with prior knowledge (Newell, 1983). Writing-to-learn strategies can vary according to how they are implemented. Some can be done in class, as homework or on-going projects, and even essay writing. Writing can also be done in the form of entrance or exit slips given to pupils at the beginning or end of the class.

Primary school students are engaged in writing in English and Mother Tongue language lessons more than in science. In many Science lessons, students are encouraged to begin their discovery of the topic with questions or trigger that would spark their curiosity. They will then go through activities and exercises that are targeted to grasp the scientific concepts. During the activities, students develop science process skills, habits of the mind, attitudes and ethics necessary for scientific inquiry and content mastery. The holistic approach in developing the pupils is evident in the school culture. Students are encouraged to apply what they have learnt in different situations or contexts.

Current emphasis on 5E curriculum and innovative Science lesson is driven by the notion that discrete knowledge should not be learned for its own sake. Students are encouraged to use scientific skills and their inquiring mind to understand the