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Critical thinking and discovering the meaning of unfamiliar terms through the word part analysis strategy: A study of Iranian medical students

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ABSTRACT

ESP courses designed for medical students are often concerned with word building and the memorization of word parts, which is explained by the key role medical terms play in understanding the related literature. It is expected that students who master these skills will be able to deduce the meanings of unfamiliar terms they will inevitably encounter. However, not all students have the same levels of ability to master these skills. Following the theory which suggests that critical thinkers are problem solvers, it was hypothesized that better critical thinkers might be better able to cope with unfamiliar terms. Therefore, this research was conducted with the aim of investigating the relationship between critical thinking and guessing the meanings of familiar and unfamiliar medical terms through the word part analysis strategy. The California Critical Thinking Skills Test (CCTST) was utilized along with two multiple choice (MC) tests, consisting of familiar and unfamiliar terms respectively. The results of this study indicated a stronger relationship between the CCTST and the MC test of unfamiliar terms, supporting the researcher's hypothesis. Implications are then discussed concerning the teaching and testing of medical terminology based on unfamiliar terms.

1. Introduction

The critical thinking (CT) movement which has developed during the past few decades has, in fact, revived interest in this specific mode of thought which, according to White (2006), dates back 2500 years. This movement has evolved as a reaction against the failures of many educational programs to meet their objectives and *because of the observation that many college graduates do not possess higher-order thinking skills (for good reviews, see* Paul & Elder, 2002; Roselli, 2005; Schafersman, 1991). It seems therefore that, hitherto, the pedagogical systems in many countries have been more successful in knowledge transfer than in fostering CT. For instance, Schafersman (1991) has referred to the educational system in the United States as a context where science "is often poorly taught as a fact-based discipline rather than as a way of knowing or method of discovery" (p.4), while Lochhead (1979) argues that "We should be teaching students how to think; instead, we are primarily teaching them what to think" (p. 1).

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Acknowledging the importance of CT as a route to success, material developers, syllabus designers, teachers, and various educational systems in diverse contexts have tried to exploit the insights provided by this movement, including in ESP situations (e.g., Almabekova, 2010; Šliogerienė, 2005). Reading, as an important skill, is not excluded. Of all the skills a student needs, effective reading is especially crucial in any subject, including medicine, whether studied through the medium of L1 or L2. All subjects, including medicine, rely heavily on textbooks, lecturer handouts, and other written sources which students need to read and learn from in order to be able to write good assignments and pass exams. Consequently, CT can also be involved in reading (see Talebinejad & Matou, 2012). In fact, there is a relationship between reading comprehension and CT (Norris & Phillips, 1987).

While it is acknowledged that CT can be involved in many aspects of reading, particularly in the realm of higher-level strategies like connecting the content of what is read with related content met elsewhere (see Fahim & Ahmadi, 2012), evaluating the relevance of content and quality of its argumentation, exploiting content to make decisions, and so on, in this study the researcher wishes to show that the concept of CT applies also to processing and learning the language, exemplified by one highly specific language-related strategy, crucial for medical students—the word part analysis strategy (WPAS). It is the prime strategy which enables learners to break down words into their constituents to discover their meanings. Consequently, this study investigates the relationship between CT and utilizing the WPAS to handle the meanings of familiar and unfamiliar medical terms. It focuses on medical terminology using MC tests and exploring which MC test (containing familiar or unfamiliar terms) is more indicative of the involvement of CT abilities. It was predicted that those students who display more CT skills—as measured by the CCTST—are more capable of deducing the meaning of unfamiliar terms. Therefore, it was hypothesized that there is a stronger and more significant correlation between the CCTST and the MC test of unfamiliar terms than between the CCTST and MC test of familiar terms.

It is claimed that this research is significant on the following grounds:

While studies on the relationship between CT and different subareas of TEFL abound, it seems that ESP, and in particular English for students of medicine, is under-researched in this regard. And although there are a few studies conducted in the field of ESP and CT (e.g., Bahous, 2001; Šliogerienė, 2005), almost no empirical research has been reported on the relationship between learning medical terminology and CT.

Due to rapid advancements in medicine, newly coined medical terms come into being almost daily. As argued by Cohen (2008, p. 125), "The science of medicine never stands still, nor does its terminology. One can never say that his or her work in learning medical terminology is complete because vocabulary is constantly being added as new diagnoses, treatments, and technologies are discovered or developed. … Anyone who wants to keep current with medical terminology has a lifetime of learning ahead." Therefore, medical students will inevitably encounter unknown terms sooner or later.

2. Literature review

2.1. Vocabulary learning

The acquisition of vocabulary is sufficiently important for some scholars to consider it to be "at the heart of language teaching and learning" (Candlin, 1988, p. vii). Consequently, this area demands ample research and attention. One of the learning strategies used in this field is the WPAS (Nation, 2001). By means of this strategy learners break down words into their constituents (roots and affixes). It is based on the assumption that students can learn to transfer their knowledge of such parts to many other words containing the same parts.

For example, knowing that the suffix *-ectomy* means 'removal' enables students to deduce the meaning of *tonsillectomy*, *pancreatectomy*, and *pancreatoduodenectomy* as 'the removal of tonsils', 'the removal of pancreas', and 'the removal of pancreas and duodenum' respectively. Many scholars have pointed to the benefits of implementing this strategy (Bowers & Kirby, 2010; Breen, 1960; White, Power, & White, 1989).

This strategy is widely used in the field of teaching and learning medical terminology. This is no doubt in part due to the rule-governed nature of terminology in this area which makes mastering this field somewhat more manageable, since the terminology utilizes numerous Latin and Greek affixes and roots (see Cohen, 2008). The WPAS can therefore be used by students to discover the meaning of unknown terms.

Nevertheless, although the ultimate aim of medical terminology instruction is to enable students to cope with unfamiliar medical terms, this aim is not usually met. And although the WPAS is very beneficial, different learners do not utilize this strategy to the same extent because distinguishing word parts is not always easy. For example, while many learners might know the word parts *de-* (removal), *narco-* (stupor), *-ize* (make), and *-ation* (process), only some of them will be able to guess the meaning of the term *denarcotization* (i.e., the process of depriving of narcotics). It is therefore hypothesized that learners with a more developed command of critical thinking might be better at utilizing this strategy.

2.2. Critical thinking

According to White (2006), the origin of CT dates back nearly 2500 years to the great philosopher Socrates. As mentioned by Paul, Elder, and Bartell (1997), the Socratic method of questioning is one of the best-known strategies for teaching CT. "Socratic Questioning *means* using a series of questions to progressively engage higher levels of thinking — including literal, analytical and conceptual levels of thinking" (Jones & Hodson, 2006, p. 40). Nevertheless, although CT has been the focus of attention of many educators over the past few decades, scholars have not yet reached a consensus as to its definition.