Chapter 9
Influence of Multimedia and Cognitive Strategies in Deep and Surface Verbal Processing: A Verbal-Linguistic Intelligence Perspective

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ABSTRACT

The traditional view of linguistic-verbal intelligences focuses on individual linguistic abilities at the levels of phonology, syntax, and semantics. This chapter discusses the individual linguistic abilities from a text-comprehension perspective. The chapter examines the roles of multimedia and cognitive prompts in deep and surface verbal processing. Drawn from research in working memory, multimedia learning, and deep processing, a theoretical framework is proposed to promote learners' deep and surface learning in reading. Evidence from empirical studies are reviewed to support the underlying theoretical assumptions of the framework. The theoretical and practical significance of the theoretical framework is discussed with suggestions for future research.

INTRODUCTION

Learners learn differently due to their individual differences in terms of age, gender, cognitive abilities, intelligence, interest, and personality traits (Colby, Clayards, & Baum, 2018; Kubat, 2018; Zheng, Flygare, Dahl, & Hoffman, 2009). It is believed that individual intelligence can be significantly influenced by a range of factors related to learning and performance (Cifuentes & Hughey, 1998; Iyer, 2006). Previous research has demonstrated the relationship between intelligence and its associated factors like age, working memory capacity, spatial ability, and processing speed (Salthouse, 2012). It was found that changes in working memory capacity, processing speed, and spatial ability can significantly influence learners' performance in verbal information processing (Pazzaglia, Toso, & Cacciamani, 2008; Rast, 2011; Smith

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et al., 2019). Smith et al. (2019) pointed out that due to cognitive impairments caused by the ageing process, older people experience tremendous challenges when learning new skills like browsing the Internet and engaging in online social communication. In additional to age factor, studies have shown that multimedia play an important role in influencing individuals' cognitive abilities in performances like verbal learning (Pazzaglia et al., 2008; Shadiev, Hwang, Liu, 2018), analytical thinking (Zheng, 2007), and scientific reasoning (Mayer & Anderson, 1992). Given the unique cognitive features in multimedia, Reiser (1994) suggested that educators, trainers, and instructional designers need to take into perspective the relationship between multimedia and cognitive abilities when designing and developing instruction for learners. Despite a growing body of research on multimedia and learning, studies that focus on the relation of age, visual-spatial ability, and multimedia in verbal learning are rare and research in this area is undertheorized. The current chapter therefore seeks to examine the influence of multimedia on cognitive processing ability in verbal learning. By reading the chapter, the readers will be able to:

1. Understand the role of multimedia in verbal-linguistic processing,
2. Explain the age factor in the design of multimedia for verbal learning, and
3. Describe the relationship between working memory capacity and multimedia in verbal learning.

LITERATURE REVIEW

Multiple Dimensions of Intelligences

According to Howard Gardner (2011), intelligence refers to "the ability to solve problems, or to create products, that are valued within one or more cultural settings" (p. xxviii). Gardner argued that the construct of intelligence should be examined in a larger context rather than limited to psychometric testing. This includes understanding the cultural connotations involved in the intelligence-relevant performances. Gardner noted that there is no "pure" intelligence independent of the culture in which one happens to live. In fact, an individual's intelligence is partially defined by one's sensitivity to the varying contents around him/herself (Sternberg, 1985). For example, verbal-linguistic intelligence is associated with an individual's competence to appropriately use and apply a particular language which entails the cultural and social values within the boundary of one's culture. Similarly, there is no pure individual centered visual-spatial intelligence. As a matter of fact, this type of intelligence is always incarnated in culturally rich activities like solving a Taj Mahal jigsaw puzzle problem, making a Japanese paper crane origamis, or creating a 3D object relating to an Egyptian historical artifact. Gardner thus proposed that intelligence should be conceived as something that is contextualized within social and cultural settings and that it should be considered as a process known as socially shared cognition. As Gardner rightly pointed out, intelligence does not stop at one's skin; rather, it goes beyond our biological brain to meaningfully interact with the environment around us such as tools (paper, pencil, and computer) and our network of associates (friends, colleagues, and collaborators). As a matter of fact, the cultural view of intelligence is well aligned with the framework of general world knowledge in language learning in which the learner's ability to encode and decode the verbal information is largely dependent on his/her knowledge about the subject, the context and background information culturally and socially. In other words, an individual's intelligence is related to his/her schema that relates to both subject domain and world knowledge (Cook & Gueraud, 2005; Williams, Cook, & O'Brien, 2018).

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