

SHALLOW AND DEEP PROCESSING – AN INTEGRATED COGNITIVE ARCHITECTURE FOR FOREIGN LANGUAGE LEARNING

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ABSTRACT

This article aims to present an architecture for the integration of shallow and deep processing techniques in the context of foreign language learning. Since the concept of “levels of processing” has been originally proposed by Craik and Lockhart in 1972, specialized literature has been constantly tried to replicate this cognitive-based architecture in order to find its applications to different domains. In an endeavor to fill the existing gap in the literature that attempts to “marry” language learning and psycholinguistics, this study offers an added cognitive neuroscience perspective to the understanding of shallow and deep processing encoding mechanisms that facilitate effective language learning. Starting from a brief theoretical report of the role of cognitive processes activated for the acquisition and learning of a foreign language, this study will propose some integrated pedagogical suggestions for promoting learners’ effective processing of L2 data in the classroom.

Keywords: classroom activities, foreign language learning, levels of processing, psycholinguistics

1. Introduction

When it comes to learning, the human mind is often described through a comparison with the computer. This analogy depicts brains as being robotic in their capacity of absorbing information, in that when data enters the brain it is automatically stored in a mental hard drive. However, in order for learning to happen the brain needs to process information. New skills and abilities cannot be acquired without engaging the use of knowledge in the process.

The concept of levels of processing was first introduced by Craik and Lockhart in 1972. The basic tenet of their theory is that the human mind has the capacity to process information on several different levels. A discussion of the framework of information processing informs an approach that stems from the premise that different levels of processing directly relate to the levels of memory. Therefore, the distinction between shallow processing and deep processing impacts on the difference between the ways in which learning occurs.

The need to create an architecture that successfully integrates different levels of information processing in language learning stems from findings that, according to recent investigations in Western Europe and the United States of America, the level of critical thinking skills among students in higher education is low (Guest, 2000; Van Gelder, 2005). Tests that measure the ability to apply critical evaluation, substantiate opinions, argue facts validity, and make inferences, are often failed by students and discarded by faculty in favour of memorization-based exams where students are more likely to perform at the desired level. This is a certain indication of the fact that instruction in higher education has mostly focused on shallow processing mechanisms almost exclusively, in the detriment of encouraging the use of critical thinking-oriented techniques and strategies. For learning to become long lasting and enduring, a shift of paradigm is required at all levels of instruction, especially in higher education.

2. Theoretical Framework

According to the definition given by the *American Psychological Association Dictionary of Psychology*, shallow processing represents “*the cognitive processing of a stimulus that focuses on its superficial, perceptual characteristics rather than its meaning*”. Deep processing, on the other hand, refers to a more complex mental process through which information is recalled after a thorough analysis of the language used. Implicitly, deep processing requires a semantic breakdown of the way in which words come together in order to create meaning. Processing at this semantic level usually involves a higher degree of elaboration and produces stronger, longer-lasting memories than shallow processing.

When discussing levels of processing, Craik (1973) defines depth as “*the meaningfulness extracted from the stimulus*” (p. 48). In the same line, Leow (2015)

defines deep processing as “*the relative amount of cognitive effort, level of analysis, elaboration of intake together with the usage of prior knowledge, hypothesis testing and rule formation employed in encoding and decoding grammatical or lexical items in the input*” (p. 204). As a result, deeper processing mechanisms generate more effective encoding and easier retrieval of information (Goldstein, 2011, pp. 174-175). In the context of language learning, understanding how different levels of processing function is pivotal to understanding how learning occurs. While shallow processing involves structural (discourse organization) and phonemic (sound-related) analysis resulting in short term retention of information, deep processing implicates semantic (meaning-oriented) explorations, which facilitate associations with previous knowledge, generating better access to memory for later retrieval (McLeod, 2007).

In an attempt to account for how students process language learning, several theoretical underpinnings (DeKeyser, 2007; Swain, 2005; VanPatten, 2007) generally result in the idea that learning is “*a process in which many changes take place in L2 learners’ cognition as they try to create new representations for the L2 grammar, internalize such data, restructure if necessary, all the while developing their ability to comprehend and produce the L2, either orally or written in real time*” (Leow, 2015, p. 1). Based on Leow’s postulation, we can argue that effective learning of a foreign language must involve a cognitive architecture underlined by both shallow and deep mechanisms aimed at understanding and using the target language efficiently.

3. Levels of Processing – Shallow vs. Deep

Information processing theories distinguish three ways in which information can be processed: structural, phonemic, and semantic. Following a further categorization

of processes into shallow and deep, the subsequent delineations result:

➤ *Shallow processing*, which includes encoding the physical qualities of what is learned (structural processing, e.g. the general appearance of the letters/word) alongside its auditory elements (phonemic processing, e.g. the sounds);

➤ *Deep processing*, which takes place when the meaning is encoded and related to similar previously known meanings, thus attaching sense to content (semantic processing).

This distinction also informs the difference between short-term memorization and long-term retention of information. While shallow processing involves maintenance rehearsal (memorization by repetition), deep processing entails elaboration rehearsal, including interaction with the information through meaningful analyses (associations, visualizations, critical thinking processes) of the information that is more likely to be better recalled at a later time. Consequently, the way in which information is encoded directly impacts on how well it is remembered. The deeper the level of processing, the easier the recall effort.

In most cases, information processing occurs unconsciously. Learners are usually exposed to new concepts, notions, and ideas which their brains automatically absorb and assimilate. Shallow learning may involve surface-level comprehension, mechanic memorizations, and reinforcement of knowledge through repetition. Contrastively, deep processing offers learners the opportunity to engage with the information and circulate it through prior experience and knowledge, generating an authentic and contextualized language practice. An architecture of language learning mechanisms that espouses both levels of processing should successfully integrate diverse cognitive efforts, from remembering to creating. Against this background, the educators' main concern would be to ensure

that foreign language instruction contains a healthy proportion of shallow learning opportunities and deep processing tasks that will assist learners in transitioning from breadth to depth. Deep learning may involve connections to prior knowledge, authentic examples, peer-to-peer approaches, simulations, case studies, etc.

4. Implementing Deep Processing in Foreign Language Learning

It is incontestable that shallow processing must be complemented by deep processing in order for learning to effectively occur. In the words of Debora S. Herold (2018), a professor of cognitive psychology at Indiana University – Purdue University Indianapolis, “*simply reading over a paragraph of text or listening to a lecture does not guarantee encoding it into memory. What one thinks about while listening or reading is what matters*” (para. 5). Consequently, in practice, classroom instruction should be based on a series of pedagogical principles that promote the use of deep processing strategies, aimed to supplement the shallow learning that automatically occurs when students are exposed to new information.

✓ *Create personal connections with the new information.* This helps learners to retain and recall information that may be rooted in their own experience. Forming a connection between personal experience and new concepts in the form of mental schemas allows students to process new information on a deeper level. More practically, new material can be introduced by using real world examples, case studies, or personal stories that help create an authentic context where knowledge and practice can be successfully linked.

✓ *Elaborate on the new concepts.* Elaborative encoding is a level of deep processing. By asking themselves how concepts relate to each other and by building meaningful connections between new notions and prior information, learners

are able to increase their knowledge retention by exploring new topics more in-depth. In modern approaches to language learning, the emergence of “project-based tasks” is an illustration of the importance of allowing students to further investigate the information presented in the classroom. This exploration directly links to the concept of experiential learning, which removes students from a structured environment and allows them to delve into potential new applications of the information. An effective outcome of such a strategy may include creative writing assignments, projects, and presentations in which students are encouraged to freely elaborate on the possible ramifications of a topic.

✓ *Distinguish between concepts.*

A certain level of distinctiveness is required in order to smoothen the transition between shallow and deep processing. Such a strategy helps create comparisons and identify differences and similarities between new concepts or with older notions and ideas, thus making information more meaningful and connected. Comparing and contrasting information helps the human brain categorize new concepts and effectively store them in a location from where it is easier to retrieve and apply them at a later date.

✓ *Apply new concepts.* Learning new material is one thing, but interacting with it and applying new knowledge significantly enhance knowledge retention. Hypothetical scenarios and simulations allow learners to contextualize new information and explore its applications on a more meaningful level. Such strategies make use of shallow processing, during the stage of knowledge assimilation and also go deeper into cognitive mechanisms by activating deep processing techniques (associations, analyses, applications). By actually using the new information, students not only see the value behind it, but are also empowered to transfer textbook concepts into real-life situations, thus

realizing meaningful connections between theory and practice, which is one of the main objectives of deep processing.

Understanding the various aspects that typify deep processing as a cognitive mechanism is instrumental in promoting a critical thinking approach to learning, especially in the context of foreign language instruction. A plethora of deep processing techniques based on solid comprehension of meaning and on establishing its connection with content can be successfully used to encourage the acquisition and practice of high order skills (brainstorming, problem-solving, reflexive writing, cooperative learning, discussions, debates).

5. Conclusions

Research in educational psychology has recently focused on the investigation of reflective thinking practice as a prerequisite of academic performance. Starting from Mezirow’s (1991, 1998) theories, Leung and Kember (2003) categorized reflective thinking practice into four distinct stages: habitual action, understanding, reflection, and critical thinking. If we define habitual action as a mechanical automatic activity, performed with little conscious involvement, then we can argue that the importance of shallow processing should not be overlooked. Surface processing is activated when the main emphasis is studying with the intention of reproducing information; deep processing constitutes a further attempt to understand, reflect on, and critically interpret information.

In a seminal study on the reciprocity between critical thinking and deep processing strategies, Phan (2009) applies a longitudinal approach to link the two concepts in the framework of the conceptual model he proposes. He concludes that deep learning is paramount in helping students to critically reflect on their studying and urges educators to create a classroom environment that nurtures deep processing approaches. We agree with his conclusions and argue that,

in the learning of foreign languages, critical thinking and respectively reflective thinking cannot occur without a certain form of

scaffolding that guides learners through cognitive processes from the simplest to the most complex.

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