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Solving working memory challenges in L2 english writing for spanish speakers through deep-level processing strategies

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ABSTRACT

This research paper explores the complex interplay between working memory (WM) and writing proficiency in English as a foreign language, particularly for L2 Spanish speakers of English. It posits that these individuals encounter cognitive challenges in WM due to the inherent complexity of foreign language (L2) writing. The paper advocates for the adoption of a deep-learning approach during the early stages of English acquisition to deal with these challenges effectively. Emphasizing the importance of optimally acquiring foundational skills, such as listening, speaking, and reading, it recommends that L2 writers conscientiously cultivate these skills to enhance their writing abilities. This proactive engagement with foundational skills, together with hand note-taking strategies, is proposed as a strategic means for L2 writers to overcome the cognitive demands associated with English writing proficiency.

INTRODUCTION

Working Memory (WM) and its relationship to second and foreign language (L2) writing has gained a substantial recognition in contemporary research literature. It is increasingly evident that L2 writing imposes a considerable cognitive load on individuals when compared to their proficiency in their native language (L1). According to Li (2023), this cognitive load arises from the incomplete and unautomatized linguistic system of L2 writers, together with their limited knowledge of genre and discourse. Put another way, much of the stress that L2 writers face comes from severe pressure and the simultaneous application of too many demands on WM. For educators in the domain of English as a Foreign Language (EFL), alleviating this cognitive burden presents a difficult challenge. This paper argues that an early implementation of a deep-level processing approach in English language acquisition can effectively address issues related to working memory load, particularly for Spanish speakers learning to write in L2 English.

DEVELOPMENT

Working Memory

While numerous definitions of working memory (WM) exist, this paper adopts the definition proposed by Baddely. According to Baddely (2000), WM encompasses the "combination of storage and manipulation of information for such complex cognitive tasks as comprehension, learning, and reasoning" (p. 418). This particular definition holds relevance in the context of enhancing second language (L2) writing skills, as it suggests a dual-pronged approach to the process of learning to write proficiently. Firstly, it involves the encoding of L2 verbal and written information, and secondly, the retrieval and active utilization of this information. Subsequently, as discussed later in this paper, some of the challenges faced by L2 writers may stem from ineffective encoding and suboptimal retrieval of information during the writing process – both aspects of WM as implied by Baddely.

Several researchers, including Hayes and Chenoweth, have offered alternative conceptualizations of working memory (WM), viewing it as the limitations experienced in performing a variety of memory-dependent tasks (Hayes & Chenoweth 2006). An essential facet of this conceptualization, particularly pertinent to the context of second language (L2) writing, is its emphasis on limitations. These limitations become more pronounced in L2 writing as writers often grapple with developing linguistic competencies required for the cognitively-demanding and recursive process of writing, which requires a certain level of fluency. Nevertheless, as stated by Kellog (1996) and McCutchen (1996), the need for vocabulary searches and morphosyntactic considerations can shift the writer's focus toward local, language-specific issues, as opposed to global, genre-related issues. This redirection of attention hinders the writer`s ability to write fluently.

The L2 writer encounters interruptions in writing fluency arising from their personal challenge to retrieve elements related to the form, meaning, and use of the English language. This interference is notably less pronounced when composing in one's native language (L1). Thus, the cognitive emphasis on linguistic facets imposes a strain on one's attentional resources, thereby impinging upon the organic evolution of ideas and the seamless flow of thought. The impact of such linguistic demands further underscores the divergence in writing experiences between L2 and L1 contexts.

Two Distinct Types of Cognitive Load

Cognitive Load Theory (CLT), as proposed by Sweller (2011), offers valuable insights into understanding the challenges encountered by L2 English writers during the execution of writing tasks. According to this theory, knowledge can be of two types, biologically primary knowledge and biologically secondary knowledge. The former is acquired unconsciously and rapidly, with minimal effort (e.g., facial recognition, native language comprehension). The latter, however, necessitates deliberate, effortful, and explicit instruction for effective learning. Thus, the act of writing in a foreign language may fall under the category of biologically secondary knowledge. In this regard, foreign language writing is inherently difficult. In the context of CLT, a significant bottleneck emerges when individuals engage in tasks grounded in biologically secondary knowledge, such as L2 writing, as these tasks deplete Working Memory (WM) Capacity.

According to Sweller, the depletion of Working Memory (WM) capacity can be attributed to two distinct categories of cognitive load: intrinsic and extraneous. Intrinsic load is inherently linked to the task at hand, directly influencing the process of task performance and learning. On the other hand, extraneous load pertains to the allocation of memory resources to deal with elements that are not integral to the learning process itself. These extraneous factors may include aspects such as the presentation of the task, characteristics of the learner, or environmental conditions.

In the specific context of L2 writing, as previously mentioned, writers encounter the necessity of managing both intrinsic and extraneous loads within their WM. This dual cognitive load challenge may not be as prominent when writing in one's native language or when the writer has already automated the linguistic skills required for L2 writing. The issue of Working Memory (WM) Capacity depletion is dual-faceted, so it becomes imperative for the L2 writer to engage in learning strategies aimed at effectively addressing these challenges as they arise.

Deep-Level Processing

An effective strategy to mitigate the issue of Working Memory overload during writing tasks involves adopting a deep-level processing approach to learning. This approach is particularly pertinent because, when engaged in the act of writing, the L2 writer must draw

upon information previously acquired. In order for this retrieval process to occur smoothly, the writer must employ cognitive strategies aimed at comprehending and retaining the study material for future application. This perspective aligns with the insights offered by Marton and Säljö, in their seminal work in 1976. Their research revealed that learners who carefully endeavored to grasp the underlying meaning of a text and the author's construction of the entire account experienced a more robust and enduring form of learning in comparison to those learners who adopted a superficial or strategic study approach.

Put simply, to address the lacunae concerning genre and discoursal expertise, as well as the broader domain of knowledge acquisition, the L2 writer is compelled to apply a profound and diligent approach to study and learning. It is only through such an in-depth engagement that the L2 writer can effectively navigate the complexities of conveying a message in a linguistic style distinct from the style she is sort of accustomed to in her native language. Once this comprehensive aspect is mastered, the L2 writer will be better positioned to allocate more cognitive resources within their working memory to the pursuit of acquiring and displaying linguistic skills resembling those of native speakers.

Said another way, as the manifestation of written expression skill is inherently complex, the L2 writer must employ an optimal approach to knowledge acquisition. According to Hayes and Flower (1980), Swanson and Berninger, (1996) and Cornoldi et al., (2010), proficient writing encompasses three critical components: a) meticulous planning (including goal definition, idea generation, organization of concepts, thematic coherence, and logical conclusions); b) precise transcription (the transformation of mental text representations into written symbols, drawing on phonological and orthographic knowledge); and c) rigorous revision (the diligent scrutiny of errors and inconsistencies, coupled with adjustments to enhance the textual quality) (as cited by De Vita et.al, 2021) . Thus, embracing a deep approach to learning proves instrumental in ensuring the effective execution of these high-order cognitive processes, all the while alleviating undue strain on working memory resources.

A deep approach to learning extends beyond the inclination to acquire more knowledge; it encompasses a commitment to delving into the subject matter in a thorough and comprehensive manner. Fundamental to comprehending a text is the mastery of phonological, articulatory, and word retention skills. The combination of these cognitive competencies contributes to the enhancement of working memory, a faculty instrumental in facilitating the writing process. It is noteworthy that writing, being the culminating phase of a deep approach to learning, underscores the interdependence of these cognitive skills. Consequently, if a learner does not adopt a deep approach to learning, it might not be attributable solely to a lack of desire; rather, it could stem from an incapacity, whether acknowledged or not, to engage in the requisite cognitive processes.

Longhand notetaking

In the context of preserving information for subsequent active utilization, the practice of longhand notetaking surpasses that of laptop notetaking. Research by Mueller and Oppenheimer (2014) reveals that students who employ the longhand method demonstrate superior performance compared to their counterparts who rely on laptops when recalling factual information. This disparity is attributed to the cognitive processes inherent in longhand notetaking, including the active engagement in selecting, synthesizing, and summarizing content, all of which contribute to the enhancement of knowledge retention. Consequently, within the realm of L2 writing and the optimization of Working Memory Capacity, it is advisable for the L2 writer to embrace learning strategies proven to be efficacious in fostering long-term knowledge application.

So far, the argument advanced is that, in pursuit of optimizing Working Memory Capacity and harnessing cognitive capabilities essential for handling difficult cognitive tasks, such as writing, the L2 writer must adopt a learning approach that requires undivided attention, a critical interaction with study materials and the literal use of the hands in doing so. In instances where the cognitive strain experienced by the L2 writer primarily stems from the content they are addressing, rather than the linguistic aspect per se, their recourse is to wholeheartedly commit their cognitive faculties to the acquisition of such knowledge, while simultaneously employing strategic methodologies.

Phonological Memory and EFL Writing Performance

The so-called production effect plays an important role here. That is, active and precise rehearsal of materials intended for subsequent use in writing tasks confers a distinct advantage in EFL contexts. In this regard, much research has shown that individuals exhibit a higher likelihood of retaining information for future recollection when they engage in the practice of vocalizing a reading passage, as opposed to merely reading the material silently (Conway & Gathercole, 1987; Dodson & Schacter, 2001; Gathercole & Conway, 1988; Hopkins & Edwards, 1972; MacDonald & MacLeod, 1998; MacLeod et al. 2010 as cited by Macleod, 2011). Specifically for the second language (L2) writer, the level of proficiency and fluency in composing a paper is, to a certain degree, contingent upon the speed and precision with which information can be retrieved. Thus, addressing the bottleneck problem can be approached by enhancing the learning methodology employed by the L2 writer during the initial phases of acquisition.

Said differently, the responsibility falls upon the non-native speaker to meticulously replicate the target language rehearsal to closely mirror the original presentation delivered by the native speaker. The overarching objective is to minimize the retention of inaccurate pronunciations in long-term memory, thus mitigating the risk of fossilization. Once more, this

underscores the significance of precise listening skills and the subsequent process of relearning, particularly in the area of articulation.

The notion that the quality of the input determines the quality of the output becomes paramount. This view stands in parallel with Gobet and Wood's (1999) expertise model of learning. Their Elementary Perceiver and Memorizer (EPAM) model implies that encountering a learning sequence incongruent with the domain can result in the formation of a poorly organized and ineffective discrimination network. This, in turn, leads to suboptimal knowledge indexing, increasing the likelihood of failure to retrieve the relevant knowledge when the demands of the domain require it (Gobet & Wood, 1999).

Error fossilization avoidance

In order for the writer to depend on her capacity to engage with intricate subject matter and to recollect information effectively, it is imperative to devote thorough consideration to foundational skills, including listening and pronunciation, during the initial phases of language acquisition. The second language (L2) writer, akin to the L2 speaker, must prioritize the avoidance of establishing pronunciation errors in English to prevent fossilization. Her own pronunciation, whether accurate or otherwise, becomes ingrained in long-term memory. Therefore, if the repetition of words contributes to subsequent recall, as mentioned earlier, the quality of such repetition becomes extremely relevant. In this regard, the longstanding axiom advocating the rectification of mistakes as they arise is evidently more sound than deferring correction to a stage where it may prove unduly late.

This argument, eloquently posited by Gobet and Wood (1999, p. 202), contends that inappropriate learning may result in crucial connections between nodes being overlooked, thereby missing efficient solutions to the presented problem (Which in this case is solving a writing task). They further posit that subsequent learning is unlikely to completely eliminate the impact of suboptimal knowledge, as nodes are not lost, and nodes encoding such 'poor' knowledge may be distributed throughout the entire EPAM net. Additionally, they assert that erroneous information may become embedded in the net, potentially leading to the propagation of errors during performance. All of these insights align with our perspective on language learning, which underscores the meticulous acquisition of foundational language skills.

CONCLUSION

In conclusion, working memory emerges as a consolidation of salient ideas within our cognitive framework, a phenomenon particularly visible in the context of L2 writing tasks. The inherent challenges faced by L2 writers become notably pronounced when navigating the intricacies of English composition compared to their proficiency in L1. This heightened difficulty

stems from the L2 writer's concentration on aspects of language that remain unautomatized, diverting attention away from broader considerations such as genre and global aspects of writing. Addressing this challenge entails the adoption of a deep learning approach, involving strategies like manual note-taking and vocalized engagement with materials to facilitate more efficient recall. Through the application of such cognitive methodologies, L2 writers can navigate the complexities of language acquisition, ultimately contributing to enhanced proficiency in English composition. Thus, the degree of success of a classroom language methodology will be mediated by our understanding of how working memory and memory, in general, works.

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