

















In general, WMC is helpful in many ways for grammatical problem solving. WMC-related differences may result from differences in encoding or retrieval of grammar-related knowledge in LTM, in the ability to deal with interference from competing information, and in the ability to limit distraction from irrelevant problem features.

## 9. Future work

As it is usually the case, the results of this study warrant replication in other contexts with different samples, languages, experimental conditions. Here, the researchers demonstrated that implicit grammar instruction can expand FL learners' WMC. However, it is important to emphasize that this result must be interpreted cautiously because the required data were compiled from only two intact classes over a short period of time (16 sessions). Similar studies carried out over a longer period of time are necessary to confirm the results of this research.

Future research should also address the questions of whether we know about all the components of working memory, or how the views of the functions of working memory might change in the future. Varying the ways in which grammar is taught and feedback is given are also important to determining whether the findings of this study apply across different learning conditions.

One additional question for further research concerns the degree to which the observed interaction between WMC and method of grammar instruction is generalizable to other skills such as reading, speaking, listening, vocabulary, and pronunciation.

In the present study, three tests (Forward Digit Span, Paired Associates, and OPI) were used to measure the participants' WMC. Other studies can be carried out using other measures of WMC.

## 10. References

- [1] A. Juffs and M. Harrington, "Aspects of Working Memory in L2 Learning", *Language Teaching*, vol. 44 (2), Cambridge University Press, 2011, pp. 137-166.
- [2] B.T. Tulbure and I. Siberescu, "Cognitive Training Enhances Working Memory Capacity in Healthy Adults: A Pilot Study", *Social and Behavioral Sciences*, vol. 78, Romania, 2014, pp.175 – 179.
- [3] Carroll, D.W., *Psychology of Language*, Thomson Wadworth, Canada, Toronto, 2008.
- [4] Randall, M., *Memory, Psychology, and Second Language Learning*, John Benjamin's Publishing Company, Amsterdam/Philadelphia, 2007.
- [5] J.A. Englund et.al. "Development and Evaluation of an Online, Multicomponent Working Memory Battery", *Assessment*, vol. 44, Sage Publications, 2014, pp.137-166.
- [6] Z. Weng, "Theorizing and Measuring Working Memory in First and Second Language Research", *Language Teaching Research*, vol. 47, Cambridge University Press, 2014, pp. 174–190.
- [7] Atkinson, D., *Alternative Approaches to Second Language Acquisition*, Routledge, London and New York, 2011.
- [8] K. B. Nielson, "Can planning time compensate for individual differences in working memory capacity", *Language Teaching Journal*, vol. 18(3), 2014, 272-293.
- [9] Nassaji, H. and S. Fotos, *Teaching Grammar in Second Language Learning*, Routledge, New York and London, 2011.
- [10] J. M. Norris and L. Ortega, "Effectiveness of L2 Instruction: A Research Synthesis and Quantitative Meta-analysis", *Language Learning*, 2000, pp. 417–528.
- [11] A. D. Baddeley and G. J. Hitch, "Working Memory", *The Psychology of Learning and Motivation*, vol. 8, G.H. Bower (ed.), Academic Press, London, 1974.
- [12] O'Brien et.al. "Phonological Memory and Lexical, Narrative, and Grammatical Skills in Second Language Oral Production by Adult Learners", *Applied Psycholinguistics*, vol.27, United States of America, 2006, pp. 377-402.
- [13] K. I. Martin and N. Ellis, "The Roles of Phonological Short Term Memory and Working Memory in L2 Grammar and Vocabulary Learning", *Studies in Second Language Acquisition*, vol.34 (3), 2012, pp. 379-413.
- [14] G. Ercetin and C. Alptekin, "The Explicit/Implicit Knowledge Distinction and Working Memory: Implications for Second-Language Reading Comprehension", *Applied Psycholinguistics*, vol. 34, 2013, 727–753.
- [15] C. A. Sanchez et. al., "Assessing WMC in Non-Native Language Setting", *Learning and Individual Differences Journal*, vol. 20, Elsevier Inc., 2010, pp. 488–493.
- [16] H. S. C. Thompson, "Establishing the Reliability and Validity of a Computerized Assessment of Children's Working Memory for Use in Group Settings", *Journal of Psychoeducational Assessment*, vol. 32(1), Sage Publications, 2014, pp. 15–26.
- [17] Long. M. and C. Doughty, *The Handbook of Language Teaching*, John Wiley & Sons, Ltd. Publications, United Kingdom, 2009.
- [18] R. Ellis, "Current Issues in Teaching Grammar: An SLA Perspective", *TESOL Quarterly*, 40(1), 2006, 83-107.

- [19] R. Ellis, "Implicit and Explicit Knowledge in Second Language Learning, Testing and Teaching", *Multilingual Matters*, Bristol, Buffalo, Toronto, 2009.
- [20] M. Caprario, "Guided Discovery Grammar Instruction: A Review of the Literature with Original Teaching Materials", *MA TESOL Collection*, 2013.
- [21] N. Spada, "Beyond Form-Focused Instruction: Reflections on Past, Present and Future Research", *Language Teaching*, Cambridge University Press, vol. 44(2), 2011, pp. 225–236.