EFFECT OF BIONIC READING MANIPULATIONS ON LEARNING OUTCOMES

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Abstract - This study aimed to examine the effects of different versions of the Bionic Reading application, which claims to facilitate rapid reading and maintain high levels of comprehension through various text-based manipulations, on learning outcomes. Accordingly, the study experimentally investigated whether different Bionic Reading manipulations result in differences in students' learning performance. To enable real-time data collection under experimental conditions, a specialized software system capable of implementing the relevant text manipulations was developed. A factorial experimental design was employed, and prior knowledge, topic interest, and working memory capacity were included as covariates to control for potential effects arising from individual differences. A 4 × 2 factorial design, consisting of four Bionic Reading manipulation conditions and two measurement occasions (pretest and posttest), was used to examine learning outcomes. The participants were 163 undergraduate students enrolled at the Faculty of Education at Pamukkale University during the 2025–2026 academic year. Multivariate analysis of covariance (MANCOVA) was conducted to analyze learning outcomes. The findings indicated that, after controlling for prior knowledge, topic interest, and working memory capacity, the experimental conditions did not have a statistically significant multivariate effect on learning outcomes. In other words, different Bionic Reading manipulations did not result in significant differences in students' learning performance. This finding suggests that the visual modifications introduced by Bionic Reading in text presentation did not significantly enhance learning performance, at least under the experimental conditions examined in this study. Overall, this study contributes to the literature by experimentally evaluating the effects of Bionic Reading manipulations on learning outcomes and by enabling a more precise examination of this relationship while controlling for individual differences. The findings provide empirical evidence regarding the effects of visually modified text presentation on learning in educational settings and contribute to a better understanding of the limitations of Bionic Reading's potential to support learning.

Keywords - Bionic Reading, experimental research, text-based manipulations, learning outcomes

This study was supported by Scientific and Technological Research Council of Turkey (TUBITAK) under the Grant Number 124K157. The authors thank to TUBITAK for their supports.