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Can AI Boost the 3Rs? Exploring the Influence of AI-Based Learning Applications on Students' Information Processing Skills

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Artificial intelligence (AI) is rapidly revolutionizing the higher education sector and transforming how students learn, understand, and interact with information via AI-based learning tools. As there are no previous studies comparing AI-based and traditional learning within the 3Rs framework, a research gap is evident. Therefore, the current exploratory study investigates the effects of AI-based learning applications on students' information processing skills and draws special attention to the 3Rs: review, retention, and retrieval. Six hundred fifty (650) undergraduates were purposefully divided into two groups. All students were provided an information-search assignment, for which they had to collect, analyze, and use information on course-specific topics covered during the first three months of the semester. One group was instructed to use AI-based learning tools, while the other group was not. One week was given to each group to complete the task. Immediately after completion, 121 students in each group (242 total) were randomly selected using the Morgan table. The selected two groups responded to a self-reported questionnaire, which measured their information review skills, ability to store information in long-term memory, and capacity to retrieve relevant knowledge. A comparison of retrieval fluency, retention, and review skills was conducted through quantitative analysis. Statistical differences between observational groups were found. Students who practiced AI-based learning had greater retrieval fluency, while those who followed regular studies had much stronger information review and long-term retention. These results indicate that although AI-based tools can assist in quick access to information, traditional learning methods are proven to be better for deep cognitive processing and long-term memory encoding. The study highlights the necessity of a blended and pedagogically oriented combination between AI-based and traditional learning technologies in higher education.

Keywords: Artificial intelligence in education, Information processing skills, Review, Retention, and Retrieval (3Rs)