

# **PERSONALIZED AND ADAPTIVE LEARNING TECHNOLOGY FOR EARLY GRADE READING: EVIDENCE FROM MENA**

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Children worldwide encounter challenges in reading and comprehension, necessitating innovative approaches to enhance learning outcomes. This longitudinal study investigates the effectiveness of Personalized and Adaptive Learning (PAL) technology in improving early reading skills through a randomized controlled trial involving 1,419 grade 1-3 students from 19 state-run and low-cost private schools in Jordan, Egypt and Saudi Arabia. Using a three-level Hierarchical Linear Modelling analysis, the study addresses gaps in the literature regarding the overall effectiveness of PAL and its various adaptation approaches. It also examines the interplay between PAL, contextual factors and growth in reading achievement, offering valuable insights into the impact of PAL as a supplement to classroom instruction.

The findings demonstrate a positive effect of this technology on early Arabic reading achievement, with an effect size of 0.22. Contrary to expectations, the study reveals that a determined approach to adaptation is more effective than macro adaptation with limited algorithms, challenging the common assumption that increased adaptation leads to improved learning outcomes. Furthermore, the results indicate that each additional minute spent on PAL per week was associated with an average gain of approximately half a point in Reading Achievement, indicating a substantial effect ( $ES = 0.41$ ). The study also identifies significant

factors that contribute to reading achievement disparities, including variations among the studied countries, gender and socioeconomic status.

These findings carry significant implications for educators, policymakers and researchers, emphasizing the potential for widespread adoption of PAL in early reading instruction. The study underscores the importance of targeted interventions and appropriate allocation of resources to support students from disadvantaged backgrounds, as well as to address the gender gap in reading achievement. Furthermore, the findings emphasize the significance of adopting strategies that are both efficient and effective, ensuring that educational interventions reach a wide range of students and lead to tangible improvements in reading outcomes. By providing evidence-based insights, this study lays a solid foundation for informed decision-making. Its outcomes have practical value for educators, policymakers and researchers seeking to enhance reading instruction in the MENA region and beyond.