

# **An analysis of adaptive learning recommendation based on reinforcement learning**

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Adaptive learning can provide a personalized learning trace for each learner. In adaptive learning, recommendation strategy plays an essential role due to its direct influence on learning effects and learners satisfaction. As the reinforcement learning (RL) algorithm can use historical data to make self-improvement and online updating, many researchers see value in implementing recommendation strategies based on RL. However, little message has been left for the practitioners to apply RL-based recommendation strategies under different test scenarios. It is still unclear how the performance of RL-based recommendation strategies vary with different learning times, item parameters of measurement model, test lengths, and sample sizes for the RL algorithm. To address this gap, a Monte Carlo simulation was conducted to investigate the behavior of the recommendation strategy based on Q-learning. Results showed that: first, the recommendation strategy based on Q-learning could gain better rewards than the random strategy across all conditions; second, as the learning time increased, learning rewards grew up sharply in the beginning and then flatted out; third, longer test length or item parameters with lower guessing and slip parameter produced better rewards, but the improvement goes down when the rewards are in a high level. Furthermore, the impact of the sample size was insignificant probably because it had achieved a fulfilled size. Above all, for the practical application of RL in the recommendation of adaptive learning materials, it is suggested that we should give more emphasis on the measurement model to achieve better recommendation in adaptive learning.