

Research Study: Targeted Practice

Cognitive Load Theory (a research-based model of how memory works) demonstrates that the Quantum Tutors Targeted Practice feature is proven to increase student learning efficiency with less study time.

California Polytechnic State University (Cal Poly), San Luis Obispo, California

“Evidence from the study showed that students are better able to transfer knowledge acquired from targeted practice to new problems not previously encountered.”

— **Erik Slayter**
Accounting Instructor
Cal Poly State University

“The experiment revealed that targeted practice, which applies principles from Cognitive Load Theory, increases learning efficiency, enabling students to reach the same level of performance with less study time than by working conventional textbook problems.”

— **Benny G. Johnson, Ph.D.**
President and CEO
Quantum Simulations, Inc.

Research Objective

- For the topic of Transaction Analysis, evaluate the learning impact of practicing problems of the same transaction type (targeted practice) as compared to practicing problems with varying transaction types (conventional textbook problems).

Methodology

- The field study was conducted with 88 undergraduate students taking an Introductory Financial Accounting course at Cal Poly State University.
- Students were randomly assigned to one of two practice conditions: the Textbook group which used conventional textbook-format problems (N = 44) and the Targeted Practice Group in which transactions were grouped by type (N = 44).
- The Textbook Group was given three problems of six transactions each, with each problem containing one transaction from six different types.
- The Targeted Practice Group was given the exact same set of eighteen transactions, except problems were grouped by the six types so that all three transactions of each type (investment of cash for stock, purchase of equipment, etc.) occurred back-to-back.
- Both groups of students were required to determine the effect on the accounting equation and construct the journal entry using artificial intelligence tutoring software (Quantum Tutors), which gave students step-by-step feedback on their answers and allowed them to correct their mistakes, ask questions and keep a detailed record of all work for later analysis.

- All students were given the same post-test consisting of a single conventional textbook-format problem with ten transactions. Some post-test transactions were of the types practiced, while other transactions were unlike those in the practice set.

Key Findings

- During the practice phase, students in the Targeted Practice Group completed transactions in less time and with greater accuracy than students in the Textbook Group (15.5% faster with 26.5% more correct answers achieved per unit of study time).
- On the post-test, the Targeted Practice Group average score was 3.2% higher than the Textbook Group; this difference was not statistically significant.
- On transactions involving knowledge transfer, the Targeted Practice Group score was 9.1% higher which is statistically significant, indicating that those students were better able to apply the knowledge gained during practice to a variety of new situations.

Conclusions

- Cognitive Load Theory indicates that giving students textbook problems with varying transaction types too early could have a depressing effect on learning by potentially obscuring connections between relevant accounting concepts and the analysis of different transaction types.
- An approach that is better aligned with the latest model of how memory works would be to give students practice with one transaction type at a time *before* proceeding to conventional textbook problems involving a mixture of transaction types.