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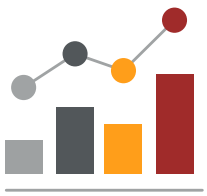
RESEARCH IN REVIEW



Making it Stick:

Using Cognitive Science and Technology to Enhance the Impact of Financial Education

Sean H.K. Kang

This study evaluates the effectiveness of a learning intervention on study participants' knowledge recall, self-confidence and behaviors following a financial education workshop on the topic of credit.

RESEARCH QUESTION

The author's primary question was how the timing of study activities following a financial education workshop for college students could impact a student's knowledge, relevant financial behaviors, and confidence in their knowledge and financial management abilities. The workshop and related study activities focused on the topic of credit, and the outcomes of interest were students' knowledge of credit, credit management behavior, and confidence in their knowledge and credit management ability.[1]

STUDY FRAMEWORK AND INTERVENTION DESIGN

The study was designed to compare the knowledge, self-efficacy and credit management behaviors of participants following a workshop about personal credit. 275 sophomore students at Champlain College (Burlington, VT) elected to participate in the study, and 175 students ultimately completed the study and had usable data. Study participants used a smartphone application to complete study activities on certain timelines.

The study activities were designed to test the effectiveness of certain cognitive science learning principles when applied in a post-instruction setting. Reflecting the principles that testing can enhance learning and explanatory feedback following incorrect answers can improve understanding, participants completed two sessions of study activities that included practice quizzes. To test the principle that spacing out the review of information over time ("spaced retrieval practice") can enhance learning and retention, some participants completed the study activities on a spaced schedule.

[1]For the remainder of this brief, we will refer to confidence in knowledge and ability as "self-efficacy."

Participants were randomly[2] assigned to one of two treatment groups or a control group:

Treatment groups completed study activities related to personal credit, with some having "spaced" study sessions to test the principle of spaced reviews and others performing all assigned study sessions within a brief, "massed" period of time. Each study activity was a self-paced practice quiz that contained 10 knowledge questions and included feedback and explanations for the correct answers.

Twenty weeks after their last interaction with credit-related information, participants completed a final assessment of their credit knowledge, management behaviors and self-efficacy.

[2]Assignments were intended to be random, although data are not available to demonstrate that participant demographic characteristics or baseline knowledge, credit management behaviors, or self-efficacy were comparable across the treatment and control groups.

OUTCOME MEASUREMENT

The final assessment examined outcomes in three areas: participants' knowledge of credit topics, self-efficacy and self-reported credit management behaviors.

- Knowledge was measured using 10 fact-based questions about credit.
- Self-efficacy was measured by asking participants to rate their confidence in their knowledge of credit and their ability to manage credit, respectively, on a 0-10 scale.
- Credit management behaviors were measured by asking participants to answer whether they practiced certain credit management behaviors and how many times they practiced those behaviors (one or multiple times). The behaviors studied were providing advice to others about credit, checking their own credit score, checking their credit report, and taking intentional steps to improve their credit.
- Participants were also asked whether they were attempting to answer the final assessment questions sincerely (i.e., did not reference other materials for answers and did not answer randomly).

The scales used for this study were created for the purpose of this research and there is no information about the reliability and validity properties of these scales.

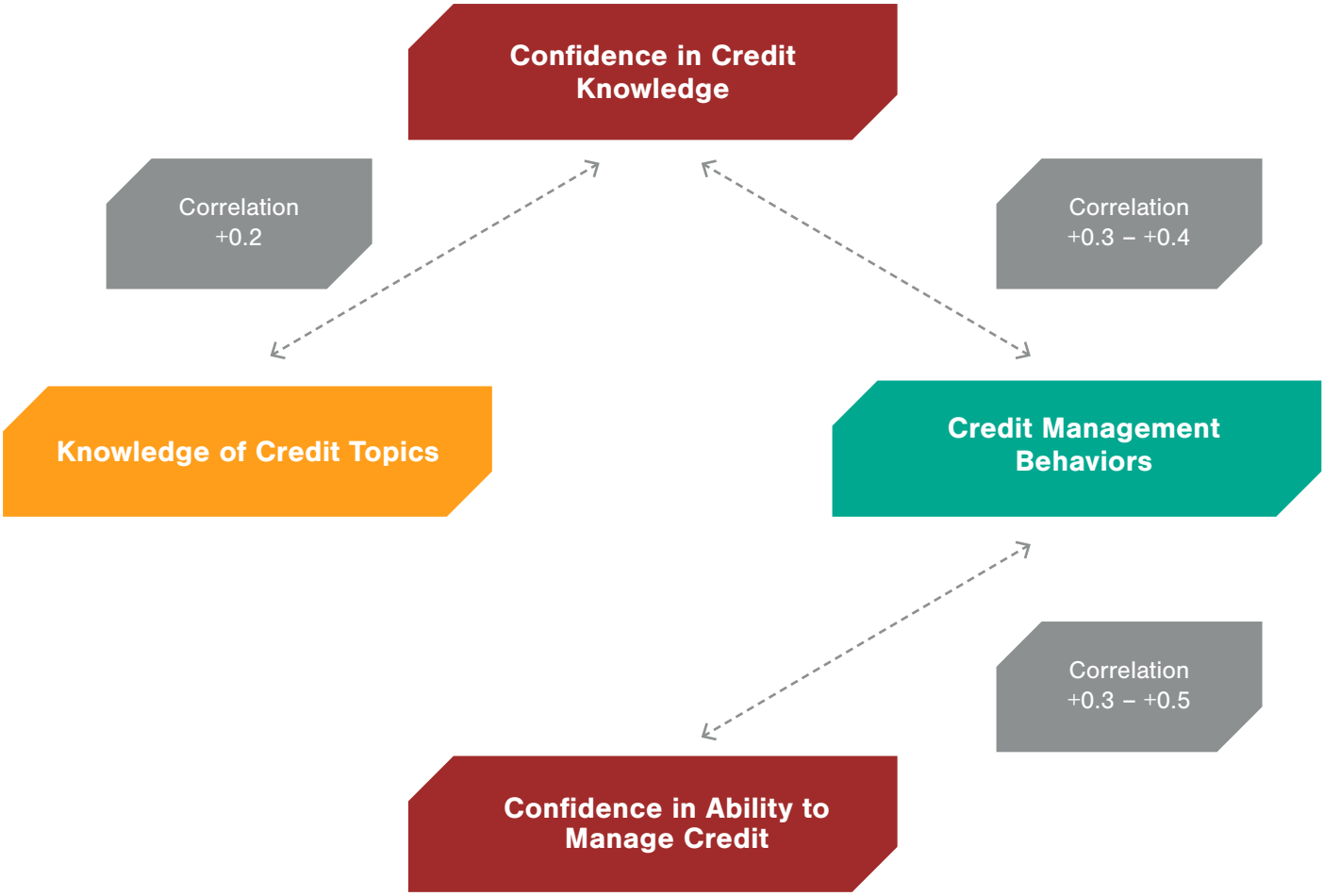
RESULTS

The researcher compared the final assessment scores for knowledge, self-efficacy and behaviors across the "massed" treatment, "spaced" treatment, and control groups. Because these outcomes were not measured at baseline, the study is unable to assess the impact the treatments had on the outcomes. If one is willing to assume that both treatment groups and the control group would have performed equally on the assessment questions at baseline, then one can interpret the study's results to show which treatments had a significant impact on knowledge, self-confidence in knowledge and behaviors, or behavior.

- **Knowledge:**
  - Participants who performed study activities in a spaced manner (the "spaced treatment" group) on average answered one more knowledge question correctly than those who either performed all study activities shortly after the initial workshop (the "massed treatment" group) or did not have any assigned credit study activities (the control group). On average, the "spaced treatment" group answered 61% of the knowledge questions correctly, whereas the "massed treatment" and control groups answered 49% and 54% correctly, respectively. The "massed treatment" and control group scores were not statistically distinguishable.
- **Self-efficacy:**
  - There was no statistically distinguishable difference in confidence in knowledge among the "spaced treatment," "massed treatment," or control groups. The average score for each group was approximately 6 on a 0-10 scale.
  - There was no statistically distinguishable difference in confidence in ability to manage credit among the "spaced treatment," "massed treatment," or control groups. The average score for each group was approximately 6 on a 0-10 scale.
- **Behavior:**
  - None of the studied credit behaviors showed a significant correlation with the intervention.

The researcher also looked for a relationship between the following outcomes: self-confidence and behavior; knowledge and self-confidence; and knowledge and behavior.

- Confidence in knowledge and confidence in ability were moderately positively related to credit behavior.
- Confidence in knowledge was weakly related to performance on knowledge questions. Knowledge was not correlated with credit behavior.



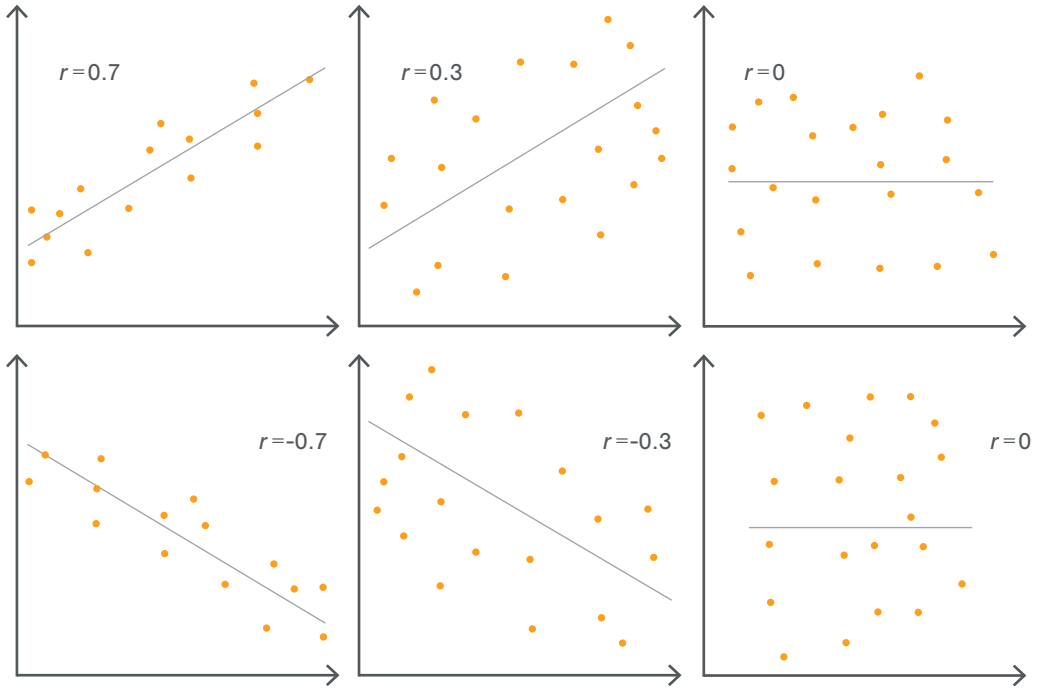
NOTES:

1. Areas with no connective arrows displayed no statistical correlation.
2. Separate correlations were calculated for each of the four credit management behaviors evaluated by the final assessment. The ranges shown here represent the range of correlations across the four credit management behaviors.

WHAT IS A CORRELATION COEFFICIENT?

Correlations represent the relationship between two variables (e.g., knowledge of personal credit topics and frequency of checking one's credit report). Variables may be correlated positively (as one variable increases, so does the other), negatively (as one variable increases, the other decreases), or have no statistical relationship (changes in one variable do not appear tied to systematic changes in the other variable). Note that the presence of a correlation between two variables does not mean that changes in one variable necessarily causes changes in the other.

Data plots showing positive and negative correlations of different strengths (r = correlation coefficient)



Correlation coefficients range in value from positive one (perfectly positively correlated) to negative one (perfectly negatively correlated). A correlation coefficient of zero signifies no correlation. Correlation coefficients that have a magnitude between zero and one are subject to interpretation, and different disciplines and studies differ in what constitutes a "weak," "moderate," or "strong" correlation. [For this study, the author considers [definitions of ranges and interpretations]. The charts above depict data that have positive and negative correlations of different strengths, as well as data with no correlation.

TAKEAWAYS

This study suggests the effectiveness of spaced retrieval practice in the financial education space. When tested on their knowledge recall 5-6 months after an informational workshop on credit, college students who performed brief retrieval exercises (i.e., 10-minute practice quizzes) in spaced intervals after the workshop scored higher than students who did not do any retrieval or experienced retrieval only immediately after the workshop. This suggests that cognitive learning principles like spaced retrieval that are effective in other subject areas may also be effective for college financial education programming. As with any research, results of this experimental research must be tested on other populations before generalizing beyond the specific population (sophomore students at Champlain College) represented in this study.

Ideas for Further Research

As noted above, this study supports the effectiveness of implementing cognitive learning principles in financial education. NEFE offers some suggestions for future research regarding this area of inquiry:

- This study evaluates the impact of retrieval practice at one and four weeks following the initial learning experience. Specifically, the researchers studied the impact on knowledge, self-confidence, and behavior at five-to-six months after the initial learning experience. Future research could explore whether this retrieval method is effective over longer time periods, such as 12 months, 18 months, or 24 months.
- The retrieval practice had less than a 70% completion rate among study participants who elected to participate. What can be said about students who do not adhere to spaced retrieval practice, and what interventions could be effective for that population?
- This study evaluates the learning impacts of spaced retrieval on college students, but not other populations, thus limiting the generalizability. How effective are these types of evaluations on other populations, and how could these evaluations be implemented for non-college populations?
- This study relates to financial education with an emphasis on credit. Do these findings hold when evaluating other personal finance lessons such as savings, budgeting and insurance?

[Citation: Kang, S. H. K., Eglington, L. G., Schuetze, B. A., Lu, X., Huaco, J., & Hinterstoisser, T. M. (in press). Using cognitive science and technology to enhance financial education: The effect of spaced retrieval practice. Journal of Financial Counseling and Planning.]

About the Study

The National Endowment for Financial Education® (NEFE®) created this research brief to highlight aspects of the following published journal article: Kang, S. H., Eglington, L. G., Schuetze, B. A., Lu, X., Hinterstoisser, T. M.,& Huaco, J. (2022). Using Cognitive Science and Technology to Enhance Financial Education: The Effect of Spaced Retrieval Practice. Journal of Financial Counseling and Planning. In press.

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