

## PART I: PROJECT GRANT COVER PAGE

1. **Type of Award:** Faculty Project Grant
  2. **Applicant Information:**  
 Name: Kalif Elijah Vaughn  
 Department: Psychological Science  
 Office: MEP 351  
 Office Phone:  
 e-mail address: [vaughnk1@nku.edu](mailto:vaughnk1@nku.edu)
- Tenure Status (Tenure-track, **Tenured**)  
 Faculty Rank (Lecturer, Assistant Professor, **Associate Professor**, Full Professor)
3. **Amount Requested:** \$6,000
  4. **Other Current FDA Award Applications:** N/A
  5. **Title of Project:** Evaluating the benefits of different test formats during successive relearning
    - a. **IRB/IACUC/IBC Approval # / Status** (if applicable): Will apply for IRB approval if project grant is funded
  6. **Short Project Description** (200 word max): Students often struggle to learn their course content, which negatively influences grades and drop-out rates. A powerful study technique known as *successive relearning* (a combination of distributed practice and retrieval practice) can dramatically increase student performance, yet little is known about which factors moderate its effectiveness. Although the technique is effective with cued recall tests, it is unclear whether the same benefits emerge with multiple-choice tests. To explore this issue, I will compare the benefits of successive relearning with multiple choice versus cued recall tests. Students prefer less versus more effortful tests (e.g., multiple choice versus cued recall), and tend to avoid self-testing when the tests are too challenging. If successive relearning remains beneficial with multiple-choice tests, implementing the technique becomes easier. We could redesign our existing self-testing websites to incorporate more multiple-choice questions. Student self-testing rates would increase, and we could track which items students have successfully recalled during these practice test sessions. We could use that knowledge to prioritize 'at-risk' items for each student, which should increase exam performance. If successful within our department, we could design these resources for other departments who have faculty willing to help create these resources.

*Kalif Vaughn*

signature\*

9/30/2024

date

\* By typing your name or pasting your signature in the space provided you are allowing this application to be reviewed by the Faculty Benefits Committee for a possible award. The applicant is also aware that failure to comply with the instructions may result in this proposal not being reviewed.

## PART II. PROPOSAL BODY

### 1. BACKGROUND

Many students fail to complete their four-year degree. At NKU, the graduation rate is approximately 50% (see the College Scorecard from the Department of Education), meaning half of the students that start at NKU never earn their degree. Although there are a myriad of factors influencing degree completion, poor study strategies likely play a causal role. Ineffective study strategies can make passing exams seem impossible. In this proposal, the applicant discusses a potent learning strategy (known as successive relearning), and then discusses a research plan to explore a potential moderating factor (test format). Funding this proposal would inform our understanding of human memory but also have clear implications for optimizing student learning. The findings will directly inform the applicant's own teaching and in-class review and have implications for best designing the electronic study resources (testing websites) available to our students within the department (and eventually across departments).

**SUCCESSIVE RELEARNING:** Students often use ineffective study strategies to study their course material, such as highlighting or rereading their notes (see Dunlosky et al., 2013 for discussion). Research has shown two strategies to be extremely effective: distributed practice (for a review, see Cepeda et al., 2006) and retrieval practice (for a review, see Kornell and Vaughn, 2016). Distributed practice simply refers to spacing out one's learning across different sessions and is the opposite of massed practice (also known as *cramming*). Retrieval practice refers to practice testing during which one tries to recall the answer to a question.

Combining distributed practice and retrieval practice is known as *successive relearning*. Successive relearning has often been implemented by having learners study foreign-language word pairs and then engage in study / test cycles until a specific performance pattern is reached (e.g., each item is correctly recalled one or more times, referred to as *criterion level*; see Vaughn et al., 2016 for manipulations in criterion level during successive relearning). Importantly, to implement the technique with fidelity, learners must engage in subsequent study / test cycles after a delay (e.g., 1-week after the prior session, as in Rawson et al., 2018). These distributed study / test cycles span across multiple learning sessions, and computer scoring methods ensure that adequate test performance is achieved on an item-by-item basis.

Successive relearning has been shown to dramatically improve memory and long-term retention (e.g., Bahrick et al., 1993; Rawson et al., 2013; Vaughn et al., 2016; Higham et al., 2021). The addition of a subsequent relearning session confers staggering long-term memory benefits. An illustrative example can be seen in analyzing the data from Rawson et al. (2018). After learning foreign-language word pairs to criterion, learners returned for a 1-week delayed recall test. At the start of that session, participants recalled only 20% of the material. Performance increased in a curvilinear fashion across relearning sessions, climbing to nearly 80% after 3 relearning sessions. These performance values are remarkable considering that each additional relearning session raised performance approximately 20%, which is equivalent to two letter grades (on average).

**CHALLENGES IMPLEMENTING SUCCESSIVE RELEARNING:** Implementing successive relearning correctly is not an easy task. A variety of quizzing apps (e.g., Quizlet) offer a low-cost method for students to engage in retrieval practice, but they require students to create the materials for their courses. Additionally, they do not incorporate distributed practice by default. Finally, these apps do not track correct versus incorrect responses during testing, which is a necessary ingredient in any successive relearning paradigm. Unfortunately, students typically misjudge the accuracy of their memory and their recall responses (see Bjork et al., 2013 for an overview), suggesting the need for a computer-controlled scoring process.

To facilitate the process, instructors could create practice testing resources for their students. I have coded multiple self-testing websites for my own courses, as well as courses taught by my colleagues in the Department of Psychological Science. These are websites that quiz students on the exam content. We have demonstrated that using these self-testing websites improves student exam performance (Vaughn et al., 2024). Although beneficial, these websites do not allow for experimenter-controlled implementation of successive relearning due to many short-answer questions. To implement this, a system that tracks the accuracy of student responses is necessary, and the scoring mechanism needs to be electronic (i.e., determined via the computer). If we can use practice test questions that have a clearly correct response, such as multiple-choice questions, we can allow the computer to select items appropriately to implement the successive relearning technique. However, to date, no empirical research has investigated whether successive relearning is effective with multiple-choice questions. If we find evidence that successive relearning is still effective with multiple-choice questions, then I can invest the time to alter my testing websites to include multiple-choice questions. If successive relearning is not effective with multiple-choice questions, or is far less effective compared to cued recall, then we will need to explore other mechanisms for students who wish to implement successive relearning.

## **2. IMPORTANCE**

Our educational system is in a state of crisis. Only about half of students who enroll at NKU complete their degree. Poor study strategies are one potential reason for these poor retention rates. Students with lackluster study strategies will experience college as difficult and frustrating. Despite studying for long hours, many will fail their exams due to poor study habits (such as rereading their notes or highlighting their textbooks). These are the students who are at risk of dropping out of school. If we can develop powerful tools to help these students master their course content, we will dramatically alter their college experience and performance. Instead of dreading their exams, they will feel prepared for them. Instead of devoting countless hours to study techniques that do not work, they will study strategically with principles backed by science. The research from this project could have powerful effects on student success and ultimately improve our retention rates.

## **3. GOALS**

The goal of this project is to determine whether there is an advantage for more effortful

types of practice tests (specifically, cued-recall tests versus multiple-choice tests) if material is to be learned across multiple relearning sessions (i.e., successive relearning). Appropriate criteria for determining this would be to compare long-term performance after successive relearning has occurred with both test formats.

I also hope to learn new coding skills, including scheduling emails via cron tasks and improving the layout and functionality of my experiments. I also hope to teach these skills to any undergraduates assisting me on the project.

## 4. PROCEDURES

### Experiment 1

Participants will learn (and relearn) foreign-language word pairs across four sessions total. I outline these four sessions below (see also Figure 1).

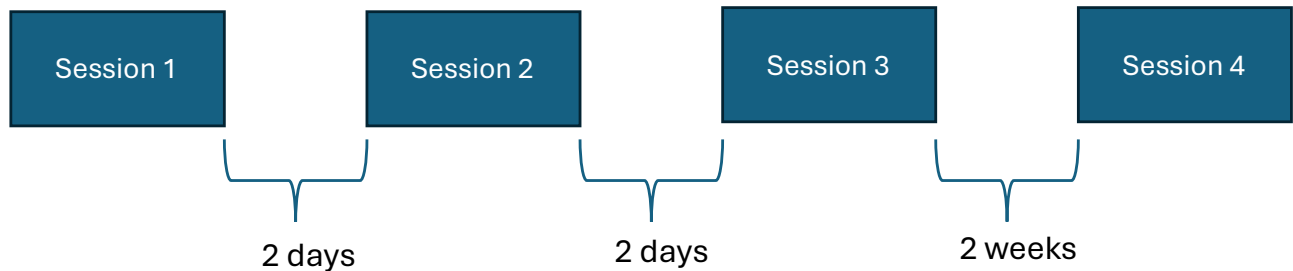
**Session 1:** Participants study 60 Lithuanian-English word pairs (e.g., smegenys – brain). During each study trial, participants copy the English target (e.g., brain) into a textbox. Copying the target allows us to ensure that that specific word pair was properly encoded. After all items are copied, the criterion test phase begins. Importantly, there are two test formats: cued recall and multiple-choice tests (see Figure 2). During a cued-recall test, a Lithuanian word is presented (e.g., smegenys - \_\_\_\_\_) and participants are instructed to type in the English translation (e.g., brain). During a multiple-choice test, a Lithuanian word is presented (e.g., lietus) along with four possible translations. Critically, the four possible translations consist of one genuine translation (e.g., rain) and three lures (e.g., gold, cup, and milk). The lures reflect other targets being learned in the current experiment, which increases the difficulty of the test. If an item is answered correctly, it is dropped from further practice. If an item is not answered correctly, the Lithuanian word and correct English translation are shown for four seconds. After all items are answered correctly, Session 1 ends.

**Session 2:** Participants return after a 2-day delay to complete the first relearning session. During this relearning session, participants are tested in the same manner as during Session 1. Items are tested one at a time, retaining their original test format (either cued recall or multiple choice). Feedback is provided for missed items. Once all items are correctly recalled, this relearning session will end.

**Session 3:** This session will occur 2 days after Session 2 and will follow the same relearning procedure as in Session 2.

**Session 4:** Session 4 will be the final relearning session. Participants will complete the same procedure as during Session 2 and Session 3, with one modification to the procedure. Importantly, half of the items will receive the same test format that they received originally (either multiple choice or cued recall); however, half of the items will receive the opposite test format. For instance, 15 items that were previously tested in a multiple-choice format will now be tested in a cued recall format, and vice versa. Altering the final test format will allow us to examine transfer performance. We might find discrepancies between the two test formats on transfer tests. There is some

evidence that retrieval effort can moderate the benefits of test practice (e.g., Pyc and Rawson, 2009). As cued recall requires more effort, we might find evidence to suggest that cued recall is the superior test format. If so, we might observe (a) higher cued recall performance overall, and/or (b) higher transfer performance from cued recall to multiple choice.



**Figure 1.** Visual depiction of the procedure used in the successive relearning paradigm.

<b>Cued Recall</b>	<b>Multiple Choice</b>
<p>namas : _____</p> <p><input type="text"/></p> <p><input type="button" value="Next"/></p>	<p>batas : _____</p> <p><input type="radio"/> shoe</p> <p><input type="radio"/> soldier</p> <p><input type="radio"/> honey</p> <p><input type="radio"/> city</p> <p><input type="button" value="Next"/></p>

**Figure 2.** Cued recall versus multiple choice test trials for the foreign-language word pairs to be used in the experiment.

### Experiment 2

Experiment 2 will extend the results of Experiment 1 by exploring (with a new sample) whether the number of lures during multiple-choice tests matters if successive relearning is used.

The general procedure will be the same: Participants will learn and relearn information across four sessions. In contrast to Experiment 1, all participants will receive only multiple-choice tests with varying numbers of lures (either 2, 4, 6, or 8 lures). The number of lures will be manipulated within participants (i.e., all participants will receive some questions with 2 lures, some questions with 4 lures, and so on). Items will be randomly assigned to lure condition. The delays between each session will be identical to Experiment 1.

**Session 1:** Participants will study and learn 60 Swahili-English<sup>1</sup> word pairs to criterion via multiple-choice tests. The subset of 60 items will be randomly divided across four different lure possibilities (i.e., 15 items will be randomly assigned to either be tested with 2, 4, 6, or 8 lures). As in Experiment 1, all the possible lures will be valid targets for other items. Items answered correctly will be dropped from practice. Feedback will be provided for items answered incorrectly. After all items have reached a criterion of one correct recall, Session 1 will end.

**Session 2 and Session 3:** These two sessions will function as standard relearning sessions. All items will be tested again with the same multiple-choice test as in Session 1 (e.g., items tested in the two-lure condition in Session 1 will be tested with two lures in Session 2). The same relearning procedure will be followed, requiring all items to be correctly recalled before the session ends.

**Session 4:** The final session will operate the same as Sessions 2 and 3 with one critical difference: all items will be tested with 4 lures. This is a necessary change as the final test must equate the number of lures to create a fair test for all items. For some items, 4 lures will represent a more challenging test (i.e., items that started with 2 lures), and for other items the difficulty will decrease (i.e., items that started with 6 or 8 lures) or remain the same (i.e., items that started with 4 lures). Performance on this final test will allow us to observe whether initial test / relearning difficulty influences final retention.

## 5. BUDGET

Item	Cost
1 Research Assistant to work from mid-May 2025 to mid-May 2026 (\$12 x 5 hrs x 52 wks)	\$3,120
Fringe benefits (assuming 8%)	\$250
2 experiments with NKU students (60 participants x \$20 x 2)	\$2,400
Server rental	\$216
Domain name	\$20
<b>Total Amount Requested from Project Grant</b>	<b>\$6,006</b>

### Budget justification

**Student Stipends:** \$3,120 to support 1 student during Summer and Fall (2025) and Spring (2026).

**Experiment Costs:** We will pay our participants a fair wage of approximately \$10 / hour. Each session will last approximately 30 minutes, and we will have a total of 4 sessions. This equates to a total of 120 minutes (2 hours) per participant, rendering the total cost per participant at \$20.

A power analysis was utilized within G\*Power software to determine a sufficient sample size to detect a small-to-moderate effect ( $f = 0.18$ ) at 90% power in a 2 (cued

<sup>1</sup> In Experiment 1, we will use Lithuanian-English word pairs. In Experiment 2, we will switch to Swahili-English word pairs. By using different materials, we widen our subject pool availability as we do not need to exclude students who participated in Experiment 1.

recall vs multiple choice) x 4 (Relearning Session: 2, 3, 4, 5) repeated-measures ANOVA. Using these power parameters, the required sample size is 58 participants. This value has been rounded to 60 participants to account for attrition.

In sum, completing an experiment using these values results in a cost of \$1,200 (60 participants x \$20). Given that I plan to conduct two experiments, the final cost is \$2,400.

**Equipment Costs:** The applicant intends to rent a computer server and lease a domain name from a hosting service. The purpose of the computer server is to allow for online data collection and data storage. Importantly, the server will provide the applicant with administrator access to run cron tasks, which allow for computer scripts to be scheduled and executed at specific intervals. These cron tasks will allow for reminder emails to be scheduled for participants. Additionally, this provides an additional training opportunity for undergraduates, who can gain experience with computer servers.

## 6. REFERENCES

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- Pyc, M. A., & Rawson, K. A. (2009). Testing the retrieval effort hypothesis: Does greater difficulty correctly recalling information lead to higher levels of memory? *Journal of Memory and Language*, 60(4), 437-447. <https://doi.org/10.1016/j.jml.2009.01.004>
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71. <https://doi.org/10.1037/xap0000146>

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- Vaughn, K. E., Fuegen, K., Goddard, P., & Krull, D. S. (2024). The influence of self-testing websites on college exam performance. *Scholarship of Teaching and Learning in Psychology*, 10(1), 30–43. <https://doi.org/10.1037/stl0000258>
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- Vaughn, K.E., & Kornell, N. (2019). How to activate students' natural desire to test themselves. *Cognitive Research: Principles and Implications*. 4: 35. <https://doi.org/10.1186/s41235-019-0187-y>

## 7. OUTCOMES

Several research and teaching outcomes will emerge from this project grant.

### Research

- Presentation of data at national scientific conferences (Psychonomic Society)
- Inclusion of data in a peer-reviewed publication

### Teaching

- Presentation of data at NKU's Celebration of Student Research
- Mentoring of undergraduate student researchers

All data will be collected by Spring 2026. A poster will be created for the NKU Celebration of Student Research poster session. The manuscript outlining our results will be submitted to a peer-reviewed journal during Summer 2026. The data will be presented at the Psychonomic Society in November 2026. These specific outcomes are achievable and realistic within the timeline specified.

## 8. CRITERIA

The project will be a success if the following criteria are met: (a) all planned experiments are executed as intended to collect the required data to answer our key research question, (b) data are analyzed to answer our key research question, (c) results are submitted to a peer-reviewed manuscript for publication, and (d) results are presented at a national conference (e.g., Psychonomic Society) and our university conference (NKU's Celebration of Student Research).

## 9. URGENCY

Only about half of students who enroll at NKU complete their degree. This is a critical problem that needs to be addressed. One potential reason for these poor retention rates is that some students struggle to learn their course content. If we can develop powerful tools to better help students learn their course material, they might feel more prepared for their exams. Rather than failing an exam, they might earn a passing grade and start to acquire the confidence and resilience to persist rather than drop out.

**VALUE OF THE PROJECT:**

**A. Value to the applicant's professional growth.** The applicant would learn a variety of novel skills during this research process. First, the applicant would improve his general coding abilities. The applicant has never conducted a five-session experiment using web-based coding (i.e., running the task in a web browser). The applicant would learn a variety of coding skills in the process, including writing scripts to automatically email participants at scheduled intervals, creating daily backups of data, automated analysis to check data quality, and so on. Second, the data obtained from this research would be publishable in a top-tier journal, and I would involve undergraduates in the process.

**B. Value to the applicant's teaching and students.** The greatest benefits of this project will emerge for NKU students. I provide retrieval practice resources for my students, typically via external self-testing websites. Students who use these websites perform better on their exams; however, a major hurdle is getting students to use these websites. We recently conducted an experiment manipulating whether students read or were tested on their course content on the websites. Using the websites boosted exam performance, but review strategy did not matter (see Vaughn et al., 2023). We speculated that (a) students who used the website tended to be higher-performing students, and (b) students in the study group likely found a way to self-test (e.g., importing the materials into a quizzing app). A major goal moving forward is to make the testing website accessible to all students, particularly lower-performing students. Additionally, we need to design these websites so that students feel no need to transfer the materials to another quizzing app. The results from this research provide a clear path forward: If successive relearning is equally effective with multiple-choice questions, then the websites can be redesigned to incorporate more multiple-choice questions. The website could then track their progress on a question-by-question basis to better implement successive relearning. By using multiple-choice questions, students will likely use the self-testing websites more often and not feel the need to transfer the items to another app.

Additionally, any undergraduates who will assist me on this project will receive in-depth training and mentoring. These topics include developing coding skills utilizing high-level languages (e.g., R and Julia), as well as web-based coding skills (e.g., JavaScript and PHP). The students will gain data analysis skills and training in how to create publication-quality figures (using ggplot2 in R). Students will conduct statistical analyses (e.g., Repeated-Measures ANOVA) and interpret the output. Lastly, students will receive mentorship on writing and reporting the results in a scientific manuscript, and they will be included on the eventual publication.

**C. Value to the scholarly community.** This research would determine whether successive relearning benefits emerge with multiple-choice tests, and whether those benefits are similar in magnitude to cued recall benefits. This research would expand our understanding of the testing effect and how retrieval effort plays a role in successive relearning. If retrieval effort does not matter, we can explore potential boundary conditions, such as providing strong hints during relearning trials or exploring retrieval practice schedules (e.g., systematically increasing retrieval effort over relearning sessions). If retrieval effort does matter, this would mark a departure from prior research

and provide fodder for additional exploration.

**D. Value to the University.** Approximately half of the students who start at NKU do not graduate. There are many costs to this unfortunate outcome. There are the direct costs of students not paying tuition for the duration of their degree, but also indirect costs involved in not raising our degree completion statistics. Future students might be averse to joining NKU if the degree completion rate is lower; perhaps they will attribute that to the courses being overly difficult and/or poorly taught. Although giving students additional study resources is not a panacea, it might be sufficient for students on the verge of dropping out to remain enrolled.

**E. Value to the non-academic community.** Although I will explore learning primarily with students, these principles will likely transfer to all types of learners. Adults could benefit from these research findings, whatever their learning goals might be (e.g., learning a foreign language).

### **BACKGROUND OF APPLICANT RELEVANT TO THIS PROJECT**

The applicant earned a master's and doctoral degree in Experimental Psychology from Kent State University. His program of research has focused on learning and memory, and particularly the results of repeated retrieval practice (e.g., learning to a higher versus lower criterion level) on long-term retention. During this period, the applicant learned how to design experiments for laboratory-based data collection, as well as analyze complex data sets to draw meaningful conclusions.

The applicant received postdoctoral training that not only increased his understanding of memory research but provided the applicant with valuable experience designing experiments for online data collection. The knowledge gained included how to code in novel computer languages such as PHP, HTML, and JavaScript. The applicant also learned how to operate a remote computer server for data storage and retrieval. These factors enabled the applicant to conduct online research successfully.

Since joining the NKU Department of Psychological Science, the applicant has published approximately 14 manuscripts in peer-reviewed journals. Critically, of these published manuscripts, several were on the topic of successive relearning. Those manuscripts outline similar paradigms but answer different research questions. Importantly, the applicant successfully coded the experiments (as well as analyzed, or played a major role in analyzing, the data) outlined in those manuscripts. Therefore, the applicant has direct experience conducting successive relearning research, as well as writing and publishing research in peer-reviewed articles.

These factors make the applicant uniquely qualified to conduct the experiments outlined in this document.

### **OTHER SUPPORT AND COMMITMENTS**

The applicant does not currently have any external funding but would use the results from this research to pursue external funding.

## PART III. APPENDICES

1. SUPPORTING DOCUMENTATION. None
2. Applicant's Curriculum Vita (short form attached)

### Kalif Elijah Vaughn

#### EDUCATION

PhD            2014, Experimental Psychology, Kent State University  
 M.A.           2012, Experimental Psychology, Kent State University  
 B.A.           2008, Psychology | Political Science Minor, Purdue University

#### DISSERTATION

“Criterion Learning and Associative Asymmetry: Investigating the Role of Mediators”

#### PROFESSIONAL EXPERIENCE

2022 – present      Associate Professor, Northern Kentucky University  
 2016-2022          Assistant Professor, Northern Kentucky University  
 2014-2016          Post-Doctoral Researcher, Williams College

#### TEACHING EXPERIENCE

Department of Psychological Science, Northern Kentucky University  
 Research Methods (PSY 210; 211 / 212)  
 Learning and Behavior (PSY 337)  
 Cognitive Processes (PSY 338)  
 Cognitive Processes Lab (PSY 338L)  
 Advanced Research Methods (PSY 410)

#### AWARDS AND HONORS

Department of Psychological Science George Goedel Faculty Mentoring Award (2022)  
 Excellence in Teaching and Instruction Award (2021)

#### PEER-REVIEWED JOURNAL ARTICLES (selected; 17 total)

- Bernardi, E., Vaughn, K. E., Dunlosky, J., & Rawson, K. A. (2024). Toward mastering foreign-language translations: transfer between productive and receptive learning. *Memory*, 1–12. <https://doi.org/10.1080/09658211.2024.2397043>
- Vaughn, K. E., Fuegen, K., Goddard, P., & Krull, D. S. (2024). The influence of self-testing websites on college exam performance. *Scholarship of Teaching and Learning in Psychology*. <https://doi.org/10.1037/stl0000258>
- Vaughn, K. E., Krull, D. S., & Goddard, P. (2023). Review Websites Improve College Exam Performance, but Review Strategy Might Not Matter. *College Teaching*, 1–8. <https://doi.org/10.1080/87567555.2023.2257349>
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- Vaughn, K. E., Srivatsa, N., & Graf, A. S. (2021). Effort praise improves resilience for college students with high fear of failure. *Journal of College Student Retention:*

- Research, Theory and Practice*. <https://doi.org/10.1177/1521025120986517>
- Smalarz, L., Kornell, N., **Vaughn, K. E.**, & Palmer, M. A. (2019). Identification performance from multiple line-ups: Should eyewitnesses who pick fillers be burned? *Journal of Applied Research in Memory and Cognition*. <https://doi.org/10.1016/j.jarmac.2019.03.001>
- Kornell, N., & **Vaughn, K. E.** (2018). In inductive category learning, people simultaneously block and space their studying using a strategy of being thorough and fair. *Archives of Scientific Psychology*, 6, 138–147. <https://doi.org/10.1037/arc0000042>
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#### **STUDENT CO-AUTHORED PUBLICATIONS**

- Cline, B., & **Vaughn, K. E.** (2024). The effects of mental warm-up on learning efficiency. *Nýsa: The NKU Journal of Student Research*.
- Kahmann, V., & **Vaughn, K. E.** (2023). Effects of note-taking and retrieval practice on memory performance. *Nýsa: The NKU Journal of Student Research*.
- Weimer, C., & **Vaughn, K. E.** (2021). Effects of reading speed and retrieval practice on reading comprehension. *Nýsa: The NKU Journal of Student Research*.
- Chitwood, M. R., & **Vaughn, K. E.** (2019). Cognitive performance and sounds: The effects of lyrical music and pink noise on performance. *Nýsa: The NKU Journal of Student Research*.
- Krull, S. R., & **Vaughn, K. E.** (2019). Mnemonics, testing, and creativity: Creative thinking and effectiveness of learning method. *Nýsa: The NKU Journal of Student Research*.

#### **CONFERENCE PRESENTATIONS (selected; 21 total)**

- Kahmann, V. K., & **Vaughn, K. E.** (2023). Are prompts more effective when used for guided notes versus retrieval practice? Poster presented at the 64<sup>th</sup> annual meeting of the Psychonomic Society, San Francisco, CA.
- Vaughn, K. E.**, Goddard, P., & Krull, D. (2022) Review Websites Improved College Exam Performance, But There Was No Advantage for Retrieval Practice. Poster presented at the 63rd annual meeting of the Psychonomic Society, Virtual.
- Vaughn, K. E.**, Fitzgerald, L. L., Hood, D., Migneault, K. Y. & Krummen, K. (2021) The effect of hint strength on the benefits of retrieval practice. Poster presented at the 62nd annual meeting of the Psychonomic Society, Virtual.
- Vaughn, K. E.**, Hartin, T. (2020). Pre-writing increases semantic activation but does not enhance learning. Poster presented at the 61st annual meeting of the

Psychonomic Society, Virtual.

**Vaughn, K. E.** (2019). Will students self-test when made aware of the benefits? Poster presented at the 60th annual meeting of the Psychonomic Society, Montreal, Quebec, Canada.

Fuegen, K., Brooks, A., Goddard, P., & **Vaughn, K. E.** (2019). Screencasting Psycinfo searches: A technique for promoting active learning and measuring information literacy. Poster session presented at the annual meeting of the Association for Psychological Science, Washington D. C.

**Vaughn, K. E.**, Fuegen, K., Goddard, P., Krull, D. (2018). Self-testing improves learning of psychological concepts. Poster presented at the 59th annual meeting of the Psychonomic Society, New Orleans, LA.

**Vaughn, K. E.**, Kornell, N. (2017). Retrieval Failures Enhance Memory as Much as Retrieval Success in Recognition Memory. Poster presented at the 58th annual meeting of the Psychonomic Society, Vancouver, BC, Canada.

**Vaughn, K. E.**, Kornell, N. (2016). Enhancing Conceptual Learning by Generating Analogies. Poster presented at the 57th annual meeting of the Psychonomic Society, Boston, MA.

Rawson, K. A., **Vaughn, K.E.**, Walsh, M., Dunlosky, J. (2016). Investigating and Explaining the Potency of Successive Relearning for Enhancing Long-Term Retention. Paper presented at the 57th annual meeting of the Psychonomic Society, Boston, MA.

Kornell, N., **Vaughn, K.E.** (2016). Desirable Easiness: Hints That Reduce Effort, But Not Learning, During Retrieval Practice. Paper presented at the 57th annual meeting of the Psychonomic Society, Boston, MA.

### 3. Previous FBC Awards

Sabbatical (Fall 2022)

**Title:** The Influence of Retrieval Practice on Academic Performance

**Description:** During the sabbatical leave, I analyzed data from two disparate lines of research and submitted two manuscripts to peer-reviewed journals. The first manuscript outlined the results of a real-world study in which students were granted access to external study websites that either quizzed them (test group) or exposed them (read group) to their actual course content. We found that exam performance increased when students used the websites, but surprisingly, there was no difference between our groups (which is a departure from the modal laboratory-based findings in this area). This manuscript was rejected from *Scholarship of Teaching and Learning in Psychology*, but the feedback helped us revise and resubmit it to *College Teaching* (where it was invited for a revise and resubmit, and eventually accepted for publication). The second manuscript outlined the results of a retrieval-practice intervention on self-testing rates in learning foreign-language vocabulary. I told a random subset of students about the benefits of retrieval practice and encouraged them to self-test when studying the word pairs. Although the group of students that were told about the benefits of retrieval practice did self-test at high rates, so did the control group that was not informed of these benefits (a dreaded null effect). This manuscript required a host of nuanced analyses that I conducted within R, as well as collecting additional data from Amazon's Mechanical Turk. Although the manuscript was rejected from *Applied*

*Cognitive Psychology*, the feedback was valuable and highlighted that the analyses would benefit from a Bayesian approach. I continue to analyze and explore this project, and I have recruited a former colleague to contribute to the project.

## FDA Project Grant Evaluation Form for Chairs

**Instructions:** Please print or type in the following form. Comment length is limited to this page. Forward a copy to Faculty Senate Benefits Committee c/o Grace Hiles [hilesg1@nku.edu](mailto:hilesg1@nku.edu)

Faculty applicant name: Kalif Vaughn

Evaluations are based on criteria as defined in the Faculty Handbook **11. FACULTY DEVELOPMENT PROGRAMS** sections 11.1 through 11.4

This individual qualifies for the proposed project (full-time/part-time, tenured/tenure track, not on terminal contract): Yes  No

Applicant has asked if Department funds are available to support the project: Yes  No

If Department funds are available to support this project, how much may be used to defray costs? \$ 0

Indicate your assessment of the following items from very low to very high:

	Very low	Low	Neutral	High	Very high
Overall quality of proposal					✓
Ability of applicant to carry out project					✓
Overall value of project					✓
Value to the department					✓
Value to student learning					✓
Value to the field of study				✓	

**General Comments:**

The importance of Dr. Vaughn's proposed project grant is obvious: students often fail to use study strategies that are effective. Dr. Vaughn plans to determine if successive relearning (self-testing distributed across multiple sessions) is equally effective for test formats that rely on recognition (multiple-choice) and recall (cued-recall). The results of this project can help inform both students and faculty on effective strategies students can use to better prepare for assessments. Given Dr. Vaughn is an associate professor and has never received a project grant, receiving this grant will help him achieve the goal of promotion to professor. This project will also provide valuable experiential learning opportunities for a student research assistant. I fully support this application.

Specific comments on categorical rankings including any category ranked neutral, low, or very low:

Justin Gates 10/1/2024  
 Name (typed or signed) Date

Department: Psychological Science