Faculty Perceptions on Using Retrieval Practice to Learn Medical Terminology: A Qualitative Multiple Case Study

Lisa Cerrato, EdD, MS, RHIA

Professor/Coordinator Health Information Management Technology (HIMT)

Columbus State Community College

OHIMA Annual Meeting – March 2023

Introduction

- Retrieval practice is one of the most widely studied cognitive science principles for improving long-term memory.
- Students who use more active study strategies, such as retrieval practice, tend to perform better on exams and retain course content in long-term memory than students who use passive study techniques.
- This qualitative multiple-case study explored the views of faculty regarding the effectiveness and utility of retrieval practice in a medical terminology course.

Problem Statement

- The problem addressed in this qualitative multiple case study was that students who use passive study techniques when learning medical terminology are less likely to perform well on exams and retain course content in long-term memory.

Conceptual Framework

- The guiding framework of this study centered on **identity education (IdEd)** which refers to instructors deliberate and active involvement with students' identity-related processes to facilitate student engagement in the classroom (Schachter & Rich, 2011).
- The premise of IdEd is that aspects of students' identities are instrumental to their educational goals and that identities are linked to academic engagement and motivation. Empirical research links aspects of students' identities to educational goals.
- There are many ways to define identity. Identity defines the uniqueness of humans; it is a summary of all individuals' traits and characteristics. Identity-related processes can refer to many aspects such as ethnic and religious entities, socio-economic background, educational background, personality traits, roles performed in social interactions (e.g., parent, child, employee, student), or stories told about the self to provide personal meaning.

- Aspects of students' identities are instrumental to their educational goals as students are agents in defining and presenting themselves in social interactions within the classroom.

Literature Review

In my literature review for this study, various themes surfaced as I searched for studies pertaining to retrieval practice.

- Themes connected to retrieval practice:
    - **Testing Effect Phenomenon**
        - Retrieval practice quizzing promotes what is known as the testing effect phenomenon or retrieval-based learning. This phenomenon occurs when retrieval practice (i.e., quizzing) modifies memory representations.
        - Substantial gains in long-term retention of information result from using active retrieval practice during the learning process such as quizzing. The testing effect produces learning advantages that improve retention and recall of information by strengthening the durability of the information within long-term memory and the ability to retrieve it in the future.
        - Additionally, retrieval practice quizzing can help students anticipate the type of questions they may encounter on an exam, the level of detail they are expected to learn, and whether their prior learning might produce acceptable performance.
    - **Cognitive Load**
        - Cognitive load refers to the effort required to process information in the working memory when completing a task. The basic premise of cognitive load is that students' information processing is heavily constrained by limited working memory, which can only process finite amounts of information at one time.
        - Factors such as task difficulty and students' available cognitive resources influence their success in learning. Students draw on cognitive resources when learning new information or solving problems.
    - **Cognitive Information Processing Models**
        - **Atkinson-Shiffrin Three-Stage Information Processing Model of Understanding (1968)**
            - There are three types of human memory: (a) sensory memory that receives new information from the external environment, (b) working memory that processes the information received from

sensory memory, and (c) long-term memory that permanently stores the information learned.

- Learning and memory are discontinuous and multi-staged. As new information is taken in, the information is manipulated before it is stored.
- Information can be in the form of visual, auditory, olfactory, taste, or tactile stimuli.
- The information transfer process from the sensory memory to the working memory requires the learner's attention and focus. When students consciously pay attention to the information in their sensory memory, it is transferred into the working memory.

- **Self-Regulated Learning (SRL)**
  - Students transform their mental abilities into task-related academic skills oriented toward their own goals.
  - Cognition, motivation, and metacognition are the three essential components of SRL.
    - Cognition includes cognitive information processing strategies such as rehearsing, organizing, elaborating information, critical thinking, and problem-solving.
    - Motivation represents beliefs and attitudes that influence the use and development of cognition and metacognition, such as when a student thinks a task is tedious or too complex.
    - Metacognition, commonly referred to as higher-order thinking, involves controlling the cognitive process engaged in learning.
  - Metacognitive strategies such as planning, monitoring, and evaluating impact the cognitive and motivational strategies within all learning tasks.
  - To actively engage in the learning process, students need to monitor their learning process. Monitoring and regulating the learning process helps students decide whether the learning activity is fruitful and how to plan future learning activities.

- **Effort Monitoring and Regulation (EMR)**
    - EMR integrates cognitive load and SRL. The EMR model considers how students monitor and regulate their effort toward learning.
    - According to EMR, when students learn, input processing at the task and metacognitive level interacts with students' monitoring and effort regulation. These interactions, in turn, impact cognitive load.
    - When students monitor their learning, they base their judgments on different sources of information or cues from the study material that they believe indicates their learning level.
    - Regulation of effort occurs when students decide to increase, decrease, or continue their current invested effort level with their studies. Accurate self-monitoring of effort is essential.
    - How students regulate their effort and learning goals can be challenging to monitor.
        - Students' beliefs about their effort are often inaccurate, and therefore, not necessarily a predictive cue of their actual learning.
        - Students tend to overestimate the quality of their learning. Typically, there is a non-linear correlation between the students' invested effort in learning and achieved learning outcomes.
        - High effort does not necessarily mean that learning is effective, and low effort does not necessarily mean that learning is ineffective.

Methods

- A purposive sampling was used to collect data for this multiple case study.
- Eight college faculty from CAHIIM-accredited associate degree programs were interviewed.
- Five of the faculty interviewed also participated in a focus group.
- Faculty had experience teaching medical terminology ranging from two to 23 years.

Limitations

Limitations of this study include the following:

- Student views and perspectives on retrieval practice quizzing were not explored in this study.
    - Future studies should explore student perspectives on retrieval practice quizzing to gain insight on what might encourage students to adopt retrieval-based learning strategies more regularly as a study technique.
- Participant reactivity may have influenced the responses of research participants in the interviews and focus group as the researched served as the interviewer.
    - Also, analysis of the data collected is limited by researcher subjectivity, assumptions, and biases.

Recommendations for Practice

1. Encourage faculty to incorporate retrieval practice opportunities in their college-level courses.
2. Encourage faculty to provide timely performance feedback and interventions for students to strengthen students' metacognitive control of future study decisions.
3. Encourage faculty to consider the IdEd conceptual framework (Schachter & Rich, 2011) or another documented practice for enhancing student-faculty relationships in the classroom to foster more intentional and purposeful student engagement with the course material.
    - Students form identities regardless of explicit attention from educators; however, faculty who view students as partners help co-create learning with students by building positive relationships.
    - Purposeful and ongoing interactions between instructors and students promote co-constructed relationships that provide students with agency in the classroom.
    - Acknowledging and promoting student agency in educational experiences may stimulate students' desire to participate more fully in the classroom.

Recommendations for Future Research

1. Explore students' perspectives on retrieval practice quizzing.
2. Conduct studies on retrieval practice quizzing in college settings that measure the impact retrieval practice quizzing has on exam scores.

3. Conduct studies on retrieval practice quizzing in college settings that examine the influence of graded versus optional or non-graded retrieval practice activities and its impact on student completion rates of retrieval practice exercises.

Conclusions

- The study strategies students favor impact their learning.
- Many students rely on passive study strategies such as rereading, highlighting text, and writing notes verbatim (Biwer et al., 2020; Dattathreya & Shillingford, 2017; Karpicke, 2012; Sauvé et al., 2018).
- Although empirical evidence shows that retrieval practice quizzing leads to more effective long-term retention of course information, students tend to underestimate the benefits of retrieval practice quizzing as a study strategy (Biwer et al., 2020; Gurung & Burns, 2019; Maddox et al., 2020; Roediger & Brown, 2020).

References

Biwer, F., Egbrink, M. G. A. oude, Aalten, P., & de Bruin, A. B. H. (2020). Fostering effective learning strategies in higher education – A mixed-methods study. *Journal of Applied Research in Memory and Cognition*, *9*(2), 186–203. https://doi.org/10.1016/j.jarmac.2020.03.004

Dattathreya, P., & Shillingford, S. (2017). Identifying the ineffective study strategies of first-year medical school students. *Medical Science Educator*, *27*(2), 295-307. https://doi.org/10.1007/s40670-017-0396-2

Gurung, R. A. R., & Burns, K. (2019). Putting evidence-based claims to the test: A multi-site classroom study of retrieval practice and spaced practice. *Applied Cognitive Psychology*, *33*(5), 732–743. https://doi.org/10.1002/acp.3507

Karpicke, J. D. (2012). Retrieval-based learning: Active retrieval promotes meaningful learning. *Current Directions in Psychological Science*, *21*(3), 157–163. https://doi.org/10.1177/0963721412443552

Maddox, G. B., Peravali, R., & Linville, T. (2020). Examining the effects of training on young and older adult implementation of spaced retrieval strategies. *Aging, Neuropsychology, and Cognition, 29*(1), 48-69. https://doi.org/10.1080/13825585.2020.1846676

Roediger, H. L., III, & Brown, P. C. (2020). The importance of testing as a learning strategy. *Education Digest, 85*(3), 11-16.

Sauvé, L., Fortin, A., Viger, C., & Landry, F. (2018). Ineffective learning strategies: A significant barrier to post-secondary perseverance. *Journal of Further and Higher Education*, *42*(2), 205–222.

Schachter, E., & Rich, Y. (2011). Identity education: A conceptual framework for educational researchers and practitioners. *Educational Psychologist*, *46*(4), 222–238. https://doi.org/10.1080/00461520.2011.614509