

Open Your Class With This Tomorrow- *The Science of Learning: 99 Studies That Every Teacher Needs to Know 2nd Edition*

Teacher Directions: Provide students with the following summary of a journal article based on the book *The Science of Learning: 99 Studies That Every Teacher Needs to Know, 2nd Edition*. Then, have them answer the practice article analysis question and multiple-choice questions to test their research methods skills.

AP Psychology Style AAQ (Article Analysis Question)

Directions: Respond to all parts of the question using the source provided.

- (A) Identify the research method used in the study.
- (B) State an operational definition of the dependent variable.
- (C) What does the fact that the results were statistically significant mean regarding the impact of spacing out study sessions in the study?
- (D) Identify at least one ethical guideline applied by the researchers.
- (E) Explain the extent to which the research findings may or may not be generalizable using specific and relevant evidence from the study.
- (F) Explain how at least one of the research findings supports or refutes the researchers' hypothesis.

Title: *Spacing effects in learning a temporal ridgeline of optimal retention. Psychological Science*

Rubric

- (A) Identify the research method used in the study.

The study used experimental research.

Experimental research involves manipulating and controlling confounding variables to establish cause-and-effect relationships. In this study, researchers manipulated the duration between revision sessions and observed its impact on participants' performance, which is characteristic of experimental methodology.

- (B) State an operational definition of the dependent variable.

The study's dependent variable is long-term memory retention, operationalized as the participants' performance measured by successful answers on the final exam conducted after various intervals of spaced learning sessions.

The operational definition of the dependent variable clarifies how the researchers measure and quantify memory.

- (C) What does the fact that the results were statistically significant mean regarding the impact of spacing out study sessions in the study?

The results' statistical significance indicates that the improvements in memory retention due to spacing out study sessions were unlikely to have occurred by chance alone.

This suggests that the spacing effect is effective and supports the hypothesis that spacing out study sessions enhances long-term memory retention.

(D) Explain at least one ethical guideline applied by the researchers.

The researchers used informed consent. Before formally agreeing to participate, participants were provided detailed information about the research objectives, procedures, and potential risks.

OR

The researchers ensured confidentiality and anonymity by keeping participants' identities confidential throughout the study.

OR

By maintaining anonymity, participants' privacy rights were protected, and they could answer questions honestly without fear of repercussions. This enhances the credibility and integrity of the research findings while upholding participants' rights to privacy. Ensuring participants' confidentiality demonstrates respect for their privacy and fosters trust between researchers and participants.

(E) Explain the extent to which the research findings may or may not be generalizable using specific and relevant evidence from the study.

The research findings may be generalizable to populations with similar characteristics to the study participants because the sample was representative and diverse in age, gender, and background. The study included a large and diverse sample from different ages and countries, capturing a broad spectrum of perspectives and experiences. Therefore, the findings are likely applicable to populations with similar characteristics.

(F) Explain how at least one of the research findings supports or refutes the researchers' hypothesis.

The findings support the researchers' hypothesis that spacing out study sessions improves long-term memory retention. The statistically significant results demonstrated that longer gaps between study sessions led to better memory recall and recognition over time, indicating that the spacing effect enhances memory retention, as the researchers hypothesized.

Effects of Meditation on Stress Reduction Among College Students

Multiple-Choice Practice Qs

1. What study design was employed in "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?
 - A) Observational study
 - B) Cross-sectional study
 - C) Longitudinal study
 - D) Experimental study

An experimental study design involves manipulating an independent variable (spacing intervals) to observe its effects on a dependent variable (memory retention). In this study, researchers manipulated the duration between revision sessions to assess its impact on participants' long-term memory retention, making it an experimental study.

2. How did the researchers ensure ethical conduct in the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?
 - A) By selecting participants based on their prior knowledge and expertise
 - B) By conducting the study online to ensure accessibility from any standard web browser
 - C) By maintaining participants' anonymity and providing detailed information about the research objectives and potential risks
 - D) By excluding participants from certain countries to ensure homogeneity in the sample

The researchers ensured ethical conduct by maintaining participants' anonymity and providing detailed information about the research objectives, procedures, and potential risks before obtaining consent.

3. How did the researchers utilize effect sizes in the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?

- A) To determine participants' prior knowledge and background
- B) To identify participants' demographic characteristics to evaluate the sample's representativeness.
- C) To ensure random assignment and control for confounding variables.
- D) To compare the magnitude of observed differences between groups, regardless of sample size

Effect sizes (d-values) were used to provide additional context regarding the magnitude of the observed differences between groups, helping researchers understand the practical implications of the findings and the size or magnitude of the observed effects.

4. What is the independent variable (IV) in the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?

- A) Participants' age
- B) Duration between revision sessions
- C) Participants' performance in the final exam
- D) The number of study facts learned

The researcher manipulated the independent variable (IV), which in this study is the duration between revision sessions, to investigate its impact on long-term memory retention.

5. What would be an appropriate dependent variable (DV) in the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?

- A) Participants' age
- B) The level of motivation of participants on a Likert scale
- C) Duration between revision sessions
- D) Participants' scores on the final exam

The dependent variable (DV) is measured and affected by the independent variable (IV). In this study, participants' performance in the final exam serves as an appropriate DV to assess the impact of different spacing intervals on long-term memory retention.

6. What potential confounding variable should be controlled for in the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?

- A) Participant age
- B) Participant performance in the final exam
- C) Duration between revision sessions
- D) Number of study facts learned

Age could be a confounding variable in this study because it may influence memory retention independently of the spacing intervals. Therefore, it should be controlled to ensure that any observed effects on memory retention are not due to age differences among participants.

7. How did the researchers ensure diversity in the participant pool for the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention"?
- A) By selecting participants from a single demographic group
 - B) By conducting the study in a controlled laboratory setting
 - C) By using convenience sampling methods
 - D) By gathering participants of different ages and from various countries

The researchers ensured diversity in the participant pool by gathering individuals of different ages and from various countries, capturing a broad spectrum of perspectives and experiences.

8. Which aspect of the study design in "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention" helps establish causality between spacing intervals and memory retention?
- A) The use of a representative sample
 - B) The inclusion of participants from various countries
 - C) The use of random assignment
 - D) The reliance on self-reported data

Random assignment (placing participants into groups by chance) minimizes bias by ensuring participants are assigned to different spacing intervals in a randomized manner. This helps attribute any observed differences in memory retention to the manipulation of spacing intervals, strengthening the study's internal validity and supporting causal conclusions.

9. Which group in the study "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention" is the control group?
- A) Participants who received feedback after the final exam
 - B) Participants who revised study materials at 7-day intervals
 - C) Participants who revised study materials at 35-day intervals
 - D) Participants who did not receive any manipulation of spacing intervals

The control group in this study consists of participants who did not receive any manipulation of spacing intervals. They serve as a baseline for comparison against the experimental group, allowing researchers to assess the impact of different spacing intervals on memory retention.

10. What role does the control group serve in the "Spacing Effects in Learning: A Temporal Ridgeline of Optimal Retention" study?
- A) To receive the experimental manipulation of spacing intervals
 - B) To provide feedback on the study procedures
 - C) To serve as a comparison against the experimental group
 - D) To gather demographic information from participants

The control group does not receive the experimental manipulation; instead, it serves as a comparison against the experimental group, which receives the manipulation (different spacing intervals). Comparing the control group's performance with the experimental group's performance helps determine the impact of the spacing intervals on memory retention.