



# The Effectiveness of PowerPoint as Used as a Learning Aid When Used in Conjunction with Note-taking



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## Introduction

- PowerPoint is a much used multimedia lecture aid that is widely touted but little researched.
- The most robust finding to date is that PowerPoint enhances learners' interest<sup>1</sup>; whether it enhances learning is less well established.
- Although our previous studies<sup>2</sup> have not found PowerPoint to enhance immediate recall of lecture material, those studies focused primarily on variables directly associated with the PowerPoint presentation.
- One reason we have found no effects may be that student involvement with the lecture is a necessary mediator of PowerPoint's effects.
- For example, a well documented mediator of learners' memory of a lecture is note-taking<sup>3,4</sup>, which is said to create a generative effect<sup>5</sup>.
- A generative effect is the enhancement of learning that occurs from conscious engagement in the lecture.
- We suspect that PowerPoint has the capacity to enhance learner engagement in a lecture by facilitating note-taking.
- Therefore, we conducted an experiment that examined the independent and interactive effects of PowerPoint and note-taking on learners immediate recall and comprehension of a lecture.

## Hypotheses

- Learners asked to take notes will perform better on the immediate recall and knowledge transfer tests than will students who are not asked to take notes, because they will enjoy the generative effects of note-taking.
- Learners in the PowerPoint condition will perform better on recall and transfer tests than will students who are given a lecture without PowerPoint, because they will have less cognitive load.
- PowerPoint and note-taking will interact, because generative effects and reduced cognitive load will act synergistically to create an environment ideal for the recall and comprehension of the lecture material.

## Methods

### Participants

- Psychology students recruited through the Department of Psychology at the University of Wisconsin-Eau Claire
- Females=30 vs. Males=9

### Materials

- Informed consent form
- Test of previous knowledge
- Scantron sheet and #2 pencil
- 2 lectures visually recorded on DVD (one with, one without PowerPoint slides) about neuron communication
- PowerPoint slides giving brief outlines of associated lecture material
- 28 item multiple choice retention tests
- 24 item true/false transfer tests
- Evidence of participation and debriefing forms

### Procedure

- We randomly assigned participants to each of the 4 conditions
- Students read and completed an informed consent form
- Students then completed a test of their previous knowledge of neuron communication
- Participants viewed a lecture that was previously recorded, either with or without PowerPoint slides
- Participants were either encouraged to take notes or asked not to take notes
- Variations in the independent variables were completely crossed
- Lecture speed, presenter and topic were consistent across conditions
- After the lecture participants took a retention test and then a transfer test
- When finished, participants received evidence of participation and debriefing forms

## Results

Table 1

| PPT Condition | Note Condition | Mean  | Standard Deviation |
|---------------|----------------|-------|--------------------|
| No PowerPoint | No Notes       | 18.00 | 4.16               |
| No PowerPoint | Notes          | 18.86 | 4.41               |
| PowerPoint    | No Notes       | 20.00 | 2.83               |
| PowerPoint    | Notes          | 18.11 | 4.91               |

• Table 1 displays means and standard deviations of scores on the retention test. Higher scores indicate better recall of material from the lecture.

- We used an ANOVA to determine the effects of PowerPoint and note-taking on the retention test.
- There were no significant differences between PowerPoint conditions.  
✓  $F(1,35) = .227, p = .64$
- Note-taking had no effect on immediate recall of lecture material.  
✓  $F(1,35) = .154, p = .70$
- There was no interaction between PowerPoint and note-taking.  
✓  $F(1,35) = 1.090, p = .30$

Table 2

| PPT Condition | Note Condition | Mean  | Standard Deviation |
|---------------|----------------|-------|--------------------|
| No PowerPoint | No Notes       | 15.20 | 2.82               |
| No PowerPoint | Notes          | 15.29 | 2.98               |
| PowerPoint    | No Notes       | 15.69 | 3.59               |
| PowerPoint    | Notes          | 14.78 | 2.64               |

• Table 2 displays means and standard deviations of scores on the transfer test. Higher scores indicate better comprehension of material from the lecture.

- An ANOVA was also used to determine the effects of PowerPoint and Note-Taking on the transfer test.
- There were no significant differences between PowerPoint conditions.  
✓  $F(1,35) = .000, p = .99$
- Note-Taking had no effect on comprehension of lecture material.  
✓  $F(1,35) = .166, p = .69$
- There was no interaction between PowerPoint and Note-Taking.  
✓  $F(1,35) = .242, p = .63$

## Discussion

- The results of this study were inconclusive.
- There were neither main nor interactive effects of PowerPoint or note-taking.
- However, before we can conclude that these variables do not influence PowerPoint's impact on learning, or create a generative effect, we must consider difficulties we encountered in our work.
  - Participants may not have been adequately motivated to learn the material, given that:
    - ✓ The extra points offered were not contingent on their performance.
    - ✓ The lecture material was dry and/or difficult to comprehend.
  - Additionally, participants may have had trouble paying attention due to the lack of decorative details; the slides simply consisted of black text on a white background.
  - Finally, this study suffered the limitation of few participants.

• Despite these limitations, the consistency of the current findings with our previous work<sup>2</sup> reinforces our growing conviction that variations in PowerPoint implementation do not influence students' immediate recall of lecture material under these or other conditions.

• Our research has looked only at variations of text-based functions of PowerPoint. Perhaps such variations in the use of PowerPoint have little effect on learning, but rather other features of PowerPoint, including tables, figures, and videos, may influence learning. In fact, a growing literature on multimedia learning has documented powerful effects of these aspects of teaching materials on retention and transfer<sup>6</sup>.

## References

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