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The Effectiveness of Microsoft PowerPoint in Enhancing Student Learning and Presentation Skills

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Abstract

In the realm of formal education, a Microsoft PowerPoint presentation has become one of the most popular teaching technologies. In this paper the author summarizes empirical evidence of its effectiveness in improving cognitive learning outcomes and oral presentation skills for students. The review suggests that there is no consistent effect on cognitive learning across all studies when PowerPoint is used as an additional lecture medium compared to traditional instruction (Hedges' g = 0.067). Positive effects are more likely to be observed for K–12 than university students. Student-made PowerPoint presentations, on the other hand, demonstrate more benefits for the organization of knowledge, visual literacy, and verbal fluency and self-reported improvement in presentation competences, though an overreliance on slides may sometimes lower verbal fluency and engagement of the audience. The author has found that cognitive-load theory and the principles of multimedia-learning can account for the positive and the reported negative aspects of poorly designed slides. The paper highlights the need for continued research on the transfer of presentation skills acquired in the context of PowerPoint based assignments and for studies to focus on examination of the design features and pedagogical integration instead of on comparing the presence of absence of the PowerPoint-based assignment. Suggestions for teachers and course developers are provided.

Keywords: *formal education,* PowerPoint, *Microsoft PowerPoint, presentations.*

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Introduction:

Microsoft PowerPoint has come a long way, especially since its commercial release in the late 1980s, when it was used in the business world for making presentations, to its current ubiquity in classroom instruction and student evaluation. It is used by instructors for organizing the content of lectures, presenting visual representations and providing notes, and by students to organize and present orally, a major part of the grade in many courses. The high usage of software has led to sustained scholarly research on the role of the software and its effects on learning and communication skills, as well as considering conditions for its effectiveness.

The early enthusiasm for PowerPoint was based on the belief that multimodal presentations would enhance attention, understanding, and recall. That optimism has been dampened by subsequent empirical studies. Meta-analytic evidence suggests that using PowerPoint in place of chalk-and-talk or overhead-transparency instruction has little effect on cognitive learning, on average (Baker et al., 2018). Simultaneously, there are also qualitative and mixed-methods studies that report that the design and implementation of student-produced slides can support a deeper engagement with content and measurable improvement in presentation skills (Giang, 2024; student-perception studies, 2024-2025). The conflicting results highlight the need to differentiate instructor-produced PowerPoint from student-created PowerPoint as two different pedagogical practices.

The current paper brings together the available evidence on the use of PowerPoint, summarizes the main theoretical approaches that explain the outcomes observed, identifies some areas of important future research, and provides guidance for practice based on the evidence. Analysis is restricted to peer-reviewed scholarships published primarily since 2010 and with a focus on research studies that used experimental, quasi-experimental or rigorous mixed-methods designs.

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Literature Review

The use of PowerPoint as an Instructional Medium and Cognitive Learning Outcomes. The most detailed quantitative meta-analysis is the one by Baker et al. (2018). Based on 48 independent studies conducted in 22 different years, the overall effect size was Hedges' g = 0.067 (95 % CI [−0.103, 0.236]), not significantly different from 0.The overall effect size was Hedges' g = 0.067 (95 % CI [−0.103, 0.236]) which is not statistically different from 0, based on 48 independent studies conducted in 22 different years. The heterogeneity was found to be significant (I^2 = 91 %). There was a moderate positive effect (g = 1.079) for samples from a K–12 program, and nearly none at all (g = 0.006) for samples from a college program when analyzed by the moderator. These results indicate that it may be beneficial to younger learners to have well-designed slides that provide additional visual structure and dual coding, but that university students, who have already been trained to receive abstract verbal information, do not gain significantly from such slides.

Previous studies by Bartsch and Cobern (2003) showed that preference for PowerPoint does not necessarily lead to better learning. PowerPoint lectures were favored by students over overhead-supported lectures but the performance in the quiz suffered when the PowerPoint images were irrelevant or the background music was inappropriate. Later studies have found that the use of unnecessary decorative elements leads to an increase in cognitive load and a decrease in retention (Mayer, 2021). However, the opposite of these multimedia-learning principles (short text, appropriate graphics, and temporal contiguity between audio and visual information) can assist understanding without impacting working memory.

Another area of study focuses on the implications of giving students slide handouts prepared by the instructor. Several investigations have linked the use of full slides before class to reduced attendance and, in some cases, reduced performance on exams (Worthington & Levasseur, 2015; subsequent within-subject designs, 2021). The effect of individual-difference moderators is important: In some instances, students with high self-efficacy seems to benefit from handout

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provision, while students with low self-efficacy and female students seem to suffer from handout provision (PowerPoint-slide-provision study, 2019). All these findings raise doubts about the routine use of PowerPoint as a panacea for all the pedagogical issues.

Develop PowerPoint skills and presentation techniques created by students.

If students create their own PowerPoint presentations and present them, a different pattern of outcomes occurs. Student-perception studies (2024) and student-information and learning from the preparation process (2024) suggest that the preparation process fosters depth of content processing, organizational skill development, and self-efficacy in public speaking. Students say that making slides makes them engage in the selection of main ideas, ordering of arguments, and thinking about visual rhetoric, which are all consistent with the principles of constructive learning. In an investigation with English-majored undergraduate students, participants found PowerPoint to be useful for supporting their verbal presentations and structuring their presentations, but they also noticed that reading off a screen can limit verbal fluency and spontaneous interaction with the audience (Giang, 2024).

These systematic reviews of oral-presentation competence in higher education focus on the importance of design features such as practice opportunities, timely feedback and modeling (van Ginkel, et al., 2015, 2019). The practice element may be provided in PowerPoint assignments, but the success of these assignments relies on the level of feedback that is provided and on explicit teaching of both slide design and delivery technique. The perceived benefits of slideshow-based assignments that have been published from 2020-2025 consistently include the reduction of anxiety, an improvement in structure, and peer collaboration, while technical problems and stage fright are common problems.

Theoretical Frameworks

There are two conflicting theories that account for the effects of PowerPoint. According to cognitive load theory (Sweller, 2010), there are three types of cognitive load, intrinsic, extraneous, and germane load. Unstructured slides, with redundant text or decorative slide objects or bulleted lists with many items,

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increase the extraneous load and reduce the resources for schema building. The cognitive theory of multimedia learning (Mayer, 2021) also outlines key design principles: coherence, signaling, redundancy, spatial and temporal contiguity, and modality, that all help to optimize the processing of dual channels. These principles, when violated in an empirical way, consistently give sub-optimal learning results while compliance can result in modest benefits, especially when dealing with complex or spatially based content.

Research Gap

Although 20 years of research have been conducted, there are a number of key gaps. First, most studies examine whether a PowerPoint is used or not, rather than systematically manipulate a range of features (slide density, visual complexity, interaction). Second, there is limited evidence of the transfer of PowerPoint presentation skills to real-world settings. Third, the relationship between the learner's characteristics (prior knowledge, self-efficacy, cultural background) and slide design has been studied only occasionally. Lastly, there's been a rapid evolution in collaborative and cloud features of PowerPoint, along with generative AI for slide creation that has outstripped empirical testing. These gaps need to be addressed through research designs that are beyond binary comparisons, and which measure proximal learning outcomes as well as distal skill transfer.

Objectives

This is the current synthesis, which has three related goals:

To summarize the quantitative and qualitative evidence related to the effect of instructor delivered PowerPoint on the students' cognitive learning outcomes.

2. To test student created PowerPoint presentations in helping to develop oral presentation competence and related academic skills.

3. To elicit, in theory, design principles and pedagogical practices that maximize the educational value of PowerPoint, while minimizing documented drawbacks.

Methodology

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The narrative systematic-review approach is used in this paper. A search on the major academic databases (ERIC, PsycINFO, Web of Science, ScienceDirect, and Google Scholar) was conducted by combining the following keywords: PowerPoint, student learning, presentation skills, cognitive load, and multimedia learning. Studies that included original data or quantitative synthesis about learning outcomes or presentation competence in formal educational environments were included. Experimental and quasi-experimental studies and mixed methods designs were favored, and descriptive or opinion pieces were not included. The product of this was a themed interpretation of the different types of PowerPoint use provided by the instructor versus the students, based on the cognitive-load theory and the multimedia-learning theory.

Results

There are three main findings from the synthesis. First, if PowerPoint is used only as a presentation medium for the teacher, the impact on cognitive learning is almost nonexistent. The overall null effect of this conclusion remains the most compelling quantitative statement from the research of Baker et al. (2018); later primary studies have reported further instances of positive results with younger children and with content that can be illustrated.

Second, giving students full slides prior to class often decreases attendance and can have a negative impact on those with low self-efficacy. Partial (or guided) note taking versions of slides do not seem to be as harmful and can aid in note taking if prepared using multimedia principles.

Third, when students create their own PowerPoint presentations, gains in content organization, visual literacy and presentation confidence are related to the PowerPoint.Third, gains in content organization, visual literacy, and presentation confidence are associated with the creation of student PowerPoint presentations. The quality of instructional scaffolding (explicit instruction on slide design, rehearsal time, and scaffolding feedback from peers and/or instructors) has an impact as well; positive outcomes are strengthened by scaffolding, while no

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scaffolding may result in presentations with so much text that the audience goes to sleep.

Discussion

All the evidence indicates that PowerPoint can be neither a positive nor a negative tool; it can be either a good or a bad educational tool, depending on the quality of the design and the pedagogical integration. If the instructor considers the software as a means of delivery, extraneous cognitive load may be high. However, when teachers make the construction of slides a learning process, and ask students to design coherent visual-verbal arguments using complex content, they can facilitate deeper processing and transferable communication that is essential to students.

Theory and evidence leads to practical recommendations. Minimal text, relevant (not decorative) graphics, and clear indication of conceptual structure on slides. The spoken narration should reinforce the text that is on the screen. For presentations, formative feedback should include feedback on content accuracy as well as delivery, there should be explicit feedback on design principles and there should be timed rehearsal opportunities. The visual product can also be assessed by multi-source evaluation (self, peer, and institution) instead of by the instructor.

The present synthesis has a number of limitations, including the relative lack of studies undertaken outside Western contexts of higher education and the predominance of short-term outcome measures. Longitudinal study designs are recommended for future studies, exploring how new AI tools for creating slides, like ChatGPT, affect the learning experience, and how cultural values of visual communication influence PowerPoint pedagogy.

Conclusion

Microsoft PowerPoint is a powerful instructional technology that is very context-dependent in terms of its effectiveness as an educational tool. Meta-analytic evidence suggests that it is not a reliable method to enhance cognitive learning in

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university students when used as a traditional method of teaching lectures; this may apply to younger students. When carefully integrated into a learning context involving modeling, practice, and feedback, student-made PowerPoint presentations make a meaningful contribution to learning in areas of organization, visual literacy, and oral presentation. Rather than ask the question of whether PowerPoint should be used, educators and researchers are encouraged to focus on questions of how the PowerPoint features can be used to help achieve specific learning goals, while respecting the human 'working memory' limitations. Empirical studies of design variables, student characteristics and long-term skill transfer will continue to support further development of evidence-based practice.

Conflict of Interest

The authors declare that they have no financial, professional, technological, commercial, institutional, or personal conflicts of interest that could have influenced the content, interpretation, or conclusions presented in this article.

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Data Availability

No new clinical, experimental, or patient-level datasets were generated or analysed during this study. All information discussed in the review was obtained from the published literature and publicly available sources cited in the manuscript. Additional information relating to the review may be obtained from the corresponding author upon reasonable request.

Informed Consent

Not applicable. No patients or other human participants were recruited, and no identifiable personal or clinical information was collected or analysed for this review.

Use of Generative AI

The authors declare that no generative artificial intelligence tools were used to conduct the literature review, generate the scholarly content, interpret the

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evidence, or formulate the conclusions presented in this article. The discussion of generative AI, artificial intelligence, and machine-learning technologies in the manuscript relates solely to their applications in healthcare resource optimization and does not constitute their use in preparing the article.

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