

ABSTRACT

Title of Document: TEACHER EDUCATION STUDENTS'
PERCEPTIONS OF USE OF MS
POWERPOINT AND THE VALUE OF
ACCOMPANYING HANDOUTS

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Doctor of Philosophy, 2007

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This research study investigated issues related to use of Microsoft (MS) PowerPoint presentation software program in teacher education and drew attention to the significant value of handouts that accompany PowerPoint presentations. Graduate and undergraduate teacher education students at four higher education institutions were surveyed through semi-structured interviews and questionnaires concerning their views on use of PowerPoint and related handouts. Interviews provided qualitative findings, while questionnaires gave both qualitative and quantitative results. The results of Mann-Whitney U tests indicated that both graduate and undergraduate students perceived PowerPoint to be a useful learning and teaching tool, but results also showed that significant differences existed between the

perceptions of graduate students and undergraduates, with undergraduates reporting fewer class discussions when PowerPoint is used.

Majority of students expressed the belief that handouts accompanying PowerPoint presentations were very important for their learning, as shown by qualitative and quantitative results. This study also revealed that undergraduate students, compared to graduate students, take fewer notes during a PowerPoint presentation if they receive a handout. Qualitative results indicated that “guided-note” handouts, which provide a skeleton of the PowerPoint presentation without giving complete lecture notes, were found to be the most effective way to facilitate active learning and note-taking, in the students’ perceptions.

TEACHER EDUCATION STUDENTS' PERCEPTIONS OF USE OF MS
POWERPOINT AND THE VALUE OF ACCOMPANYING HANDOUTS

By

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Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2007

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DEDICATION

This dissertation, which is the culmination of many hours spent in study, is dedicated with love to my family.

To my parents
Aysel and Nasip Yilmazel

for their unconditional love, support, and for instilling the value of education in me.

To my son
Sarp Şahin

who was born in the midst of this quest and has always been a continual reminder of what is truly important

I also dedicate this to my best friend, my husband
Serdar Şahin

who during all these years has been standing by my side, inspiring me, supporting me and believing in me every step of the way.

Without each one of you, my dream could not have come true.
I love you so very much!

ACKNOWLEDGEMENTS

First and foremost, I want to thank God, Who has always been a source of strength to me all my life.

Heartfelt gratitude, appreciation and thanks go to the members of my doctoral committee, Dr. Rebecca L. Oxford, Dr. Vedat Diker, Dr. Margaret Ann Kassen, Dr. Millicent Kushner, and Dr. Roberta Lavine for guiding me through this journey by giving me constructive feedback during all the stages of my dissertation. My utmost respect and gratitude go to my advisor, Dr. Rebecca L. Oxford, who has given me unconditional support in every aspect of my professional development at the University of Maryland. There are no words to describe how grateful I am for all your encouragement, support and untiring help. I only hope that some day, I inspire others the way you inspire me every day.

Special thanks to Dr. Steve Koziol, Dr. Perla Blejer, Dr. Roberta Lavine, Dr. Melinda Martin-Beltran, Dr. Megan Peercy, Dr. Gloria Park, Dr. Elizabeth Marshall, Dr. Sarah Shin, Dr. Christine Mallinson, Dr. Debra Suarez, Mrs. Holly Stein, Mr. Howie Stein, Jordan Schugar, Heather Ruetschlin, Emek Ergun, Tommy Totten, Julia Dietering, and Simone Cade for their assistance in my data collection.

I also want to acknowledge and give special thanks to the volunteer teacher education students who participated in this study without whom this dissertation would not be a reality.

Finally, I would like to thank my entire family, especially my mother-in-law Nezahat Şahin, for their constant support in this wonderful journey.

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CHAPTER 1: INTRODUCTION

Overview

The purposes of research study in this dissertation were to: (a) explore teacher education students' attitudes about PowerPoint's influence on student learning, instructional features, instructors' overall teaching, and specific aspects of instructors' performance; (b) understand the value of PowerPoint handouts for students; and (c) identify potential differences between graduate and undergraduate students' perceptions on the two topics in the prior objectives. Teacher education students' perceptions are particularly important because many of these students aspire to positions as teachers, administrators and university faculty members with an opportunity to implement what they have learned in teacher education. Thus, as future educators, their views can help shape the future of the education system. Since students are known to implement what they have learned about instructional technology (Abbott & Faris, 2000; Bitner & Bitner, 2002; Carney, Lisowski, Drabik, Skarupski, Lisowski, Blasko, & Bohl, 2002; Flick & Bell, 2000; Willis & Raines, 2001), understanding their perceptions about PowerPoint and about accompanying handouts may guide us in understanding how they will use these tools in their own teaching.

The chapter begins with some background information about MS PowerPoint as a presentation tool. Then the statement of the problem is laid out, providing a concise discussion of the concerns regarding use of PowerPoint as a teaching and learning tool in teacher education. Then the purpose of the study, the significance of the study, and the research questions are explained. In the theoretical framework section, Mayer's "Cognitive Theory of Multimedia Learning" (2001), the theory that this study is built

upon, is introduced. Then the study's limitations and a summary conclude this chapter.

Background

Although Microsoft PowerPoint has not been around all that long (Rogers, 2001), many of us feel like we have always had PowerPoint because it seems ubiquitous, from business and education to politics and leisure. Some amount of PowerPoint expertise is becoming expected for anyone in academic practice and others involved in teaching, at least in the modernized parts of the world. We seem to be fast approaching the situation in which one must have a PowerPoint presentation when presenting at local, national or international conferences. In the corporate world, PowerPoint became such an indispensable tool that appearing "at a meeting without PowerPoint would be unwelcome and vaguely pretentious, like wearing no shoes" (Parker, 2001, ¶ 8).

The use of PowerPoint as a teaching tool is becoming more and more widespread with instructors in teacher education, especially with those who wish to integrate multimedia technology into their teaching and model technology use in the classroom. The sheer popularity of this presentation tool comes from the belief that representation of information using auditory and visual inputs improves learning (Mayer & Moreno, 2003).

Statement of the Problem

Despite the frequency of PowerPoint use in the higher education context, little research exists on the students' perceptions of the use of PowerPoint as a teaching tool (Frey & Birnbaum, 2002). Research on PowerPoint in teacher education is even more limited.

Researchers have strongly urged that students' attitudes and behavior in

technologically enriched learning environments need to be better investigated (Gery, 2001; Lock, 2002), as there seems to be an important relationship between students' perceptions of learning environment and learning outcomes (Byrne, Flood, & Willis, 2002; Entwistle 1998; Prosser & Trigwell, 1997; Ramsden, 1992). Therefore, it is important to better understand how students perceive the use of PowerPoint and the value of accompanying handouts in the classroom.

Existing research on PowerPoint has focused on two areas: (a) PowerPoint vs. overhead transparencies or traditional lectures (Kask, 2000; Lowry, 1999; Mantei, 2000), and (b) students' attitudes and performance in classrooms in which PowerPoint is utilized (Atkins-Sayre, Hopkins, Mohundro, & Sayre, 1998; Daniels, 1999; Frey & Birnbaum, 2002; Harknett & Cobane, 1997; Kask, 2000; Lowry, 1999; Mantei, 2000; Sammons, 1995; Szabo & Hastings, 2000). However, studies investigating the current use of PowerPoint and the value of accompanying handouts from the perspectives of graduate and undergraduate students in teacher education have been seriously lacking. This study aimed to fill this major gap in the existing research literature.

Purpose

The purposes of this research study, therefore, were to uncover:

1. Students' attitudes toward the use of PowerPoint in teacher education, specific reasons for these attitudes, and areas of attitudinal congruence and incongruence between graduate and undergraduate students.
2. Students' perceptions of the value of PowerPoint handouts and the extent to which perceptions differ between graduate and undergraduate students.

The reason for comparing perceptions of graduate and undergraduate students was

that students' characteristics, such as prior knowledge and educational experience potentially influence students' perceptions, which may result in differences in academic performance (Ramsden, 1992).

Significance

This research study investigated the current use of PowerPoint in teacher education from the perspectives of graduate and undergraduate students. With such knowledge, an approach to teaching with PowerPoint could be devised to improve learning outcomes. This study is significant in the following respects:

1. Research studies have looked at students' attitudes toward use of PowerPoint in higher education in general but no prior study has examined the attitudes of teacher education students. In addition, no prior study has even compared the perceptions of graduate and undergraduate students regarding PowerPoint. Students' attitudes reflect the extent to which their instructors use PowerPoint to promote effective and meaningful learning. Research on this was essential because teacher educators are expected to serve as technology integration role models so that their students, as teachers or administrators, can integrate technology in the schools (Backer & Saltmarch, 2000; Strudler, McKinney, Jones, & Quinn, 1999; Swain, 2005; Willis & Mehlinger, 1996).
2. No prior study has examined the value of handouts that accompany PowerPoint presentations as perceived by teacher education students. This study investigated this question and looked at the differences between the perceptions of graduate and undergraduate student regarding the value of handouts that accompany PowerPoint presentations.

In summary, this study advanced our understanding of PowerPoint as a teaching tool in graduate and undergraduate teacher education contexts. Therefore, it has the promise of contributing to the effectiveness of implementation of PowerPoint and the use of handouts in teacher education.

Research Questions

Research Questions Concerning Students' Attitudes about PowerPoint (AP)

AP. 1. a. What are students' attitudes about PowerPoint's influence on student learning in teacher education?

AP. 1.b. Do differences exist between graduate and undergraduate students' attitudes about PowerPoint's influence on student learning?

AP. 2. a. What are students' attitudes towards PowerPoint's influence on instructional features (e.g., discussions, lesson organization, and use of time) in teacher education?

AP. 2. b. Do differences exist between graduate and undergraduate students' attitudes about PowerPoint's influence on instructional features?

AP. 3. a. What are students' attitudes towards PowerPoint's influence on instructors' performances in teacher education?

AP. 3. b. Are there any significant differences between graduate and undergraduate students' attitudes about PowerPoint's influence on instructors' performances?

Research Questions Regarding Value of PowerPoint Handouts (PH)

PH.1.a. How do students perceive the value of PowerPoint handouts?

PH.1.b. Do perceptions of graduate and undergraduate students differ concerning the value of PowerPoint handouts?

Definitions of Terms

“Guided-note” handouts: These are presentation handouts that outline or map main points in a lecture, but leave blank space to encourage student note-taking. As the lecture progresses, students are expected to identify main points and fill in the spaces with content (Neef, McCord, & Ferreri, 2005).

Ineffective and Poor Teaching with PowerPoint: Ineffective and poor teaching with PowerPoint environment is mainly characterized by straight-lecturing for the entire class period, which forces students to become passive listeners and learners.

Effective and Meaningful Learning with PowerPoint: Effective and meaningful learning with PowerPoint environment provides students opportunities to ask questions and interact with problems and content and encourages students to actively participate in the learning process.

Theoretical Framework

In the 1990s, PowerPoint had become a very popular teaching tool in academia (Murray, 2002). Learning PowerPoint did not require major technical skills and familiarity with high-tech technologies. Moreover, it allowed faculty to integrate multimedia components easily such as graphics, sound, video, animations, and charts into their presentations, which supposedly made the lessons more interesting, engaging and structured (Susskind, 2005). As a result, many teacher education faculty members began using PowerPoint presentations in their teaching.

One line of research that can help us understand how effectively PowerPoint can be utilized in instruction is cognitive science. Cognitive science deals with how the human mind works: how people learn, how they remember, and solve problems (Cooper,

1998). They also research the role of short-term memory in processing information during instruction. This study adopted Mayer's "Cognitive Theory of Multimedia Learning" (2001) as the theoretical basis for the study of students' perceptions of use of PowerPoint in teacher education.

Cognitive Theory of Multimedia Learning

Mayer, who has studied how the design of multimedia learning tools affect cognition over the past thirteen years, defines *multimedia instruction* as "presentation involving words and pictures that are intended to foster learning" (2001, p. 3). Mayer (2001) offers a cognitive theory of multimedia learning (Figure 1.1), in which he suggests that visual and verbal representations can complement one another and that meaningful learning happens when learners make connections between visual and verbal representations. This theory is based on three assumptions:

- *The dual-channels assumption*: Humans have two separate channels—an auditory/verbal channel for processing verbal information and a visual/pictorial channel for processing pictorial verbal information (Paivio, 1986; Baddeley, 1992).
- *The limited-capacity assumption*: Each channel has only a limited capacity for processing information at one time (Baddeley, 1992; Chandler & Sweller, 1991).
- *The active processing assumption*: Meaningful learning requires making meaningful connections between words and pictures (Mayer, 1999; Wittrock, 1989).

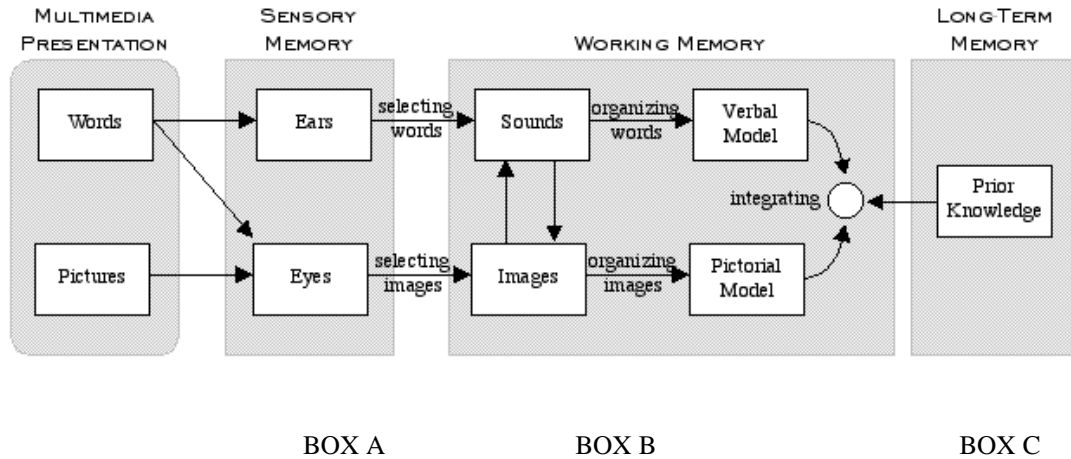


Figure 1-1 Cognitive Theory of Multimedia Learning (Mayer, 2001, p.44), adapted

In this model, there are three memory boxes: sensory memory, working memory and long-term memory. Visual and verbal representations, namely words and pictures (see far left side of Figure 3), come from the outside world as a multimedia presentation enter sensory memory through the eyes and ears. As shown in Box A, sensory memory holds pictures and printed text as exact visual images for a very brief period of time in visual sensory memory. It also holds spoken words and other sounds in the auditory sensory memory for a brief period of time. The arrow from Words to Eyes refers to printed text registered in the eyes. The visual and verbal representations that are perceived then enter working memory of the brain if they are attended to, as depicted in Box B. Learning takes place when the information moves from working memory into long-term memory (see Box C). However since working memory has a limited capacity to process information pieces at the same time (Miller, 1956), unless a conscious effort is made to identify, classify and assign meaning to the new information and transfer to long-term memory, it is gone forever. Long-term memory has an unlimited capacity to store information over long periods of time, asserts Weiten (1998). Working memory can

be compared to a small chalkboard (Macromedia, 2006). You write information on it, but it fills up quickly because it is very small. To put more information on the board, you need to erase it. Before erasing it, in order to retain the information, you write the information somewhere else, may be on a bigger chalkboard, which is your long-term memory. However, since you're working against time, not everything on the chalkboard can be transferred to the bigger board. Some of it is lost before you transfer information from your working memory to your long-term memory. In his model, Mayer (2001) suggests that learners construct coherent pictorial and verbal representations from the incoming words and images. Then they merge the verbal and the pictorial (Box B) and the relevant background knowledge (Box C), as shown with the arrow labeled *integrating* in Box B. It is also proposed that the “selecting and organizing processes may be guided partially by prior knowledge activated by the learner” (Mayer & Moreno, 2003, p. 45)

Based on his cognitive theory of multimedia learning, Mayer (2001) proposes seven principles for multimedia learning (Table 1.1). These principles can serve as a basis for educators in creating pedagogically effective multimedia materials, such as PowerPoint presentations.

<i>Table 1-1 Principles of multimedia learning (Mayer, 2001)</i>	
<i>Multimedia Principle</i>	Students learn better from words and pictures than from words alone (Mayer, 2001, p. 63).
<i>Spatial Contiguity Principle</i>	Students learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen (Mayer, 2001, p. 81).
<i>Temporal Contiguity Principle</i>	Students learn better when corresponding words and pictures are presented simultaneously rather than successively (Mayer, 2001, p. 96).
<i>Coherence Principle</i>	Students learn better when extraneous material is excluded rather than included (Mayer, 2001, p. 113).

<i>Table 1-1: Principles of multimedia learning (Mayer, 2001), continued</i>	
<i>Modality Principle</i>	Students learn better from animation and narration than from animation and on-screen text; that is students learn better when words in a multimedia message are presented as spoken text rather than printed text (Mayer, 2001, p. 134).
<i>Redundancy Principle</i>	Students learn better from animation and narration than from animation, narration and text (Mayer, 2001, p. 147).
<i>Individual Differences Principle</i>	Design effects are stronger for low-knowledge learners than high-knowledge learners and for high-spatial learners than for low-spatial learners.

Limitations of This Study

Four possible limitations of this study should be noted. First, random sampling was not used. Therefore, the degree of generalizability is not fully known.

Second, because participants came from four institutions that have certain characteristics, generalizability of results beyond the types of institutions here should be done with care.

Third, cultural differences could exist in students' perceptions of use of PowerPoint and accompanying handouts in teacher education. As presented in Chapter 3, 36.4% of the interview participants and 22.7% of the questionnaire participants were non-native speakers of English. However, differences between native and non-native English speaker students with regard to specific cultural backgrounds were not studied in this research as none of the research questions concerned cultural differences.

Fourth, this study assumes that students' response to the question regarding their current educational level (graduate and undergraduate) is an adequate measure of that

variable. This may not necessarily be the case since there might be a very small number of undergraduate students who might have taken graduate courses in which PowerPoint was used. However, student responses are arguably a reasonable representation of the current educational level for the vast majority of students.

Summary of Chapter 1

This chapter provided an overview of the PowerPoint's role in our society and in education and then presented a statement of the problem, purpose of the study, significance of the study, research questions, and definitions of terms in the research study. Next came a rationale for adopting Mayer's "Cognitive Theory of Multimedia Learning" (2001), followed by limitations of the study.

CHAPTER 2: LITERATURE REVIEW

Overview

This literature review is organized into six sections. The first section describes why students' perceptions matter. The second section presents the background and history of PowerPoint's development as a software program. The third section complements the first section by explaining how PowerPoint became a cultural phenomenon around the world. The fourth section explores the reason for the popularity of PowerPoint among many teacher education faculty members. The fifth section describes the attitudes of teacher education students toward the use of PowerPoint in classrooms. The sixth section explores contrasting standpoints taken by researchers in the debate over the effectiveness of PowerPoint as a presentation tool. Finally, the seventh section examines the value of handouts as learning tools.

Why Students' Perceptions Matter

This study assumes that students' perceptions serve as a dynamic element in the student learning process. Therefore, students' attitudes towards the use of PowerPoint and accompanying handouts may be of value to teacher educators and administrators as the results of this study provided empirical data on which instructional decisions and investments in PowerPoint-enriched instruction could be based.

Research on the relationship between students' perceptions of learning environment and learning outcomes suggest that students' perceptions have a significant and critical impact on their learning, thinking and achievement (Byrne, Flood, & Willis, 2002; Entwistle, 1998; Prosser & Trigwell, 1997; Ramsden, 1992). This is mainly

because students' perceptions of the learning environment influence the kinds of learning approaches they adopt, which in turn have an affect on students' academic performance (Marton & Booth, 1997; Prosser & Trigwell, 1997; Ramsden, 1992). Entwistle, McCune, and Hounsell (2002) suggest that the perception of teaching affects students' learning more than the teaching method itself. Walberg (1976) argues that students' perceptions act as mediators in the student learning process, which could be used to assess the quality of learning environments. Hativa (2001) discusses that the lack of cohesion between students' perceptions of good teaching and their assumptions about the instruction they are receiving (e.g., teaching, and assessment) could lead to less than optimal learning for students.

Students' perceptions also have an important role in determining how students view instructional materials (Entwistle, 1987; Entwistle et al. 2002). For instance, Salomon (1984) showed that the way students conceived of the instructional materials (working with television and printed materials) influenced the cognitive effort they put in their learning task. Hassall and Joyce (2001) found that students' perceptions of the assessment methods have an impact on the learning approaches students follow to understand the materials. Therefore, design of a learning environment that fosters positive student perceptions towards learning is an important factor in creating a high quality teaching and learning for students (Lucas, 2001).

Students' perceptions of effectiveness of instruction are also extensively used in course and instructor evaluations. Although the use of students' ratings for the evaluation of teaching effectiveness remains controversial due to the scale development, reliability, and validity concerns (Greenwald, 1997, Marsh & Roche, 1997), students ratings are still

considered to be “the single most valid source of data on teaching effectiveness” (McKeachie, 1997, p. 1219). There is substantial evidence that feedback from student evaluations can improve teaching performance (Centra, 1993; Marsh & Roche, 1997; Menges, & Brinko, 1986; Tiberius, Sackin, Slingerland, Jubas, Bell, & Matlow, 1989) because student feedback helps instructors identify and reflect on their relative strengths and weaknesses and modify their instruction accordingly (Marsh & Roche, 1997). Moreover, since students’ perceptions of teaching performance are considered as an important part of the overall assessment of an instructor, formal student evaluations are extensively used in retention, promotion, tenure and merit-pay decisions in higher education (Moore & Trahan, 1998).

History of PowerPoint

PowerPoint’s history is most interesting. According to Parker (2001), who chronicled the background and history of PowerPoint's development, the first prototype of PowerPoint was created in 1981 by a computer scientist named Whitfield Diffie. Diffie, who was working for Bell-Northern Research in Mountain View, California at the time, developed a program to design a slideshow on paper for presentation by overhead projectors. However, he himself never profited from his idea because he failed to recognize its full potential. Bob Gaskins, a colleague of Diffie back in 1981, gets credit as the “master architect” of PowerPoint because Gaskins saw the potential of a graphics program that could revolutionize the design and production of presentation materials. Both Gaskins and Diffie have always acknowledged each other’s role in the creation of PowerPoint. While Gaskins accepts Diffie as his inspiration, Diffie recognizes Gaskins’ auxiliary yet essential role. As Diffie said in an interview, "Bob was the one who had the

vision to understand how important it was to the world. And I didn't" (Parker, 2001, ¶15).

Gaskins envisioned a program “that would work with Windows and Macintosh, and that would put together, and edit, a string of single pages, or “slides” (Parker, 2001). In 1984, Gaskins joined a software firm called Forethought and hired Dennis Austin, a software developer to work with him. Together they refined Gaskins’ vision and developed “Presenter”, a black-and-white slideware program (Amare, 2004). Users could generate text and graphics pages by Presenter and then print and convert these pages into overhead transparencies via a copy machine. Presenter later became PowerPoint in 1984 (Amare, 2004).

In 1987, Forethought released PowerPoint 1.0. This first version was available only in black-and-white and only for the Macintosh users but it was an immediate success. Realizing the potential of PowerPoint, Microsoft acquired Forethought for fourteen million dollars shortly after the 1987 product release. In 1990, Microsoft launched the first PowerPoint for Windows. As a marketing strategy Microsoft coupled PowerPoint with Word and Excel to form the invincible Microsoft Office, a suite of software programs. As a result, PowerPoint’s use escalated dramatically (Parker, 2001) and the world hasn't been the same since.

PowerPoint had been created to meet the needs of the new corporate world of interdepartmental communication (Parker, 2001). As the organizations grew and became more competitive, they realized that it was effective interdepartmental communication that gives an organization a competitive edge. In other words, sharing complex information effectively with multiple people in face-to-face meetings was essential for the companies to survive and compete in the new information age. With the introduction

of PowerPoint to the business world, a new business presentation genre emerged and changed the way people communicate information (Yates & Orlikowski, in press).

In business, people started using PowerPoint for several purposes including company presentations about past successes and goals for the company, for business presentations to investors, for team meeting presentations, for training, and for product demonstrations to press and customers. PowerPoint became the most popular must-have visual aid medium in the corporate world (Munter, 2003; Munter & Russell, 2002). Soon after its enormous success in business, PowerPoint migrated into other areas and became a true cultural phenomenon.

PowerPoint: A Cultural Phenomenon

PowerPoint is everywhere these days. There are thousands of books, websites and blogs entirely devoted to PowerPoint. Microsoft estimates that at least 30 million PowerPoint presentations are made everyday (Parker, 2001). What was life like before PowerPoint? Some would ask whether there was indeed life before PowerPoint, while others (as we will see in a later section) would question whether there is life *after* PowerPoint.

The last twenty-five years have seen PowerPoint become not just the world's most popular presentation software but also a mass cultural phenomenon throughout the modern world. We can barely recall life without it. Nowadays PowerPoint is in court rooms, daycare centers, and churches. It even appears at wedding receptions and birthday parties.

Attorneys use PowerPoint presentations for their opening statements in criminal cases. In the case of State vs. Sucharew, the Arizona Court of Appeals ruled that there

was nothing inherently illegal or unfair about a prosecutor using a PowerPoint presentation in an opening statement, in which the prosecutor provided a slide show of photographic exhibits (Fisher, 2003). PowerPoint presentations are also used by daycare centers to market their childcare programs during open house days. Recently, I attended an open house of a childcare program, where program director gave parents detailed information about their programs and registration requirements through a PowerPoint presentation. Parents were especially impressed with pictures of happy students engaged in activities such as playing in the playground or enjoying the children's wading pool in the summer. The PowerPoint presentation worked like magic. Almost everyone in the presentation room signed up their child in the program after the presentation was over.

PowerPoint is also used as an entertainment tool. Nowadays at the wedding receptions, as guests take their seats, people are treated to slide shows of side-by-side baby pictures of bride and groom, or pictures with friends and family along with explanatory text and a romantic music all created by PowerPoint (Parker, 2001). PowerPoint conquered even America's churches. Twenty-first century clergy use modern presentation technology to spread the old message. A 2003 study conducted by Ellison Research, a Phoenix-based marketing research company, surveyed clergy to find out whether the overall style of worship in their congregation had changed in the last five years (Religion News Service, 2004). Results showed that the use of electronic media in church services increased dramatically in five years. The use of PowerPoint or similar computer graphics during worship rose from 5 percent in 1999 to 36 percent in 2004. In a similar study by Ellison Research, 66 percent of church ministers surveyed reported that using PowerPoint or other graphics during worship would become significant in the next

five years. Currently churches use PowerPoint presentations to convey information or promote events during worship services. Many churches use PowerPoint to display lyrics on a screen for people to follow the words. There is even a website called eBibleTeacher.com that supplies free PowerPoint backgrounds with Bible themes and worship graphics (Parker, 1999). On this website, churches can find a variety of free materials such as Bible maps and complete PowerPoint sermons with speaker notes. “Finding Wellness for the Soul” and “Marks of a True Christian” are examples of sermon titles found on PowerPoint (see Figure 2.1). People can download these sermons, edit and use them for their own purposes. There are also sermons on CD that are on sale on this website.



Figure 2-1 PowerPoint slide from “Soul Wellness” sermon on PowerPoint with presentation outline and speaker notes
(Source: <http://www.eBibleTeacher.com>, 2006)

Towards mid-90’s, PowerPoint continued its march on the road to success. A major field that got its share from PowerPoint’s rapid spread has been education.

Although Microsoft admits that PowerPoint's infiltration into schools was not planned when the program was initially developed (Guernsey, 2001), the company was quick to recognize the mass education market for PowerPoint. In the mid-1990's, schools were already in the midst of an educational technology transformation induced by emerging information and communication technologies, an initiative largely supported by the government and technology companies (Guernsey, 2001). For instance, according to a 2004 report by National Center for Education Statistics (NCES), the ratio of students to instructional computers with Internet access in American public schools was 12.1 to 1 in 1998 whereas this ratio dropped to 4.8 to 1 in 2002. This ratio was computed by dividing the total number of students in all public schools by the total number of instructional computers with Internet access in all public schools including schools with no Internet access.

Microsoft saw this period as a business growth opportunity to market its "Microsoft Office", a suite of software programs that includes Word, Excel, and PowerPoint. Microsoft's effective strategic management has played a key role in the success of Microsoft Office. Creating partnerships with government and educational institutions, donating millions of dollars worth of equipment, offering software discounts to school districts, free online tutorials and sample lesson plans, and sponsoring professional development workshops for teachers (Microsoft Presspass, 1999) were some of the strategies that carried Microsoft to success in the education sector (Shor, 2004). "Microsoft believes that the most important use of technology is to improve education," stated Bob Herbold, Microsoft's executive vice president and chief operating officer who headed Microsoft's corporate marketing at an event promoting the company's educational

offerings. "We are committed to working with schools, colleges and universities, other corporations and the government to ensure that teachers -- our most valuable educational resource -- have the opportunities and tools they need to make the best use of technology for teaching and learning" (Microsoft Presspass, 1999, ¶ 4). In the summer of 1999, Microsoft sponsored a series of summer technology institutes to help 3,500 teachers from 11 states develop skills and learn strategies for integrating technology into teaching and learning (Philipkoski, 1999). The same year, Microsoft started its own online teacher network, Classroom Teacher Network, a free, online professional development community for educators to learn and share their ideas.

PressPass (1999) also reported that Microsoft had supported the training of more than a million teachers worldwide. Microsoft donated a \$1.2 million grant to the Navajo Education Technology Consortium (NETC) to support Navajo teachers throughout 12 Navajo school districts in Arizona, New Mexico and southern Utah have access to the latest technology resources and materials. The grant helped match U.S. Department of Education's five-year, \$7.6 million National Technology Innovation Challenge Grant given to the NECT earlier in 1999 (T.H.E. Journal News/In Brief, 1999).

During the 1999-2000 school year, Microsoft's teacher.training@microsoft program (formerly called the K-12 Education Professional Development Partnership Program) supported and enhanced teacher-training programs across the U.S. by providing Microsoft products for more than 450,000 teachers at 800 teacher-training sites at colleges and state departments of education. PressPass (1999) also reported that Microsoft donated more than \$100 million in software and training resources to teacher-training programs throughout North America since the program's kickoff in 1992.

As a result, Microsoft successfully spread its doctrine in the education field. Microsoft Office became the most favored software package for word processing, spreadsheets and multimedia projects among elementary and secondary schools (Guernsey, 2001). A 2001 Quality Education Data survey found that 86 percent of the schools surveyed were using Microsoft Office tools (Shor, 2004). Not surprisingly, 69 percent of teachers who use Microsoft Office use PowerPoint in their classroom, ranking PowerPoint as the second most commonly used software after Microsoft Word (Guernsey, 2001).

Not only teachers use PowerPoint in their teaching, they teach their students how to create PowerPoint presentations as part of their assignments as early as in the kindergarten stage because PowerPoint is considered a communication skill that is essential in preparing today's students for tomorrow's workplace (Isakson, 2005). "When you get to high school, you will need a lot of PowerPoint, and in the real world, too. This gives us time to practice," said a middle-school student as he was preparing a book report on PowerPoint (Guernsey, 2001, ¶ 6). Today five and six year olds learn PowerPoint even before they learn spelling. More information about students' attitudes concerning PowerPoint is found later.

Higher Education Faculty Members Welcome PowerPoint

In the 1990s, higher education was also affected by the expansion of instructional technologies in education. Many universities responded to the professional development needs of their faculty by offering professional development technology training opportunities. According to the 1998 National Survey of Information Technology in Higher Education by Green (1999), more than three-fourths of the two- and four-year

colleges had IT support technology centers to assist faculty with instructional integration. Moreover, according to a survey of colleges ranked in the first 50 on the 2006 U.S. News & World Report, a report that publishes the results of annual surveys ranking the best colleges and universities, the author found that all of the 50 top colleges offer professional development technology workshops, tutorials or both to their faculty to help them become better users of instructional technology.

Supporting the use of instructional technology in higher education became easier with the flow of funding through instructional technology grants such as the Preparing Tomorrow's Teachers to use Technology (PT3) of the U.S. Department of Education. Congress created the PT3 grant program that is one of the biggest grant initiatives that have helped to reform teacher education programs. It has provided grants to colleges of education to create and implement technology instruction programs for teachers in training. The grant has also helped train faculty at schools of education and has helped many of the universities integrate technology into their programs (<http://www.pt3.org>). Since 1999, PT3 has reached 52 of the 100 largest teacher preparation programs, funding a total of \$275 million.

PowerPoint had become very popular in academia because of its ease of use, structure and popularity among students (Murray, 2002). Although faculty tend to be hesitant about utilizing technology in their teaching (Backer, 2001), they are more likely “to show interest in a new technology if it is easy to use and does not require a major change in the skills they already possess” (Freeman, Brimley, & Rosen, 1999; Hagner, 2001). During this period, in response to the urge for the use of new multimedia technologies in higher education, many faculty members abandoned traditional lecturing

methods and using overhead transparencies in favor of an adapted MS PowerPoint for giving presentations in class (Murray, 2002). Higher education faculty's transition to PowerPoint use was often fast and almost painless because PowerPoint is very similar to other Microsoft Office applications such as MS Word, a word processor many faculty use extensively in their profession. PowerPoint was also like an expected panacea for improving instruction for many faculty members. It allowed faculty to easily integrate multimedia components such as graphics, sound, video, animations, and charts into their presentations, which supposedly made the lessons more interesting, engaging and structured (Susskind, 2005). PowerPoint also allowed faculty to print slides and handouts for their students. Students enjoy the convenience of having PowerPoint presentation notes as handouts (Frey & Birnbaum, 2002).

Moreover, for faculty who used the overhead-projector-plus-transparencies system for lecturing, using PowerPoint has several advantages over the use of overhead transparencies. Just to name a few, PowerPoint presentations are easier to use, manage, store, modify, and reuse. They can be easily stored and reused in floppy discs, CDs or USB Flash drives. They also allow interactivity and multimedia production with a very low technical skill threshold, a feature that is not possible with overhead transparencies. PowerPoint may also provide faculty members who are not confident lecturing in class with a sense of confidence because it may cover up their deficiencies in speaking and presenting. Having a PowerPoint to guide faculty through their lecture in class may also give them a feeling of readiness or even a feeling of security. If faculty members were told that they could not use PowerPoint in class, could all of them remember things they will say without PowerPoint? Would they be able to say what they need to say exactly

right or would they feel like a fish out of water?

To make instructors' jobs even easier, "Quite a number of textbooks these days come with a huge set of PP slides for the teacher to use as a basis for lectures. That unfortunately eliminates the hard work of preparation by teachers, and also makes it easy for teachers simply to wing it in every class by marching through the canned textbook-slides for that day's meeting. Seems rather close to plagiarism to me" (Tufte, 2003a, p. 24).

For better or worse, PowerPoint has become the standard lecturing tool in higher education. Markham, Jones, Hughes, & Suttcliffe (1998) conducted a survey of teaching methods used in pharmacology in U.K. Higher Education, which was followed by a follow-up survey by Hughes (2001) to determine the extent to which non-traditional teaching and learning methods were used. Hughes found that since the first survey by Markham et al., there was a large drop (78% to 33%) in the utilization of chalk-and-talk lectures. Hughes also found that there was high use of PowerPoint presentations (60%) in the classrooms.

Like higher education faculty, students also embraced PowerPoint quite easily. The next section looks at students' attitudes toward the use of PowerPoint in higher education classrooms.

Students' Attitudes toward the Use of PowerPoint in Higher Education

While there is limited literature on teacher education students' perceptions on the use of PowerPoint and accompanying handouts compared to other majors, there is a larger body of literature that has examined students' perceptions of MS PowerPoint in higher education in general. Overall students have very positive attitudes towards

PowerPoint (Atkins-Sayre et al., 1998; Daniels, 1999, Lowry, 1999; Luna & McKenzie, 1997; Sammons, 1995) because PowerPoint presentations are more organized and better structured than traditional lectures, allowing students to understand the key points better (Szabo & Hastings, 2000).

A few studies assessed higher education students' perceptions on the value of PowerPoint presentations in lectures. Frey and Birnbaum (2002) found that majority of students had positive attitudes when lectures were accompanied by PowerPoint presentations. In this study, PowerPoint presentations were coordinated with class lectures and posted on the course website prior to class. Results showed that (a) PowerPoint had a positive effect on lectures, especially in helping students to take notes and to study for exams, (b) students preferred PowerPoint lectures to traditional lectures using a blackboard or whiteboard, and (c) students perceived professors who delivered PowerPoint as being more organized.

Susskind (2005) employing a mixed participants design in which two classes of Introductory to Psychology students received half of their lectures in a traditional format and the other half accompanied by PowerPoint presentations. The study examined the effects of non-interactive computer assisted instruction on (a) students' performance, (b) self-efficacy, (c) motivation, and (d) attitudes. For the first five weeks of the semester, section one (N=33) received instruction in a traditional lecture format where the instructor provided course-related information to the students while writing notes on a whiteboard. The same instructor presented the same lectures, notes, and graphics to section two (N=18) using PowerPoint presentations. In both sections, the instructor encouraged questions and discussion of content. Students had their first exams after the

first five weeks. They also completed a survey assessing their classroom motivation. After the exam, section one received lectures presented with PowerPoint and section two received instruction in a traditional lecture format for five weeks. Then, an exam was given that was similar in format to the first exam to both groups. Students also completed the motivations survey again. In addition, they were given another survey that assessed their attitudes toward the course and their self-efficacy. According to the researchers, the results revealed that (a) lecture style did not affect academic performance; and (b) students had positive attitudes about the course and greater self-efficacy with PowerPoint. Interestingly, student motivation declined when the instructor switched from PowerPoint to traditional lecture method. However, student motivation did not increase after the instructor switched from traditional lecture method to PowerPoint. It is interesting that although students believed that they were more capable and motivated with PowerPoint, their achievement was not affected by the instruction method.

Although not discussed by Susskind, use of mixed participants design (as opposed to between group design) has its own limitations. While this design reduces concerns about cohort effects because within cohort comparisons can be made, it does not address the differences in course content covered in two exams. In other words, Susskind does not account for the content variable in this study. Therefore, it is quite possible that the students' achievement was negatively affected by the difficulty of content in one exam but positively affected by the ease of the content in the other exam. Thus, student achievement cannot be solely explained by instruction method used by the instructor. In addition, there are issues regarding the sample. The results may not be generalized without conducting similar studies with greater class sizes and with different instructors

who do not have a preference for either lecture style.

In studies such as the one described above, we need to account for strong “demand characteristics” (social desirability response), a phenomenon well known in psychological research, where subjects give investigators what they think they want to hear. If the participants were aware of the purpose of the study, unconsciously they might have provided positive evaluations of PowerPoint lectures to give their professor what they thought he was looking for in the self-efficacy and motivation surveys. A possible solution to this problem is keeping subjects ignorant of nature of the experiment. Susskind does not specify if the participants in his study were informed of the nature of the study.

“Demand characteristics” might also have been a problem in another study by conducted by Rankin and Hoas (2001), who wanted to test the hypothesis that the PowerPoint presentations had no effect on student grades. Rankin and Hoas found that there was no significant effect of PowerPoint lectures in terms of student performance. In this study, four sections of introductory economics taught at one institution in two different semesters were used to conduct an experiment. To eliminate instructor effects, the same instructor taught two sections with no PowerPoint presentations and the other two sections with the aid of PowerPoint presentations. Each semester, one of the sections was taught with the aid of PowerPoint slides and the other taught without slides to serve as a control group. Regression analysis was used with the students’ grade as the dependent variable. Individual characteristics were also included in the analysis to account for other variables such as gender, whether the student is a freshman or not, if the student had economics in high school or not, and if the student was enrolled in an early

morning class and or otherwise, thinking that these variables might affect student performance. However, there was no explanation about how the effect of gender and how the time at which the class was taken into account in the model. Rankin and Hoas only noted that the regression model used in the study is fairly typical of the equations used in economics education literature.

There are also other problems regarding the research design in Rankin and Hoas's study. There was no detailed information about how and when the students were assessed in the study. It was also not clear how the students were assigned to classes. Moreover, there was no information on the nature of PowerPoint presentations used in the experimental group classes. Although how PowerPoint was used in the classroom is the most important thing to know in order to evaluate its effectiveness, the study seems to lack this important information. This problem was also evident in Frey and Birnbaum's (2002) study.

Instructors not only use PowerPoint in their own teaching, they also assign PowerPoint projects for students to create and present to class. Elementary students are asked to write book reports or biography reports, which they would then present to an audience (Microsoft Office, 2004). As a science project, middle school students create PowerPoint presentations that illustrate the hypotheses they test as well as the data and the results of the experiment (Borland, Crawford, & Brand, 2003). They share their presentations in class in a mock "convention of scientists." Students at the undergraduate and graduate levels also create PowerPoint presentations as part of their assignments (Cavanaugh & Cavanaugh, 2000; Marcovitz, 2001, Yoneoka, 2001). Moreover, PowerPoint is the most popular software taught in teacher education programs throughout

the country. Knowledge of PowerPoint, the must-have skill of the education world, is step-by-step taught to reinforce students' multimedia learning (Wang, 2003). However, Yoneoka (2001) reports that several students in her study "concentrated on the "beauty" and esthetic appeal of their presentations to the detriment of their content, which was often either plagiarized from the web directly or lacking in cohesion and depth" (p. 5). This problem is not restricted to students, as we have seen.

Despite PowerPoint's popularity, many people criticize it, accusing it of boring, ineffective, presenter-centered presentations and turning off audiences. Next section explores the backlash against PowerPoint that had arisen towards the end of 1990's.

Backlash against PowerPoint

PowerPoint has become a way of life for many of us. It has become the standard presentation mode "for just about anybody who wants to explain just about anything to just about anybody else" (Keller, 2003). However, towards the end of 1990's, people began criticizing not only PowerPoint as a tool but also the way it has invaded our lives and turned into a cultural phenomenon. In some companies, C.E.O.s banned PowerPoint presentations because it promotes less talking and more presenting and thus, degenerate the level conversation to a bullet way of thinking (Clarke, 2001). In 1997, Scott McNealy, chairman and C.E.O. of Sun Microsystems famously banned PowerPoint presentations in his company because of productivity issues. According to McNealy, productivity problems resulted from the inherently big PowerPoint files that take a lot of space when they are sent over the Internet (Parker, 2001). McNealy said "We had 12.9 gigabytes of PowerPoint slides on our network. And I thought, "What a huge waste of corporate productivity". So we banned it. And we've had three unbelievable record-

breaking fiscal quarters since we banned PowerPoint. Now, I would argue that every company in the world, if it would just ban PowerPoint, would see their earnings skyrocket. Employees would stand around going, ‘What do I do? Guess I’ve got to go to work’” (Oakes, 1998, ¶ 12).

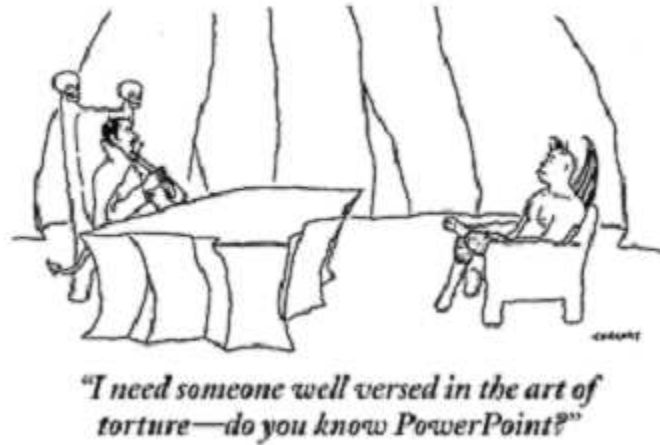
A similar initiative took place in the American military in 2000 (Parker, 2001). General Henry H. Shelton, the chairman of the Joint Chiefs of Staff, issued an order to U.S. military bases around the world telling them to prepare simpler presentations because extremely extravagant PowerPoint files were congesting the military’s bandwidth and slowing crucial communications among units in the army. The PowerPoint presentations were too detailed, complex and inhibiting because as Charles Moskos, a military-culture expert at Northwestern University, Evanston, Illinois explained, "Young officers are worried that they might leave something out of their briefing, and a supervisor might say something about it. So they pack their presentations with every detail that they can think of" (Jaffe, 2000, p.1).

Cartoonists mocked the ineffective PowerPoint presentations (see Illustration 1 for an example from Dilbert) and the boring and dull nature of PowerPoint (see exhibit 2 from Cartoonbank.com).



Figure 2-2 Cartoon about ineffectiveness of PowerPoint

(source: IDblog, <http://www.idblog.org/archives/000277.html>)



*Figure 2-3 Cartoon about ineffectiveness of PowerPoint
(Source: Cartoonbank, [http://www. Cartoonbank.com](http://www.Cartoonbank.com))*

The backlash against PowerPoint continued with the growing number of articles published by media experts, librarians, journalists and academics. Articles such as “Is PowerPoint the Devil?” (Keller, 2003), “PowerPoint is Evil” (Tufte, 2003b), “PowerPoint Makes You Dumb” (Thompson, 2003), “End PowerPoint Dependency Now!” (Bell, 2004), “Learning, One Bullet Point at a Time; Pupils Who Can't Even Spell 'PowerPoint' Can Use It as Slickly as any C.E.O.” (Guernsey, 2001), and "Death by Bullet Points" (Heavens, 2004) harshly criticized the dependence on PowerPoint slides and explained some of the problems that lead to boring, ineffective, presenter-centered presentations. The PowerPoint supporters and the don't-blame-the-tool camp were quick to respond to the anti-PowerPoint advocates with articles such as “PowerPoint Doesn't Make You Dumb” (Gunderloy, 2003), “Bullet Points May Be Dangerous, but Don't Blame PowerPoint” (Simons, 2004), and “In Defense of PowerPoint” (Holmes, 2004). They opposed the idea that PowerPoint itself is flawed and instead asserted that it was the users

who misuse PowerPoint.

Tufte, author of seven prestigious and design award winner books and a former professor of information design at Yale University, is one of the foremost academic critics of PowerPoint (2003a; 2003b). Tufte published a 23-page essay entitled “The Cognitive Style of PowerPoint” (2003a), in which he argues that PowerPoint is “making us stupid, degrading the quality and credibility of our communication, turning us into bores, wasting our colleagues’ time (p. 24).

Tufte also makes a point that PowerPoint is entirely presenter oriented, not audience or content oriented. He suggests that using PowerPoint may be convenient for the speaker but can be costly to both content and audience for several reasons. PowerPoint is reductionist in the way it disrupts, dominates, and trivializes content. He says “My research indicates that for maybe 10 or 20 percent of users, PowerPoint improves the presentation, because the users are so disorganized or inept it forces them to have points. But for the other 80 per cent there’s some significant degree of intellectual corruption. For statistical data, the damage approaches dementia” (Nadel, 2003, p.1). This is because when PowerPoint is used in technical presentations, the default styles of PowerPoint limits the amount of detail that can be presented and obscure important connections. PowerPoint may help disorganized presenters get organized but it harms the audience in the end because of the inherent intellectual corruption that is the natural concomitant of PowerPoint.

Tufte’s third criticism is about the way information is displayed. The sequential type of display, which is inherited in the nature of PowerPoint, limits free associations and creative thinking (Tufte, 2003a).

Tufte's fourth criticism is that reducing concepts into meaningless bullets makes it difficult for people to appreciate the significance and importance of points. Also, the relationships between the different points of information are not always obvious. He even argues that the bulleted, indented style of PowerPoint contributes to the destruction of American education: "Especially disturbing is the introduction of the PowerPoint style into schools. Instead of writing a report using sentences, children learn how to make client pitches and info-commercials, which is better than encouraging children to smoke" (Tufte, 2003a, p. 13).

Shaw, Brown and Bromiley (1998) echo Tufte's criticisms when they say "Bullets leave critical relationships unspecified. Lists can communicate three logical relationships: sequence (first to last in time); priority (least to most important or vice versa); or simple membership in a set (these items relate to one another in some way, but the nature of that relationship remains unstated). And a list can show only one of those relationships at a time." Thus, unless presenters fill in the gaps, people cannot see the whole picture or understand the important relationships (p. 45).

Finally, Tufte (2003a) concludes that the cognitive style of PowerPoint encourages imprecise and superficial thinking. Therefore, he recommends using paper handouts for presentations, instead of PowerPoint presentations. However, it is important to note that the software package in which the information appears cannot increase the information transfer rate unless presenters communicate crisply and accurately with the audience, no matter what the medium is.

Tufte's criticisms to PowerPoint produced a number of reactions from usability and media experts. Atkinson, who is a corporate media consultant, interviewed five well-

known experts and published an article entitled, “Five Experts Dispute Edward Tufte on PowerPoint.” In Atkinson’s article, some of these experts agreed that Tufte had some valid criticisms but they criticized Tufte for confusing cause and effect because he was blaming PowerPoint for the faults of its users (Atkinson, 2004). Richard Mayer, one of the experts interviewed by Atkinson, criticized Tufte for referring PowerPoint as a method whereas PowerPoint was only a medium that can be used effectively or ineffectively. On the other hand, Parker (2001) refutes the idea that PowerPoint is merely a tool and argues instead that it is “a business manager as well as a business suit, with an opinion...about how to organize information, how much information to organize, how to look at the world.” Referring to AutoContent Wizard, a feature of PowerPoint that helps users create a presentation by leading them through some basic questions, Parker (2001) suggests that while PowerPoint is helping presenters make their case, it makes its own case. The AutoContent Wizard gets users started by providing ideas and an organization for their presentation. Then, the Wizard uses users’ answers to automatically lay out and format their presentation. AutoContent Wizard also provides users with ready-to-use templates with speaker notes- “Selling Your Ideas”, “Communicating Bad News”, “Presenting a Technical Report” are examples of template titles provided by PowerPoint AutoContent Wizard. The "Selling Your Ideas" template, for example, includes a slide headed "Opening: Give Evidence" visualized in Figure 2.2. The speaker notes that come with the template say: “Open your presentation with an attention-getting incident. Choose an incident your audience relates to. The incidence is the evidence that supports the action and proves the benefit. Beginning with a motivational incident prepares your audience for the action step that follows”.

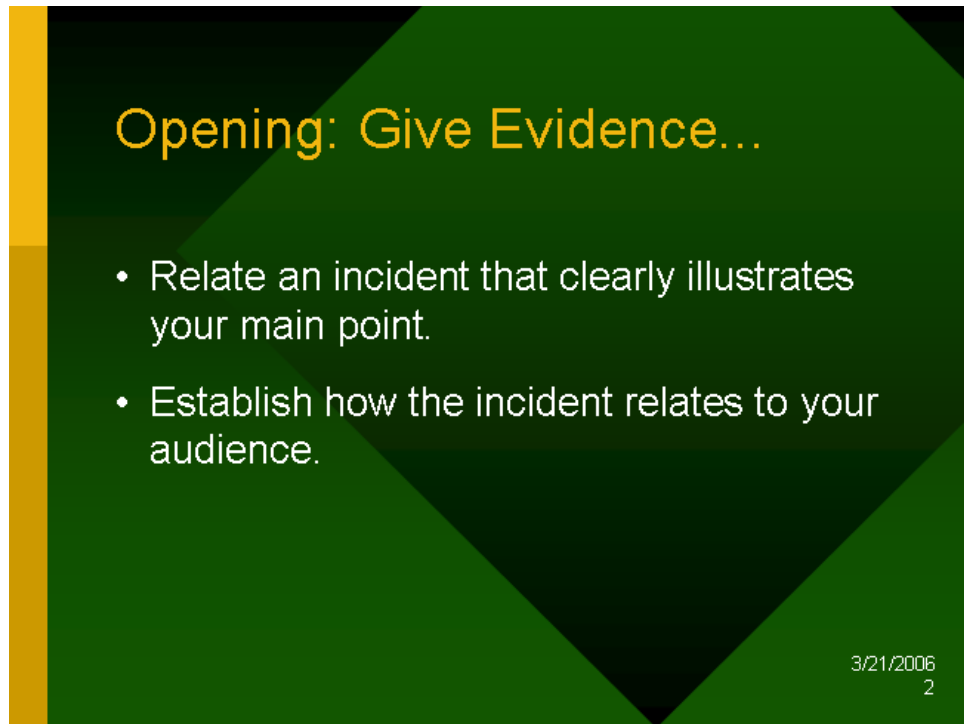


Figure 2-4 Sample slide from "Selling Your Ideas" template available from AutoContent Wizard in PowerPoint

Whether the tool is to blame or the users who are at fault, PowerPoint is here to stay. PowerPoint is a new literacy. It is a new language that is relatively easy to learn but difficult to speak well. "Communicative competence", a concept in Second Language Education that was introduced by Dell Hymes (1972), suggests that speakers of a language have to have more than grammatical competence in order to communicate effectively in a language; they also need to know how language is used by members of a speech community to accomplish their purposes. "When a child acquires his or her native language, the child acquires knowledge of sentences, not only as grammatical, but also as appropriate. He or she acquires competence as to when to speak, when not, and as to what to talk about with whom, when, where, in what manner" (Hymes 1972, p. 277).

Also, “there are rules of use without which the rules of grammar would be useless” (Hymes 1972, p. 278). Similarly, people may know what I call “the grammar of PowerPoint,” that is, the technical skills required for creating slides, turning a text into bulleted lists, inserting images, and so on, but very few people have what I term “PowerPoint communicative competence,” that is, the ability to communicate with an audience in a way that is optimally effective. In order to achieve communicative competence in PowerPoint, we need to recognize the potential pitfalls of the software as well as understand how we can utilize it to make the best of it. Thus, it is important to understand multimedia learning theory and its potential implications for learning with PowerPoint, as the next section explains.

Handouts as Learning Tools

An extensive body of literature exists documenting the benefits of handouts for student learning. Two critical functions of note-taking stand out in literature. One function concerns the *process* of note-taking, and the other function relates to the *product* of note-taking (DiVesta & Gray, 1972; Henk & Stahl, 1985; Kiewra, 1985a; Peper & Mayer, 1986; Levasseur & Sawyer, 2006). First, the *process* of note-taking itself has a significant impact on students’ cognitive processing of new information because it requires students to (a) selectively attend to the information and (b) organize ideas meaningfully by relating them to what is already known. Ruhl and Suritsky (1995) suggested that note-taking encourages students to ask more questions for clarification, thus improving encoding and comprehension. One can also assume that note-taking gives students a sense of ownership of their notes, which helps them become more involved in their own learning.

Experimental research has shown that students who take notes perform better than students who just listen during the lecture. In his analysis of 56 studies comparing note-taking and just listening, Kiewra (1985a) found that 33 studies showed significant differences between note-taking and listening, while 21 showed no significant differences, and 2 studies suggested note-taking to be dysfunctional. However, citing Ladas (1980), Kiewra (1985a) noted that many of the studies that found no significance were due to methodological deficiencies.

The *product* function of note-taking concerns the value of reviewing (as opposed to taking) notes. As discussed earlier, the *process* function of note-taking requires learners to be active throughout the note-taking process, which makes the retrieval of information easier for later review. Although the process of note-taking improves student learning independent of students' review of their notes, research shows that review of notes has extensive benefits (Kiewra, 1985a).

In spite of the significant benefits of note-taking, a review of literature on student note-taking shows that undergraduate students often fail to develop this skill and need extensive practice to master it (Baker & Lombardi, 1985; Kiewra, 1985b; Neef, McCord, & Ferreri, 2005; Titsworth & Kiewra, 2004). For instance, Baker & Lombardi (1985) found that undergraduate students were relatively inefficient note-takers and drew attention to the need for helping students identify and distinguish the important information from the less important information. In that study, most of the students recorded about half of the main ideas in a lecture and less than 25% of the other supporting ideas.

Handouts serve as the most efficient and effective way of providing students with

information. To provide students with accurate information and avoid split attention between note-taking and listening, some instructors give complete lecture notes, but receiving extensive lecture handouts seem to contribute to passive learning and lower student attendance (Brazeau, 2006; Fjortoft, 2005). Since there is a significant positive correlation between the quality of students' notes and students' academic performance (Kiewra, 1985a), some researchers have suggested using "guided-note" handouts as an alternative to no notes and complete notes (Barbetta & Skaruppa, 1995; Heward, 1994; Vaz, 1999). "Guided-note" handouts are presentation handouts that provide students with an outline and cues with blank lines on which students can record key points, and/or relationships between ideas during the presentation (Neef, McCord, & Ferreri, 2005). These handouts minimize the split-attention problem, allow more opportunities for students to process and record the information (Barbetta & Skaruppa, 1995), guide students in their note-taking, and reduce the errors related to determining what to record.

Literature about PowerPoint handouts suggests that students benefit from having access to online or paper PowerPoint slides (Levasseur & Sawyer, 2006; Parks, 1999). When well-prepared, well-organized, and available ahead of time, PowerPoint slides which can be downloaded as handouts, serve as an excellent learning tool for students before, during and after class (Frey & Birnbaum, 2002; Levasseur & Sawyer, 2006; Navarro, 1998). The fact that no research exists on teacher education students' perceptions of PowerPoint handouts prompted the present researcher to investigate this topic and examine the differences between perceptions of graduate and undergraduate students.

Summary of Chapter 2

The purpose of this literature review was to understand: (a) why students'

perceptions matter, (b) the historical development of PowerPoint as a presentation software program, (c) how and why PowerPoint became a cultural phenomenon, (d) what faculty attitudes are towards PowerPoint use in the classroom, (e) what students' attitudes are towards PowerPoint use in the classroom, (f) what the current backlash against PowerPoint is about, and finally (g) how handouts serve as learning tools.

CHAPTER 3: RESEARCH METHODOLOGY

Overview

This chapter provides a detailed description and justification of the research methodology employed in this study. The research questions are listed once again for the ease of understanding methods used. Then the rationale for the research design and the criteria for selection of settings and participants are explained. Instruments, data collection and analysis procedures and how validity and reliability was established in this study follow next. The chapter concludes with a summary.

Research Questions

This study attempts to answer the following research questions:

Research Questions Concerning Students' Attitudes about PowerPoint (AP)

AP. 1. a. What are students' attitudes about PowerPoint's influence on student learning in teacher education?

AP. 1.b. Do differences exist between graduate and undergraduate students' attitudes about PowerPoint's influence on student learning?

AP. 2. a. What are students' attitudes towards PowerPoint's influence on instructional features (e.g., discussions, lesson organization, and use of time) in teacher education?

AP. 2. b. Do differences exist between graduate and undergraduate students' attitudes about PowerPoint's influence on instructional features?

AP. 3. a. What are students' attitudes towards PowerPoint's influence on instructors' performances in teacher education?

AP. 3. b. Are there any significant differences between graduate and undergraduate

students' attitudes about PowerPoint's influence on instructors' performances?

Research Questions Regarding Value of PowerPoint Handouts (PH)

PH.1.a. How do students perceive the value of PowerPoint handouts?

PH.1.b. Do perceptions of graduate and undergraduate students differ concerning the value of PowerPoint handouts?

Research Design

A sequential mixed methods methodology was used to answer the research questions set out above. First, a qualitative design was used to fully explore the role of PowerPoint in teacher education through semi-structured interviews. 11 students from three institutions were interviewed. As a result of this initial investigation, a common vocabulary and understanding of the attitudes of and perceptions toward PowerPoint were used in the design of a questionnaire instrument administered to the students from four institutions participated in this study.

Using different sources and methods at various points in the data collection phase allowed for an in-depth understanding of the factors that affect how PowerPoint is used in teacher education. Moreover, by using mixed methods approach, it was possible to build on the strength of qualitative and quantitative data collection and evaluation and minimized the weaknesses of any single approach. Therefore, qualitative and quantitative research methods were complementary tools in this study. Finally, a multi-method approach rather than a single method approach to data collection and analysis, allowed for triangulation. The data collected through different data collection methods (such as semi-structured interviews, and questionnaires) together either supported or did not support claims in this study. Triangulation was very important for this study as it is for

any research study because it strengthens the validity of research results (Frechtling, Sharp, & Westat, 1997).

Setting

The goal of this research was to study a range of institutions that traditionally have served the special needs of urban and suburban areas while also being known for the use of technology in their undergraduate and graduate programs. The participants in this study came from different teacher education programs in four different institutions in the east coast of the United States:

The first institution was a large state Research 1 University. As Table 2 shows, the total student enrollment in fall 2005 was 35,369, of which 25,442 were undergraduate students and 9,927 were graduate students.

The second institution was an important branch of the large Research 1 University mentioned above. As Table 3.1 shows, the total student enrollment in fall 2005 was 11,650, of which 9,406 were undergraduate students and 2,244 were graduate students.

The third institution was a small suburban private college. This college was founded as an undergraduate institution but today it offers both undergraduate and graduate courses. A total of 1727 undergraduate students are enrolled in the university. Information regarding the number of graduate student enrollment was not available on this college's website.

The fourth institution was a large private university. A total of 6,130 students are enrolled in the university, of which 3,053 are undergraduate students and 3,077 are graduate students. The university was established in 1887 as a graduate and research center and it began offering undergraduate education in 1904.

Table 3-1 Snapshot of institutions from which participants were invited into this study

(Source: U.S. News, Colleges at a Glance)

	Large Research 1 University	Large Branch of Research 1 University	Small Private College	Large Private College
Public/Private	Public	Public	Private	Private
Year Founded	1856	1963	1873	1893
Number of undergraduate students	25,442	9,406	1727	5,782
Number of graduate students	9,927	2,244	NA	3,395
Total # of students	35,369	11,650	1727	9,177

Sample Selection

Sample selection methods were carefully selected and were based on the purpose(s) of the study.

Sample Selection for Interviews

According to Patton (1990), if the purpose of sampling is to gain insight or have a deeper understanding of the dynamics of a particular event, purposeful sampling should be used. In purposeful sampling, a sample is selected by the researcher based on decisions about "the sources that will most help to answer the basic research questions and fit the basic purpose of the study" (Erlandson, Harris, Skipper, & Allen, 1993, p.83). On the other hand, if the goal of the sampling is to collect data from a representative group of people in order to generalize the results back to the population of interest, then probability sampling is used. In probability sampling, every item in the population has

the same probability of being selected for inclusion in the sample (Minichiello, Aroni, Timewell & Alexander, 1995).

In phase 1, purposeful sampling was used to select interview participants because the goal of interviews was to uncover diversity of issues in using PowerPoint in teacher education that were theoretically relevant to the research questions (Strauss & Corbin, 1990). The selection of interview participants reflected differences in education status (graduate vs. undergraduate), home institution, linguistic and ethnic background, and gender. Since probability sampling was not used when selecting interview participants, results from the interviews cannot be generalized beyond those interviewed. The issues explored in the interviews were then used in the construction of questionnaire items in the second phase of this two-phased study.

Sample Selection for Questionnaires

As diversity of participants allows for more precise conceptualization (Reinharz, 1992), it was of crucial importance to have representatives of students from different educational settings and teacher education programs in this study. For both phases of this study, four criteria guided the sample selection process for questionnaires. Students were only contacted if (1) they were registered undergraduate or graduate students at four different institutions identified earlier, (2) they studied in a variety of teacher education programs (such as Mathematics Education, Science Education, Social Studies Education, and Second Language Education and Culture programs) in the selected universities, (3) they have had instructors who used and who did not use PowerPoint in their teaching, (4) they represented different race, gender, age, and language and ethnicity groups. Using this selection criteria, it was possible to obtain detailed and varied information from the

participants about how effectively and meaningfully their instructors use MS PowerPoint for teaching.

Participants

Participants in the Interviews

A total of 11 students from Science Education, English Education, Second Language Education, Language and Literacy Education and Early Childhood Education programs were interviewed for this study. Participants were registered undergraduate (3), Master's (4), and Ph.D. (4) students at the institutions identified as data collection sites. Students were at the different levels of their undergraduate and graduate degrees. The student participants were of Caucasian (4), African American (2), Asian (2), Middle Eastern (2), and Hispanic (1) origin. Four of the 11 participants were native speakers of languages other than English. Only 1 of the participants was male but this situation is in line with the current demographics in teacher education. Only students who had instructors who used PowerPoint in their teacher education courses were interviewed.

Participants in the Questionnaires

In Phase 2, a total of 310 teacher education students were surveyed but 6 students who filled out the survey reported that they did not have any PowerPoint using instructors were excluded from this study. Table 3.2 shows the demographic information for the 304 participants in the questionnaire.

Table 3-2 Questionnaire participant characteristics

Group	<i>n</i>	%
Position		
Undergraduate	135	44.4%
Master's	131	43.1%
Ph.D.	38	12.5%
Institution		
Large Research 1 University	229	72.1%
Large Branch of Research 1 University	48	15.8%
Small Private College	31	10.2%
Large Private College	6	2.0%
Specialty		
Second Language Education	124	40.8%
Mathematics Education	39	12.8%
English Education	27	8.9%
Social Studies Education	26	8.6%
Science Education	23	7.6%
Reading Education	22	7.2%
Other	43	14.1%
Language		
Native English Speaker	235	77.3%
Non-native English Speaker	69	22.7%
Gender		
Male	44	14.5%
Female	260	85.5%

Of the 304 participants, 135 (44.4%) were undergraduate, 131 (43.1%) were Master's and 38 (12.5%) were Ph.D. students. Participants were registered undergraduate or graduate students at the Large Research 1 University (72.1%), Large Branch of Research 1 University (10.2%), Small Private College (15.8%), and Large Private

College (2%), and they had instructors who used PowerPoint in their teacher education courses. The sample included more females (85.5%) than males (14.5%). The participants were distributed by specialty as follows: Second Language Education (40.8%), Mathematics Education (12.8%), English Education (8.9%), Social Studies Education (8.6%), Science Education (7.6%), Reading Education (7.2%), Special Education (1.3%), Minority and Urban Education (1.1%) and other (11.8%). In terms of linguistic background, out of 304 students surveyed, 235 (77.3%) were first, and 69 (22.7%) were second language speakers of English.

Instrumentation

Exploratory Survey of Students Completed

An open-ended questionnaire was conducted to 25 students in the Second Language Education and Culture Program at the large state Research 1 University in fall 2005. In order to capture the richness of student experiences with PowerPoint in their learning, a “critical incident” questionnaire (Brookfield, 1995) was used. A critical incident questionnaire is an assessment technique that is normally used for finding out what and how students are learning as well as identifying areas where adjustments to instruction are necessary. Participants were asked to think of a specific instructor who uses PowerPoint *effectively* and *meaningfully* in the classroom and describe in detail how this teacher uses PowerPoint. Participants were also asked to think of a specific instructor who uses PowerPoint *ineffectively* and *poorly* in the classroom and describe in detail how this teacher uses PowerPoint. Use of this technique allowed for identification and exploration of specific dimensions of PowerPoint use in teacher education from the point of view of students. Data of this exploratory study was analyzed using a data analysis

method called “content analysis”. Content analysis included coding the data by distilling key ideas, words and phrases. As a result the following themes emerged from this exploratory study:

- PowerPoint as a framework for presentation of content
- PowerPoint as a supplementary method, not the whole method of instruction
- Amount of discussion when PowerPoint is used
- Effectiveness of a lecture with and without PowerPoint
- Advantages of PowerPoint for students:
 - Diagrams, visuals to understand information that would be hard for instructor to explain orally
 - More organized and coherent lessons
- Problems with PowerPoint
 - Format problems (i.e., inappropriate selection of fonts size, and color choice)
 - Problems with instructional design (i.e., Poor structure, overloaded slides, irrelevant use of images, sounds, animations)

These themes were very strongly related to those already found in the literature review on PowerPoint, although the literature on effectiveness of PowerPoint in higher education is not very extensive. The themes emerged above has guided me in the composition of the semi-structured interview questions, which will be explained in detail below.

Method Selection and Justification

Semi-structured interview was chosen as the first data collection instrument because more detailed and in-depth data were available with in-depth interviews with students than were possible with questionnaire data. The semi-structured interviews brought out insights and understandings of effectiveness and limitations of PowerPoint in

teacher education in ways that questionnaire items might not be able to tap. Interviews allowed access to students' uncensored, unfiltered accounts of their learning with PowerPoint. I also believe that interviews revealed classroom dynamics between teachers and students when PowerPoint was used and not used. Through interviews, I was able to understand the role of PowerPoint in teacher education both from the students' points of view and to unfold the meaning of their experiences (Kvale, 1996). For this reason, I regarded interviews as an opportunity to uncover the issues that emerged from students' experiences with PowerPoint. The interview data also revealed the types of constraints hindering the successful use of PowerPoint in higher education. A total of 11 teacher education students were interviewed on their experiences with learning with PowerPoint.

Semi-Structured Interviews

Interviews can be defined as face-to-face interactions in which an interviewer attempts to obtain valid and reliable information from an interviewee on a certain topic. Interviews can take different forms but most interviews lie along a continuum between structured and unstructured types (Minichiello, Aroni, Timewell & Alexander, 1995). In structured interviews, each interviewee is asked a set of questions in the same order to ensure that responses are comparable across informants. On the other hand, unstructured interviews are like a normal everyday conversation. The purpose is to put the interviewees at ease and allow them to express themselves. The semi-structured interview lies between structured and unstructured designs. The interview schedule is controlled by a list of questions and topics to be covered. However, it retains the open quality of the unstructured interviews. For the purposes of this study, a semi-structured interview format was used.

The semi-structured student interview (see Appendix A) consisted of twenty-eight questions covering nine separate topics. The interview was designed to collect information about students and their perceptions about PowerPoint in the following areas: (a) background information, (b) PowerPoint skills and knowledge, (c) purpose of instruction with PowerPoint, (d) PowerPoint's impact on their learning, (e) PowerPoint's impact on student/faculty and student/student interaction, (f) amount of time spent with PowerPoint instruction, (g) effectiveness of PowerPoint presentations, (h) criteria for designing and presenting instructional PowerPoint presentations, and (i) value of handouts for students. All the interview questions were open-ended questions.

Questionnaires

The issues that emerged from semi-structured interviews were tested in a larger sample by means of questionnaires. A copy of the MS PowerPoint Use Analysis Questionnaire¹ is included in Appendix B. This instrument was selected because statistical techniques were used to determine validity, reliability, and statistical significance. The themes that emerged from the richly detailed interview transcripts served as a basis for the items in the questionnaire. None of the categories for the questionnaires were pre-determined in order not to limit the variety of data and thus bias the results that were collected through student interviews.

The MS PowerPoint Use Analysis Survey was partitioned into the following sections: demographic characteristics and background information, experience with

¹ The original MS PowerPoint Use Analysis Survey was longer but only findings concerning student perceptions of use of PowerPoint and the value of accompanying handouts are reported in this dissertation, as the complete data from the original survey is too comprehensive to be reported in one dissertation.

PowerPoint in classroom, attitudes towards PowerPoint's influence on learning, and perceptions about the value of handouts that accompany PowerPoint presentations.

Data Collection Procedures

Data collection occurred during the fall 2006 and spring 2007 semesters. The participation in this study was on a voluntary basis.

Ethical Considerations

Prior to data collection, Institutional Review Board (IRB) approval was obtained from all three institutions from which participants were invited into this study (see Appendices C, D, and E). The Large Branch of Research 1 University did not require an additional IRB approval since one was obtained from the Main Branch of Research 1 University. Prior to data collection, all participants were provided with full information on (a) the purpose of the research study, (b) the significance of the research study, (c) the procedure that was going to be used to collect data, and (c) the purpose of the informed consent form. The participants were guaranteed anonymity and confidentiality. In addition, in each phase of the study, in the beginning of data collection, participants were advised that they could ask questions at any stage and had the right to withdraw at any time without penalty if they so wished. Data collection was conducted in a way that was the least disruptive to students' daily schedules. When data was collected in the classrooms, the questionnaires were administered either in the beginning or at the end of class in order to avoid disruption to students' normal, daily classroom sessions.

Two phases of data collection procedures are discussed below:

Phase 1: Semi-structured Interviews

In Phase 1, data were collected by means of one-on-one interviews with teacher education students. The interview data was collected during the fall 2006 academic semester.

Each interview began with a brief explanation of the broad purpose of the study. Issues of confidentiality were discussed. The interviewees were informed that the interviews were strictly confidential and there would be no identification of the schools or individuals in any publication that may come from this study. Participants were also explained that the interview could be terminated at any time. Then, participants were given the opportunity to read and sign an informed consent form.

Participants were asked for permission to record the interview via a digital recorder. This allowed the researcher to concentrate intensely on the interview and reduced her tendency to make unconscious selection of data favoring her biases (Gall, Gall, and Borg, 2003). It also helped with transcribing and analyzing data because it provided a complete record of the interview and allowed the researcher to study the data much more thoroughly than written notes. However, the presence of a digital recorder might have affected the responses to some extent because interviewees might not have wanted to express their feelings and ideas freely when their responses were recorded (Gall, Gall, and Borg, 2003).

Student interviews explored issues such as how students saw their instructors' use of PowerPoint for instruction, how PowerPoint affects their learning and they perceive the value of handouts that accompany PowerPoint presentations. Interviews were conducted in a private setting and in a manner that avoided disruption of communication

and that encouraged candid conversation.

In addition, supportive notes were kept when necessary because these notes allowed for richer contexts, reflecting the interaction between the interviewees and the researcher. This helped to support familiarization with data and identify the main themes later during the first phase of interview data analysis.

Probing questions (Berg, 1998) were used to gather more information from the participants, especially when it was felt that further elaboration was necessary. During the interviews, member checking was used by restating, summarizing, or paraphrasing participants' responses to ensure that what I understood was correct (Kuzel & Like, 1991).

Because a semi-structured interview format was used in this study, sometimes the interview took new directions depending on the interests of students. However, most participants were asked similar follow-up questions that aimed to gather information regarding the participant's views of their own learning experiences with PowerPoint.

The interviews took approximately 40 to 60 minutes, depending on the student's elaboration on the question. Participants were given the option to remain anonymous and all but one chose to retain anonymity. As a result, names, place names and other potential identifying factors have been changed to respect the participants' wishes.

Each digitally recorded interview file was downloaded onto a computer in audio file format right after the interview. The interviews were transcribed immediately into a word processing document to make sure that the transcript reflected fully what was in the actual interview. Transcription of a 40-60 minute interview took about 3-4 hours. All transcriptions were stored in MS Word files on the computer and on two different backup

USB devices.

Phase 2: Questionnaires

The procedure involved completing a questionnaire at a time and location convenient to participants. Purpose of the data collection was explained to all the student participants prior to conducting questionnaires. Sometimes the student questionnaires were given in class, depending on the wishes of student participants. When given in class, students were informed that their participation was not a course requirement.

Data Analysis Procedures

“Data analysis is the process of bringing order, structure, and interpretation to the mass of collected data” (Marshall and Rossman, 1999, p. 150). The data collected through interviews and questionnaires were analyzed using both qualitative and quantitative techniques.

Phase 1: Qualitative Data Analysis

In this study, content analysis was used in analyzing responses to semi-structured interview questions and open-ended survey questions related to the perspectives and opinions of teacher education students towards their experiences with PowerPoint in their classes. Content analysis included coding the data by distilling key ideas, words and phrases and analyzing data thematically using the category system developed by the researcher.

According to Bogdan and Biklen (1992, p. 154) there are two stages of data analysis. The first stage occurs while data are being collected, and the second stage after data collection has been completed. Data collection and data analysis took place

simultaneously in this study. Therefore, data analysis began with the first interview (Merriam, 1998).

Stages in Interview Data Analysis

According to Patton (1990, p. 376), "*The first decision to be made in analyzing interviews is whether to begin with case analysis or cross-case analysis.*" In this study, interview transcripts were analyzed individually; and then the cross-case analysis of eleven interviews followed. Cross-case analysis involved using a comparison method, which grouped the students' responses to common questions, allowing analysis of different perspectives on emerging issues.

The data analysis involved a five-step procedure as presented below. However, since the process of doing qualitative research is cyclical, the data analysis in this study was also cyclical and did not strictly follow a linear procedure.

Step 1: Reflection During Data Collection (prior to transcribing interview data).

In addition to supportive notes kept during interviews, after each interview, the researcher took time to reflect on the interview she conducted. The notes were most useful when captured while the interview was still fresh in the researcher's mind. This activity was done even before the transcription of the interview data. The tentative themes and issues that emerged from each interview were written down. In the reflections, identifying characteristics of participants were also noted. This helped the researcher with the selection of the other participants. Issues that the researcher wanted to pursue in the next interviews were also noted.

Step 2: Case Analysis. Data gathered during the interviews were analyzed inductively to identify emergent themes and to categorize results. First, each transcript

was pasted into the first column of a two-column Word document. The second column was used to write down notes and identify reoccurring themes in the interview data. Each transcript was read and re-read for overall meaning and then was annotated with key themes, and concepts in the second column.

Step 3: Coding. Coding is one of the most significant steps taken during qualitative data analysis and involves assigning a code to pieces of data that appears relevant to a particular issue. Sections of data on like or related themes in each individual transcript were color-coded, which helped to make the emergent themes visible. This process helped to identify and refine the themes further, reducing them in number by grouping related themes together under categories. For instance, themes such as “PowerPoint as a time-saver, and ease of use” that were related to efficiency of PowerPoint were grouped under “Efficiency.”

Step 4: Refining the Categories. As the study progressed, the interview-based data collection and analysis became more focused and refined. New categories emerged. For instance, after the first two interviewees talked extensively about the importance of handouts in their learning, new questions were added to the interview protocol about whether receiving a handout helped student learning and if it did, how. This helped the researcher to narrow the interview study to a more directed collection of data and analysis (Bogdan & Biklen, 1998).

Step 5: Cross-Case Analysis. At this stage, students’ responses to the same questions in the interview protocol were merged into a master transcript. Responses were analyzed in categories, as there was considerable overlap in responses given to individual questions.

Step 6: Finalizing Categories and their Related Sub-categories. Only categories that were triangulated from varied responses by participants were selected to be final categories. The selection was based on the amount and quality of supporting information as well as verification of those categories and subcategories across participants. Weaker themes that were not supported were maintained separately in case the theme appeared again later and were eventually detached if no other evidence presented itself.

Analysis of Qualitative Data from the Questionnaire

Qualitative data from questionnaire was analyzed in the same way interview data was analyzed. As there was considerable overlap in responses to the open-ended questions in the questionnaire, data from these items were pooled to enable the major themes to be identified. For each item, student responses were pasted into the first column of a two-column Word document. The second column was used to identify reoccurring themes in the qualitative data from the questionnaire. Themes that were triangulated from varied responses by participants were identified as categories.

Phase 2: Quantitative Data Analysis

Responses to the questionnaire items that were on a Likert-scale were assigned a number value of 1 through 5. Quantitative data collected from the questionnaire was entered into a dataset using the Statistical Package for Social Sciences version 15.0 computer software program for Windows. Data analysis procedures involved a series of descriptive and correlation statistics, and Mann-Whitney *U* test.

The Mann-Whitney *U* test is a good alternative to the two-sample *t* test when assumptions underlying the *t* test (normality and homogeneity of variance) are not met and the independent variable is ordinal (Hinkle, Wiersma, & Jurs, 1994). This statistic

tests whether or not the two groups are "equivalent in location." While the mean is valid when the distance between all scale values is equal, it's a problem when the variables are ordinal because in ordinal scales the distances between the values are arbitrary. The Mann-Whitney U ranks all the cases from the lowest to the highest score and compares means of the two groups by converting means into rank scores, which are called "Mean Ranks". Then, it compares the rank scores to determine statistical differences (Pallant, 2001). When the sample sizes for comparison groups are larger than 20, which was the case in this study, then the sampling distribution of U approaches a normal curve. Therefore, mean ranks and z distributions were used to report the findings in this study.

Establishing Validity and Reliability of the Study

Three types of triangulation identified by Denzin (1970) were used to increase credibility of this study:

(a) Data triangulation was maintained by gathering data from different data sources. Data was collected from a diverse range of teacher education students who study in different teacher education programs at four different higher education institutions.

(b) Investigator triangulation was maintained by using more than one researcher to interpret data. After the qualitative and quantitative data were interpreted, the dissertation committee chair of the researcher read the interpretations, and helped in the revision and expansion of the interpretations. When discrepancies were detected between the two researchers, data were reexamined. Any disagreements were resolved through discussion until a consensus was reached.

(c) Methodological triangulation was maintained by using more than one method to gather data. In this study, data was gathered from semi-structured interviews and

questionnaires. Questionnaire had both open-ended and close-ended questions, which enabled collection and comparison of qualitative and quantitative data.

Reliability and validity statistics for the quantitative data was provided using SPSS.

Summary of Chapter 3

This chapter has outlined the research questions that would guide the current study and then explained the criteria for selection of settings and participants.

Instruments, data collection and analysis procedures came next. All instruments and the directions that accompanied them are available in the Appendices section. How validity and reliability was established was also discussed in this chapter.

CHAPTER 4: QUALITATIVE RESULTS FROM THE INTERVIEW

Overview

The purpose of this study was to examine students' attitudes towards their teacher educators' use of instructional PowerPoint, and students' perceptions of the value of PowerPoint handouts. In this sequential mixed methods study, there were two phases. In Phase I, a qualitative design was used to fully explore the role of PowerPoint in teacher education through semi-structured interviews. The results of the interviews produced insights and provided the basis for the selection of categories and question items for the questionnaires, which formed the Phase II of this research study. Therefore, results for each phase are presented in the order data was collected.

Qualitative results from semi-structured interviews are presented in Chapter 4 and consist of categories that provide a profile of the most common themes that merged from the analysis of semi-structured interview data.

Quantitative and qualitative results from the questionnaire (discussed in Chapter 5 and 6) comprised the second analysis phase and addressed each research question in order. Quantitative results consist of descriptive statistics and percentages that provide a profile of study participants in the study. The Mann-Whitney U test analyses that examined perceived differences between graduate and undergraduate students are also discussed in Chapter 5.

Qualitative results from questionnaires are presented in Chapter 6 and consist of categories that provide a profile of the most common themes that merged from the analysis of open-ended questions in the questionnaire.

Analysis of the Interviews

Eleven teacher education students were interviewed about their attitudes towards, and perceptions of current PowerPoint use in their teacher education experience. As explained in Chapter 3, the data analysis of interviews involved a five-step procedure including reflection, case analysis, coding, refining, cross-case analysis and finalizing. Of all the emerged themes, three major categories and related sub-categories were identified (see Table 4.1). These serve as an advance organizer for readers of this chapter.

Illustrative examples of quotations are found in Table 4.2 at the end of the chapter.

Table 4-1 Categories and their sub-categories

<i>Category</i>	<i>Sub-category</i>
<i>Effectiveness of PowerPoint</i>	On topic, interactive, focused, structured, less ambiguity, ease of use, easier to know teacher expectations, good for taking notes, benefits for visual learners
<i>Efficiency of PowerPoint</i>	Good organization tool, PowerPoint as an outline, PowerPoint as an organizer of ideas, PowerPoint as a guide, PowerPoint as a backup, time saver, access, availability, convenience
<i>Value of PowerPoint Handouts</i>	Ease of following along and taking notes, importance of handouts for second language speakers of English

The three categories reflect teacher education students' perceptions and experiences regarding (a) effectiveness of PowerPoint, (b) efficiency of PowerPoint, and (c) value of handouts that accompany PowerPoint presentations. In the categories and their sub-categories table, confirming and divergent viewpoints were presented for each category, when applicable. Direct quotes have been selected from the individual interviews that are illustrative of the perceptions and experiences of the majority of the

students interviewed. Quotes were used as the main tool in the write-up of the results to express the students' perceptions of PowerPoint in their teacher education experiences, and to strengthen the results.

In order to maintain confidentiality, a pseudonym has been substituted for each participant's real name. Karen, Mary, Peline, Sophia, Darlene, Kim, Janet, Ming, Selin, Teresa, and Jeremy were interviewed for this study at a time and place convenient to them. Analysis of each category and its sub-category is discussed as follows:

Effectiveness of PowerPoint

In an attempt to understand the eleven students' perceptions of the use of PowerPoint in their classes, I asked them to describe the ways PowerPoint affected their learning. Students' attitudes were generally quite positive towards PowerPoint, although they did not think this tool was being used to its fullest potential. There were a number of issues that the students explained that all seemed to relate to effectiveness of PowerPoint. Karen, an advanced doctoral student in science education, referring to PowerPoint's tremendous potential to increase the availability and convenience of education, said:

I could see that if faculty was into PowerPoint and creative, he or she could then use creatively to get across messages, to show animation or activities that really otherwise would be time consuming in a non-technical environment ... you know like... to do lab experiments for instance, you have to bring in all of the glassware and the bunsen burner ...all of that stuff into the lab environment or into the lecture environment to show this demonstration when you could probably have a video of it which would capture students' attention close to equally as well.

(Interview, Karen, September 2006)

Karen was then asked to elaborate on in what ways PowerPoint was effective:

Go back to the science experiment example. It would be very difficult and time consuming and you really wouldn't get the opportunity to see perhaps a demonstration of what it is that you are speaking about ...I think for students to actually see it is 1) more engaging and 2) there is less ambiguity as to what they walked away with understanding.

(Interview, Karen, September 2006)

Students perceived their instructors who used PowerPoint as organized and on track. Students also use PowerPoint as a medium of communication for the same reasons, when they are asked to present in class. Kim, an undergraduate student, stated:

I really like PowerPoint. I think it is helpful in a lot of ways. Also if you have to do a presentation yourself it is easier that way. It makes sure that you stay on track. I think it is the same for teachers. They want to make sure that they stay on track. When they use PowerPoint, they do what they are supposed to be doing.

(Interview, Kim, January 2007)

Students also believe when PowerPoint is used, they feel more certain about what they are expected to know. When asked if PowerPoint added anything to her learning, Darlene, who is an undergraduate student, said:

Yeah, I think so. I think that it makes it easier for me to know what I have to know for the class. Make sure that I get everything that I am supposed to be learning down. I know what I am going to be tested on ...that kind of stuff. I think it makes it just easier all around.

(Interview, Darlene, January 2007)

Kim also felt that PowerPoint served as a guide for her learning:

I think it is helpful. . . it is an easy way for us to know the main points of what is going on. You can see exactly what the professor wants you to take from what he is saying so you don't like... understand something wrong. It is kind of a guide for like learning so we know exactly what we are supposed to know.

(Interview, Kim, January 2007)

The topic of how PowerPoint stimulates the visual learner came up in several interviews. Mary, who identified herself as a very visual learner, discussed the frustration she felt in her prior education in which the auditory mode was the only instruction method:

I am so visual that most of my teachers have not accommodated that in my life so I have learned to work around it. PowerPoint is a tool that I don't have to find so many other ways to compensate for what isn't there.

(Interview, Mary, October 2006)

Sophia also felt that PowerPoint was effective in many ways including (a) helping instructors to accommodate visual learners, get students attention by using different features of PowerPoint, and (c) saving time.

Because it is more visual it is more helpful. You can't ask the students to look at the book but you can take the most important things from the book and put it on the screen. It saves time because instructors are not writing on the board. You could also use visuals to make students pay more attention to what is presented.

(Interview, Sophia, October 2006)

According Peline, Sophia, and Ming, who were second language speakers of English, PowerPoint presentations were more effective for presenting factual information or theory. Peline stated:

Especially when they talk about theory, it helps to have a PowerPoint. When they give me a handout, I feel safer because theory is a difficult part for me to understand and grasp. PowerPoint presentations and PowerPoint handouts help my understanding theories.

(Interview, Peline, November 2006)

Sophia 's comments were in line with those of Peline's:

One of my instructors used PowerPoint to present theories and it was very effective. Even students used PowerPoint for their own presentations. I think it was the best way to do it. You can't have people reading from the book or you can't just lecture the students because there are a lot of details. PowerPoint helps to show the connection between ideas. These are the reasons..these are the results. That was really helpful.

(Interview, Sophia, October 2006)

Selin felt that PowerPoint provided a new and different approach for instruction in her classes and explained how this approach helped international students:

We have a lot of international students in my program and PowerPoint leaves less room for miscommunication in my classes. Teachers get their points across easily because students can both see and hear what is presented and this enhances understanding. I think the more modalities the better.

(Interview, Selin, October 2006)

Efficiency of PowerPoint

There were a number of issues that the students explained that all seemed to relate to efficiency of PowerPoint in instruction. Students indicated positive attitudes because most of them felt that PowerPoint provided an efficient learning environment for them. Mary said:

As an adult grad learner, you don't have time. I am looking for easier learning and efficient learning. I want the fastest input the most efficient way and PowerPoint does that for me.

(Interview, Mary, October 2006)

Ming stated that some information could be delivered more effectively and efficiently with PowerPoint, especially in large classrooms where the number of students was high:

If there are 200 people in a lecture hall, it is better to use PowerPoint to lecture instead of using the chalkboard...I think information can be delivered more effectively with PowerPoint because it is a very structured way of teaching. You can always go back. It gives you the skeleton of the whole course.

(Interview, Ming, September 2006)

Janet also commented on how PowerPoint provided a structured and organized learning environment in her classes but she did not feel that it helped her learning:

I think PowerPoint can make the instruction more structured and more organized but PowerPoint does not really add any value to my learning. PowerPoint doesn't do anything for me. It is just another way to lecture really.

(Interview, Janet, December 2006)

According to students, instructors' use of PowerPoint increases students' confidence that the faculty had planned ahead and that their time was not wasted by pausing several times during a lecture. When asked if PowerPoint improved instruction in her classes, Kim stated:

Yeah, I do. I think it makes the class run smoother like where we don't have to take a break for the teacher to figure out what they are gonna say next. Usually they have an outline when they lecture. I guess it is the same thing. It gets run smoother. They have an outline but we can see it, too. There is no awkward pauses or they are trying to figure out what they are gonna do next.

(Interview, Kim, January 2007)

Value of PowerPoint Handouts

The most important finding of all in Phase 1 was regarding the importance of handouts for students who were second language speakers of English. Although all students said that having a handout of the presentation helped their learning, Sophia, Ming, Peline and Selin felt that the handouts were crucial for their learning. For example, Sophia said that without the handouts, PowerPoint presentations placed an added burden on her learning:

Handouts are very important for me. Assuming that I get a copy of what is being presented, PowerPoint really helps when it is well-prepared. If the teacher doesn't do that for me, then it is an added burden because I have to listen, read and write and not in my first language.

(Interview, Sophia, October 2006)

PowerPoint handouts are useful to give students a structure to their note-taking.

Having written notes or the presentation outline also let the learners know that they have the resources right in front of them and that allows them to be free to listen to the instructor. When asked how receiving handouts helped her learning, Sophia said:

It gives a reason for listening. It helps as a brief arrangement for my thoughts. When I have to copy notes from the PowerPoint versus taking notes for myself... if I have the outline already, I add to it. When I don't get a handout, it is usually writing what is on the PowerPoint because I need that outline to review class material but I don't get a chance to reflect on what I am learning.

(Interview, Sophia, October 2006)

When a handout is not given, many times learners miss out on the additional information by the instructor, which shows associations or connections between ideas presented because students are so busy writing notes. Selin, who also felt that having a handout was helpful, said:

If the instructor provides a copy of the presentation beforehand, I think that really helps but if they don't give a copy of it, I think I feel more distracted because I read what is on the screen and I can't follow what they say and take notes. But when they give me a copy, I just listen and take notes. It is easier to follow along the lecture when PowerPoint handout is given.

(Interview, Selin, October 2006)

Jeremy's comments were in line with those of Selin's:

When I receive a handout, I feel secure that I already have the notes and I can listen more critically what the professor is saying and make more connections to

it.

(Interview, Jeremy, December 2006)

Selin also felt that having the handout ahead of time was even more helpful than receiving it right before the presentation in class:

Our (...) professor puts the PowerPoint two days before the class so we print it out and look through it. This provides the students with a preparation for the class. Also, PowerPoint handouts are good review tools for students.

(Interview, Selin, October 2006)

Technology has benefited all of us by allowing the easy dissemination of information. All students interviewed appreciated the instructors who posted slides online and indicated that access to slides really facilitated their learning. Mary, who believed interacting with slides promoted active learning for her, said:

By putting the slides on Blackboard, and the giving students access to them..that is really promoting active learning because you can download them and use them as you see fit in your own self-study.

(Interview, Mary, October 2006)

Having a copy of the PowerPoint presentation handout also reduce the anxiety normally experienced during note-taking and increase students' confidence about what they covered in class and what they need to know. Ming stated:

It [handout] gives me the structure of the whole class and when I leave the class, I have something to take with and if I want to review the class, I have something in hand and I can trace back the structure of the class and remember what I learned in the class easily. I always try to get a handout. If the instructor didn't

give one, I always ask for one cause I think that is what is important.

(Interview, Ming, September 2006)

When asked to elaborate on the ways handouts helped, Ming said:

It helps me to remember the content, that is one thing and help me review...after the class cause I have the skeleton of the class. In the class it saves time so I don't have to watch the professor write on the board while I know what he or she is writing and they save my energy to take notes sometimes.

(Interview, Ming, September 2006)

Jeremy indicated that two of the most important factors that affect his preference to take a course from a teacher who uses PowerPoint than a teacher who does not were (a) his teacher's teaching style and (b) whether the instructor provides a handout or not.

When asked what made the handouts so helpful for him, Jeremy said:

It is another study aid. It breaks the information down even further. The other sources that they (instructors) provide to present information and the application that they are providing with it is helpful.

(Interview, Jeremy, December 2006)

When students do not get a handout, they are more concerned about copying down the notes from the slides than listening to the instructor, which causes them to split their attention and this hinders their learning:

If there is a lot of information on one slide, I feel like I have to write down everything before I actually listen . . . so most of the time I am not even listening while I am writing . . . trying get everything on that slide down.

(Interview, Kim, January 2007)

Summary of Chapter 4

The main purpose of this chapter was to interpret qualitative data obtained from interviews with 11 teacher education students about their attitudes towards and perceptions of PowerPoint use in their teacher education experience. Content analysis of data generated the following three major categories: (a) effectiveness of PowerPoint, (b) efficiency of PowerPoint, and (c) value of handouts that accompany PowerPoint presentations.

Table 4.2 presents the categories and related interview excerpts that illustrate students' experiences in their learning with PowerPoint in their teacher education programs.

Table 4-2 Categories from interview data analysis and illustrative excerpts

Category	Illustrative Excerpts
Effectiveness of PowerPoint	<ul style="list-style-type: none"> ▪ [PowerPoint can be used] <i>creatively to get across messages, to show animation or activities that really otherwise would be time-consuming in a non-technical environment.</i> ▪ <i>I think for students to actually see it is 1) more engaging and 2) there is less ambiguity as to what they walked away with understanding.</i> ▪ <i>They (teachers) want to make sure that they stay on track. When they use PowerPoint, they do what they are supposed to be doing.</i> ▪ <i>I think that it makes it easier for me to know what I have to know for the class. I know what I am going to be tested on.</i> ▪ <i>PowerPoint leaves less room for miscommunication in my classes.</i>
Efficiency of PowerPoint	<ul style="list-style-type: none"> ▪ <i>I want the fastest input the most efficient way and PowerPoint does that for me.</i> ▪ <i>I think it makes the class run smoother like where we don't have to take a break for the teacher to figure out what they are gonna say next.</i>

Table 4-2 Categories from interview data analysis and illustrative excerpts, continued

Value of PowerPoint Handouts	<ul style="list-style-type: none">▪ <i>If the teacher doesn't [give me a handout], then it is an added burden because I have to listen, read and write and not in my first language.</i>▪ <i>If they don't give a copy of it [handout], I think I feel more distracted because I read what is on the screen and I can't follow what they say and take notes.</i>▪ <i>[When a handout is not given], I feel like I have to write down everything before I actually listen. . . so most of the time I am not even listening while I am writing . . . trying get everything on that slide down.</i>▪ <i>When I receive a handout, I feel secure that I already have the notes and I can listen more critically and make more connections to it.</i>
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CHAPTER 5: QUANTITATIVE RESULTS FROM THE QUESTIONNAIRE

Overview

This chapter presents the quantitative results of the questionnaire, which was conducted in the second phase of the two-phased study. The qualitative results from semi-structured interviews in Phase 1, which were discussed in Chapter 4, provided the basis for the selection of categories and question items for the questionnaires in Phase 2. This chapter provides the results for each research question raised in this phase.

Comparison of graduate and undergraduate students in terms of their attitudes towards PowerPoint was already planned in the dissertation proposal. However, this comparison seemed even more important after the analysis of interview data, which showed that perceptions of graduate and undergraduate students greatly varied. Therefore, of interest to this study were the differences between graduate and undergraduate students on their (a) attitudes towards PowerPoint's influences on student learning, instructional features, instructors' overall teaching, and specific aspects of instructors' performance and (b) perceptions of value of PowerPoint handouts in their teacher education experiences.

Results

Results Concerning Students' Attitudes about PowerPoint (AP)

A total of 18 items investigated students' attitudes about PowerPoint's influence on (a) student learning, (b) instructional features, and (c) instructors' overall teaching and specific aspects of instructors' performance. Results are presented below.

AP. 1a. What are students' attitudes about PowerPoint's influence on student learning in teacher education? (Items 1-8)

Basic frequency distributions were used to determine the general attitudes toward the use of PowerPoint in teacher education. Table 5.1 presents the results using a five-point scale (ranged from definitely false, more false than true, in between, more true than false, definitely true) for the greatest amount of detail.

<i>Table 5-1 Frequencies and percentages related to students' attitudes about PowerPoint's influence on student learning (Using 5- point scale)</i>						
<i>(Items 1-8)</i>		Definitely false	More false than true	In Between	More true than false	Definitely true
1. I feel I <i>understand</i> the information <i>better</i> .	<i>n</i>	12	40	99	119	30
	%	(4.0%)	(13.3%)	(33.0%)	(39.7%)	(10.0%)
2. I can <i>formulate more or better questions</i> to ask	<i>n</i>	18	54	124	80	25
	%	(6.0%)	(17.9%)	(41.2%)	(26.6%)	(8.3%)
3. I feel <i>more interested</i> in the material.	<i>n</i>	30	45	137	66	25
	%	(9.9%)	(14.9%)	(45.2%)	(21.8%)	(8.3%)
4. I become <i>more involved</i> with the content	<i>n</i>	29	64	103	84	20
	%	(9.7%)	(21.3%)	(34.3%)	(28.0%)	(6.7%)
5. I feel I stay <i>more focused</i> on the content.	<i>n</i>	22	34	89	118	40
	%	(7.3%)	(11.2%)	(29.4%)	(38.9%)	(13.2%)
6. I <i>take better class notes</i> .	<i>n</i>	27	24	52	121	78
	%	(8.9%)	(7.9%)	(17.2%)	(40.1%)	(25.8)
7. I am <i>more certain</i> about what I am expected to know.	<i>n</i>	9	28	55	142	69
	%	(3.0%)	(9.2%)	(18.2%)	(46.9%)	(22.8%)
8. I feel I <i>still benefit</i> from a <i>straight PowerPoint lecture</i> when it is <i>well-prepared</i> and <i>engaging</i> .	<i>n</i>	10	21	63	148	61
	%	(3.3%)	(6.9%)	(20.8%)	(48.8%)	(20.1%)

Table 5.2 presents the collapsed frequencies and percentages in order to provide a more general picture.

<i>Table 5-2 Frequencies and percentages related to students' attitudes about PowerPoint's influence on student learning (Collapsing to 3-point scale)</i>				
<i>(Items 1-8)</i>		Definitely false & More false than true	In Between	Definitely true & More true than false
1. I feel I <i>understand</i> the information <i>better</i> .	<i>n</i>	52	99	149
	%	(17.3%)	(33.0%)	(49.7%)
2. I can <i>formulate more or better questions</i> to ask	<i>n</i>	72	124	105
	%	(23.9%)	(41.2%)	(34.9%)
3. I feel <i>more interested</i> in the material.	<i>n</i>	75	137	91
	%	(24.8%)	(45.2%)	(30.1%)
4. I become <i>more involved</i> with the content	<i>n</i>	93	103	104
	%	(31.0%)	(34.3%)	(34.7%)
5. I feel I stay <i>more focused</i> on the content.	<i>n</i>	56	89	158
	%	(18.5%)	(29.4%)	(52.1%)
6. I <i>take better class notes</i> .	<i>n</i>	51	52	199
	%	(16.8%)	(17.2%)	(65.9%)
7. I am <i>more certain</i> about what I am expected to know.	<i>n</i>	37	55	211
	%	(12.2%)	(18.2%)	(69.7%)
8. I feel I <i>still benefit</i> from a straight PowerPoint lecture when it is well-prepared and engaging.	<i>n</i>	31	63	209
	%	(10.2%)	(20.8%)	(68.9%)

Nearly five in ten (49.7 %) students felt they *understood the information better* when PowerPoint is used in instruction (Item 1). Nearly two in ten (17.3%) disagreed with this statement while 33% of the students indicated they felt ambivalent about whether they understood the information better or not when PowerPoint is used in instruction. On the other hand, only 30.1% of the students surveyed indicated that they

felt more interested in the material (Item 3), 34.7% felt *more involved* with the content (Item 4), and 34.9% *formulated more or better questions* to ask (Item 2).

PowerPoint helps students *take better class notes* and *identify important information* they need to know in a given class. Nearly seven in ten (65.9%) students felt they *took better class notes* (Item 6) and the majority of students (69.8%) felt *more certain* about what they were expected to know (Item 7) when PowerPoint is used in the classroom. Results for Item 8 suggest that nearly seven in ten (68.9%) students indicated that they *still benefit* from a straight PowerPoint lecture when it is well-prepared and engaging.

AP. 1b. Do differences exist between graduate and undergraduate students' attitudes about PowerPoint's influence on student learning? (Items 1-8)

The Mann-Whitney U test was used to determine whether statistically significant differences existed between the attitudes the two groups about PowerPoint's influence on student learning. This nonparametric statistical test was appropriate to analyze the Likert scale questionnaire data, which were considered ordinal and were not normally distributed.

The results of the Mann-Whitney U tests are presented in Table 5.3. Since the sample sizes for both graduate and undergraduate student groups are larger than 20 in this study, the sampling distribution of U approaches a normal curve. Therefore, the z scores based on the U distribution are reported in Table 5.3. For comparison of frequencies and percentages behind Table 5.3, see Appendix F.

Two of the eight items related to influence of PowerPoint on student learning were found to be significantly different by education status (graduate vs. undergraduate)

at the $p < 0.05$ level. Compared to undergraduate students, graduate students felt *more involved* with the content when PowerPoint was used (Item 4). The mean rank for undergraduate students was 138.41 while the mean rank for graduate students was much higher (160.26) and thus, the difference between the two groups was statistically significant ($z = -2.252$, $p = 0.024$) at the $p < 0.05$ level.

Table 5-3 The Mann-Whitney U test results comparing graduate and undergraduate students on their attitudes toward PowerPoint's influence on student learning

	Status	N	Mean Rank	z	p-value	Interpretation
1. I feel I <i>understand</i> the information <i>better</i> .	Undergrad.	133	148.55	-0.367	.714	-
	Grad.	167	152.05			
2. I can <i>formulate more or better questions</i> to ask	Undergrad.	134	147.00	-0.751	.453	-
	Grad.	167	154.21			
3. I feel <i>more interested</i> in the material	Undergrad.	134	148.13	-0.724	.469	-
	Grad.	169	155.07			
4. I become <i>more involved</i> with the content	Undergrad.	134	138.41	-2.252	.024*	G>UG
	Grad.	166	160.26			
5. I feel I stay <i>more focused</i> on the content.	Undergrad.	134	141.60	-1.928	.054	-
	Grad.	169	160.25			
6. I take <i>better class notes</i> .	Undergrad.	134	158.74	-1.346	.178	-
	Grad.	168	145.73			
7. I am <i>more certain</i> about what I am expected to know.	Undergrad.	134	168.02	-3.024	.002**	UG>G
	Grad.	169	139.30			
8. I feel I <i>still benefit</i> from a straight PowerPoint lecture when it is well-prepared and engaging.	Undergrad.	134	155.90	-0.741	.459	-
	Grad.	169	148.91			

* Significant at the $p < 0.05$ level.

** Significant at the $p < 0.005$ level.

On the other hand, compared to graduate students, undergraduates indicated that they felt *more certain* about what they are expected to know when PowerPoint is used. The mean rank for graduate students was 139.30 while the mean rank for undergraduate students was much higher (168.02), indicating a statistically significant difference ($z = -2.252$, $p = 0.002$) at the $p < 0.005$ level.

However, no statistically significant differences were found between the attitudes of graduate and undergraduate students toward PowerPoint's influence on their learning for the Items 1,2,3,5,6, and 8 (See Table 5.3). The differences between the mean ranks for graduate and undergraduate students for these items were not significant. This indicates that graduate and undergraduate students did not report attitudes that were different for (a) understanding the information better (Item 1), (b) being able to formulate more or better questions to ask, (Item 2) (c) feeling more interested in the material (Item 3), (d) staying more focused on the content (Item 5), and (e) taking better class notes (Item 6).

AP. 2a. What are students' attitudes towards PowerPoint's influence on instructional features (e.g., discussions, lesson organization, and use of time) in teacher education? (Items 9-14)

This section explored the impact that PowerPoint had on specific features of instruction. Frequencies and percentages related to students' attitudes towards PowerPoint's influence on instructional features are presented in Table 5.4. This table presents the results using a five-point scale (ranged from *definitely false*, *more false than true*, *in between*, *more true than false*, and *definitely true*) for the greatest amount of detail while Table 5.5 presents the collapsed frequencies and percentages. Results showed that students perceive PowerPoint to have a positive impact on instruction in

their teacher education experiences. Students indicated that, when PowerPoint was used, lessons were *better organized* (70.9 %) (Item 10), *easier to understand* (54.4%) (Item 11), and *easier to follow* (68.2%) (Item 12).

The majority of the students (68.9%) disagreed with the statement that “PowerPoint presentations steal time from instruction” (Item 14) but a relatively high number of students (43.4%) felt class time was spent *more effectively* when PowerPoint was used (Item 13) while 40.7% indicated ambivalent feelings about effective use of class time. Also 42.2% did not feel they had *fewer discussions* in class (Item 9) while 23.4% indicated they did.

Table 5-4 Frequencies and percentages related to attitudes about PowerPoint’s influence on instructional features (Using 5- point scale)

(Items 9-14)		Definitely false	More false than true	In Between	More true than false	Definitely true
9. I feel we have <i>fewer discussions</i> in class.	n	41	87	104	60	11
	%	(13.5%)	(28.7%)	(34.3%)	(19.8%)	(3.6%)
10. I feel that lessons are <i>better organized</i> .	n	8	16	64	141	73
	%	(2.6%)	(5.3%)	(21.2%)	(46.7%)	(24.2%)
11. I feel that lessons are <i>easier to understand</i> .	n	10	27	101	111	54
	%	(3.3%)	(8.9%)	(33.3%)	(36.6%)	(17.8%)
12. I feel that lessons are <i>easier to follow</i> .	n	6	27	63	151	55
	%	(2.0%)	(8.9%)	(20.9%)	(50.0%)	(18.2%)
13. I feel class time is spent <i>more effectively</i> .	n	14	34	123	102	29
	%	(4.6%)	(11.3%)	(40.7%)	(33.8 %)	(9.6%)
14. I feel PowerPoint presentations <i>steal time</i> from instruction.	n	100	108	62	27	5
	%	(33.1%)	(35.8%)	(20.5 %)	(8.9%)	(1.7%)

Table 5-5 Frequencies and percentages related to attitudes about PowerPoint's influence on instructional features (Collapsing to 3-point scale)

<i>(Items 9-14)</i>		Definitely false & More false than true	In Between	More true than false & Definitely true
9. I feel we have <i>fewer discussions</i> in class.	n	128	104	71
	%	(42.2%)	(34.3%)	(23.4%)
10. I feel that lessons are <i>better organized</i> .	n	24	64	214
	%	(7.9%)	(21.2%)	(70.9%)
11. I feel that lessons are <i>easier to understand</i> .	n	37	101	165
	%	(12.2%)	(33.3%)	(54.4%)
12. I feel that lessons are <i>easier to follow</i> .	n	33	63	306
	%	(10.9%)	(20.9%)	(68.2%)
13. I feel class time is spent <i>more effectively</i> .	n	48	123	131
	%	(15.9%)	(40.7%)	(43.4%)
14. I feel PowerPoint presentations <i>steal time</i> from instruction.	n	208	62	32
	%	(68.9%)	(20.5 %)	(10.6%)

AP. 2b. Do differences exist between graduate and undergraduate students' attitudes about PowerPoint's influence on instructional features? (Items 9-14)

The Mann-Whitney *U* test was used to determine whether statistically significant differences existed between the attitudes of graduate and undergraduate students about PowerPoint's influence on specific features of instruction for the items 9-14. The results are presented in Table 5.6. For comparison of frequencies and percentages behind Table 5.6 see Appendix G.

Two of the six items related to influence of PowerPoint on instructional features were found to be significantly different for graduate and undergraduate students. Compared to graduate students, undergraduate students felt they *had fewer class discussions* when PowerPoint was used (Item 9). The mean rank for undergraduate

students was 173.08 while the mean rank for graduate students was significantly lower (135.29) and thus, the difference between the two groups was statistically significant ($z = -3.876, p = 0.000$) at the $p < 0.005$ level.

Table 5-6 The Mann-Whitney U test results comparing graduate and undergraduate students on their attitudes toward PowerPoint's influence on instructional features

(Items 9-14)	Status	N	Mean Rank	z	p-value	Interpretation
9. I feel we have <i>fewer discussions</i> in class.	Undergrad.	134	173.08	-3.876	.000**	UG>G
	Grad.	169	135.29			
10. I feel that lessons are <i>better organized</i> .	Undergrad.	134	161.36	-1.874	.061	-
	Grad.	168	143.64			
11. I feel that lessons are <i>easier to understand</i> .	Undergrad.	134	154.45	-0.455	.649	-
	Grad.	169	150.06			
12. I feel that lessons are <i>easier to follow</i> .	Undergrad.	134	158.23	-1.290	.197	-
	Grad.	168	146.13			
13. I feel class time is spent <i>more effectively</i> .	Undergrad.	134	148.31	-0.601	.548	-
	Grad.	168	154.04			
14. I feel PowerPoint presentations <i>steal time</i> from instruction.	Undergrad.	134	162.82	-2.111	.035*	UG>G
	Grad.	168	142.47			

* Significant at the $p < 0.05$ level.
 ** Significant at the $p < 0.005$ level.

Compared to graduate students, more undergraduate students felt that PowerPoint presentations stole time from instruction (Item 14). The mean rank for graduate students was 162.82 while the mean rank for undergraduate students was 142.47, indicating a statistically significant difference ($z = -2.111, p = 0.035$) at the $p < 0.05$ level.

The mean rank for Items 10, 11, 12, and 13 appeared approximately the same. This indicates that graduate and undergraduate students did not report attitudes that were

different that (a) the lessons were *better organized* (Item 10), (b) the lessons were *easier to understand* (Item 11), (c) the lessons were *easier to follow* (Item 12), and (d) class time is spent *more effectively* (Item 13), when PowerPoint was used.

AP. 3a. What are students' attitudes towards PowerPoint's influence on instructors' performance in teacher education? (Items 15-18)

One of the most interesting findings of the questionnaire was PowerPoint's positive influence on instructors' performance as reported by students. Item 15 explored the impact PowerPoint had on instructors' overall teaching as perceived by the students. Items 16-18 looked at PowerPoint's influence on specific aspects of instructors' performance. Five-point and collapsed (3-point) frequencies and percentages related to students' attitudes towards PowerPoint's influence on instructors' overall teaching (Item 15) are presented in Tables 5.7 and 5.8 respectively. The frequencies and percentages for Items 16-18 are presented in Tables 5.9 and 5.10.

Table 5-7 Frequencies and percentages related to attitudes about PowerPoint's influence on instructors' overall teaching (Using 5- point scale)

(Item 15)		Worsens Significantly	Worsens to Some Extent	Not Change Significantly	Improves to Some Extent	Improves Significantly
15. What impact do you think PowerPoint has on your instructors' teaching?	<i>n</i>	5	19	72	164	41
	<i>%</i>	(1.6%)	(6.3%)	(23.8%)	(54.3%)	(13.6%)

Overall, results showed that according to students, PowerPoint had a positive impact on their instructor's overall teaching. As Table 5.8 presents, in response to what impact PowerPoint had on their instructors' teaching, out of 302 students who responded, 205 (67.9%) indicated that PowerPoint improved their instructor's teaching to some

extent (54.3%) or significantly (13.6%) on a five-point scale (ranged from *worsens significantly, worsens to some extent, not change significantly, improves to some extent, and improves significantly*) (Item 15).

Table 5-8 Frequencies and percentages related to attitudes about PowerPoint's influence on instructors' overall teaching (Collapsing to 3-point scale)

(Item 15)		Worsens Significantly & Worsens to Some Extent	Not Change Significantly	Improves to Some Extent & Improves Significantly
15. What impact do you think PowerPoint has on your instructors' teaching?	<i>n</i>	24	72	205
	%	(7.9%)	(23.8%)	(67.9%)

Questionnaire results also showed that overall, teacher education students perceive PowerPoint to help instructors structure their instruction. As shown in Table 5.10, more than six in ten (60.6%) students felt that their instructors were *better prepared* for class instruction (Item 16), 69% of the students felt instructors *organized their thoughts better* (Item 17), and 71.8% felt they *better stay on track* (Item 18).

Table 5-9 Frequencies and percentages related to attitudes about PowerPoint's influence on specific aspects of instructors' performance (Using 5- point scale)

(Items 16-18)		Definitely false	More false than true	In Between	More true than false	Definitely true
16. I feel the instructors are <i>better prepared</i> for class instruction.	<i>n</i>	8	30	81	131	52
	%	(2.6%)	(9.9%)	(26.8%)	(43.4%)	(17.2%)
17. I feel the instructors <i>organize their thoughts better</i> .	<i>n</i>	8	19	66	152	55
	%	(2.7%)	(6.3%)	(22.0%)	(50.7%)	(18.3%)
18. I feel the instructors <i>stay on track better</i> .	<i>n</i>	6	20	58	155	29
	%	(2.0%)	(6.7%)	(19.5%)	(52.0%)	(19.8%)

Table 5-10 Frequencies and percentages related to attitudes about PowerPoint's influence on specific aspects instructors' performance (Collapsing to 3-point scale)

<i>(Items 16-18)</i>		Definitely false & More false than true	In Between	Definitely true & More true than false
16. I feel the instructors are <i>better prepared</i> for class instruction.	<i>n</i>	38	81	183
	%	(12.5%)	(26.8%)	(60.6%)
17. I feel the instructors <i>organize their thoughts better</i> .	<i>n</i>	27	66	207
	%	(9.0%)	(22.0%)	(69.0%)
18. I feel the instructors <i>stay on track better</i> .	<i>n</i>	26	58	184
	%	(8.7%)	(19.5%)	(71.8%)

AP.3b. Are there any significant differences between graduate and undergraduate students' attitudes about PowerPoint's influence on instructors' overall teaching and specific aspects of instructors' performance? (Items 15-18)

The Mann-Whitney *U* test was used to determine whether statistically significant differences existed between the attitudes of graduate and undergraduate students about PowerPoint's influence on instructors' overall teaching (Item 15) and on instructors' performance related to specific aspects of instruction (Items 16-18). The results of the Mann-Whitney *U* tests for Item 15 and Items 16-18 are presented in Table 5.11 and Table 5.12 respectively. For comparison of frequencies and percentages behind these tables, see Appendix H and I respectively.

The Mann-Whitney *U* test found no statistically significant differences between the attitudes of graduate and undergraduate students about PowerPoint's influence on instructors' overall teaching (Item 15). The mean rank for undergraduates was 141.57, while that for graduate students was 159.42, showing that the attitudes about PowerPoint's influence on instructor's teaching were not significantly different between

the groups.

Table 5-11 The Mann-Whitney U test results for graduate and undergraduate students on their attitudes toward PowerPoint's influence on instructors' overall teaching

(Item 15)	Status	N	Mean Rank	z	p-value	Interpretation
9. What impact do you think PowerPoint has on your instructors' teaching? (Scale: Significantly Worsened... Significantly Improved)	Undergrad.	134	141.57	-1.946	.052	-
	Grad.	168	159.42			

* Significant at the $p < 0.05$ level.

According to the Mann-Whitney *U* test (Table 5.12), no statistically significant differences exist between the attitudes of graduate and undergraduate students about PowerPoint's influence on specific aspects of instructors' performance.

Table 5-12 The Mann-Whitney U test results comparing graduate and undergraduate students on their attitudes about PowerPoint's influence on specific aspects of instructors' performance

(Items 16-18)	Status	N	Mean Rank	z	p-value	Interpretation
16. I feel the instructors are better prepared for class instruction.	Undergrad.	134	153.71	-.415	.678	-
	Grad.	168	149.74			
17. I feel the instructors organize their thoughts better.	Undergrad.	134	161.36	-1.305	.192	-
	Grad.	168	143.64			
18. I feel the instructors stay on track better.	Undergrad.	134	154.45	-.786	.432	-
	Grad.	169	150.06			

* Significant at the $p < 0.05$ level.

The differences between the mean ranks of the graduate and undergraduate students for Items 16, and 17, and 18 were not significantly different. This indicates that graduate and undergraduate students did not report significantly different attitudes about their instructors that they (a) were better prepared for class instruction (Item 16), (b) organized their thoughts better (Item 17), and (c) stayed on track better (Item 18) when PowerPoint was used. For comparison of frequencies and percentages behind Table 5.12, see Appendix I.

Results Regarding Value of PowerPoint Handouts Presentations (PH)

A total of 9 items investigated the value of PowerPoint handouts for students in their teacher education experiences. Results are presented below.

PH. 1a. How do students perceive the value PowerPoint handouts?

Basic frequencies and percentages were used to determine the general value of PowerPoint handouts for students. Table 5.13 presents the students' perceptions using a five-point scale (ranged from *definitely false, more false than true, in between, more true than false, definitely true*), for the greatest amount of detail. Table 5.14 presents the collapsed frequencies and percentages, providing a more general picture.

As seen in Table 5.14, results indicated that handouts were *very important* to students. A high percentage of the students (62.4%) indicated they *learned more* during a PowerPoint presentation when they were given a presentation handout (Item 19). Only one in ten (10.9%) disagreed with this statement. More than seven in ten (73.3 %) students indicated that having a PowerPoint handout *facilitated their note-taking* (Item 20).

Table 5-13 Frequencies and percentages related to students' perceived value of PowerPoint handouts (Using 5- point scale)

(Items 19-27)		Definitely false	More false than true	In between	More true than false	Definitely true
19. I learn more during a PowerPoint presentation when I am given a presentation handout.	<i>n</i>	14	19	81	125	64
	%	(4.6%)	(6.3%)	(26.7%)	(41.3%)	(21.1%)
20. Having a PowerPoint handout facilitates my note-taking.	<i>n</i>	11	19	51	115	107
	%	(3.6%)	(6.3%)	(16.8%)	(38.0%)	(35.3%)
21. I find PowerPoint handouts very useful for understanding the information by following along the presentation.	<i>n</i>	13	21	57	110	102
	%	(4.3%)	(6.9%)	(18.8%)	(36.3%)	(33.7%)
22. I find PowerPoint handouts very useful for after class reviews.	<i>n</i>	11	6	43	117	125
	%	(3.6%)	(2.0%)	(14.2%)	(38.6%)	(41.3%)
23. When I get a handout of the presentation, I feel that I have what I need for that class period	<i>n</i>	18	38	74	125	46
	%	(6.0%)	(12.6%)	(24.6%)	(41.5%)	(15.3%)
24. When I get a handout of the presentation, I don't take notes.	<i>n</i>	94	98	47	50	12
	%	(31.2%)	(32.6%)	(15.6%)	(16.6%)	(4.0%)
25. When I don't get a handout, I am more concerned about copying notes from the PowerPoint than listening to the instructor.	<i>n</i>	20	38	43	118	82
	%	(6.6%)	(12.6%)	(14.3%)	(39.2%)	(27.2%)
26. When I am not given a handout, I am often so busy taking notes from the slide that I don't have time to think about the content.	<i>n</i>	20	35	51	108	89
	%	(6.6%)	(11.6%)	(16.8%)	(35.6%)	(29.4%)
27. When I don't get a handout, I cannot copy down everything on the slides because the instructor often moves on to the next slide before I am done.	<i>n</i>	19	26	59	119	78
	%	(6.3%)	(8.6%)	(19.6%)	(39.5%)	(25.9%)

Table 5-14 Frequencies and percentages related to students' perceived value of PowerPoint handouts (Collapsing to a 3- point scale)

<i>(Items 19-27)</i>		Definitely false & More false than true	In between	Definitely true & More true than false
19. I learn more during a PowerPoint presentation when I am given a presentation handout.	<i>n</i>	33	81	189
	%	(10.9%)	(26.7%)	(62.4%)
20. Having a PowerPoint handout facilitates my note-taking.	<i>n</i>	34	51	222
	%	(11.2%)	(16.8%)	(73.3%)
21. I find PowerPoint handouts very useful for understanding the information by following along the presentation.	<i>n</i>	56	57	212
	%	(18.6%)	(18.8%)	(70.0%)
22. I find PowerPoint handouts very useful for after class reviews.	<i>n</i>	17	43	242
	%	(5.6%)	(14.2%)	(79.9%)
23. When I get a handout of the presentation, I feel that I have what I need for that class period	<i>n</i>	56	74	171
	%	(18.6%)	(24.6%)	(56.8%)
24. When I get a handout of the presentation, I don't take notes.	<i>n</i>	192	47	62
	%	(63.8%)	(15.6%)	(20.6%)
25. When I don't get a handout, I am more concerned about copying notes from the PowerPoint than listening to the instructor.	<i>n</i>	58	43	200
	%	(19.2%)	(14.3%)	(66.4%)
26. When I am not given a handout, I am often so busy taking notes from the slide that I don't have time to think about the content.	<i>n</i>	45	51	197
	%	(14.9%)	(16.8%)	(65.0%)
27. When I don't get a handout, I cannot copy down everything on the slides because the instructor often moves on to the next slide before I am done.	<i>n</i>	30	59	197
	%	(9.9%)	(19.6%)	(65.4%)

Students also consider handouts as a crucial part of any PowerPoint presentation because they are used as a guide and resource during class and for after class reviews. A

high number of students (70%) indicated that they found PowerPoint handouts very *useful for understanding the information* by following along the presentation (Item 21). Almost eight in ten (79.9%) students indicated that they found PowerPoint handouts very *useful for after class reviews* (Item 22).

Interestingly, a high number of students (56.8%) indicated that when they get a handout, they *had what they needed* for that class period (Item 23). On the other hand, 63.8% of the students reported that they *do take notes* even when they get a handout (Item 24). However, when students *do not* get a handout, (a) 66.4% felt *more concerned about copying notes* from the PowerPoint than listening to the instructor (Item 25), (b) 65.0% felt so *busy taking notes* from the slide that they *didn't have time to think about the content* (Item 26), and (c) 65.4% *could not copy down everything* on the slides because the instructor often moved on to the next slide before they were done (Item 27).

PO.1b. Do perceptions of graduate and undergraduate students differ concerning the value of PowerPoint handouts?

The Mann-Whitney U test was used to determine whether statistically significant differences existed between perceptions of graduate and undergraduate students toward the value of PowerPoint handouts. Table 5.15 presents the results. For comparison of frequencies and percentages behind Table 5.15, see Appendix J.

Table 5-15 The Mann-Whitney U test results comparing the perceptions of graduate and undergraduate students on the value of PowerPoint handouts

(Items 19-27)	Status	N	Mean Rank	z	p-value	Interpretation
19. I learn more during a PowerPoint presentation when I am given a presentation handout.	Undergrad.	134	143.51	-1.583	.113	-
	Grad.	169	158.73			
20. Having a PowerPoint handout facilitates my note-taking.	Undergrad.	134	139.27	-2.379	.017 *	G>UG
	Grad.	169	162.09			
21. I find PowerPoint handouts very useful for understanding the information by following along the presentation.	Undergrad.	134	151.55	-.084	.933	-
	Grad.	169	152.36			
22. I find PowerPoint handouts very useful for after class reviews.	Undergrad.	134	149.34	-.505	.614	-
	Grad.	169	154.11			
23. When I get a handout of the presentation, I feel that I have what I need for that class period.	Undergrad.	134	154.67	-.688	.491	-
	Grad.	167	148.05			
24. When I get a handout of the presentation, I don't take notes.	Undergrad.	133	168.24	-3.177	.001**	UG>G
	Grad.	168	137.35			
25. When I don't get a handout, I am more concerned about copying notes from the PowerPoint than listening to the instructor.	Undergrad.	132	163.45	-2.295	.022*	UG>G
	Grad.	169	141.27			
26. When I am not given a handout, I am often so busy taking notes from the slide that I don't have time to think about the content.	Undergrad.	134	165.49	-2.484	.013*	UG>G
	Grad.	169	141.30			
27. When I don't get a handout, I cannot copy down everything on the slides because the instructor often moves on to the next slide before I am done.	Undergrad.	133	150.23	-.144	.886	-
	Grad.	168	151.61			

* Significant at the $p < 0.05$ level.

** Significant at the $p < 0.005$ level.

The Mann-Whitney U tests revealed that 4 of the 9 items concerning value of PowerPoint handouts were significantly different between the graduate and undergraduate students. Having a PowerPoint handout *facilitates graduate students' note-taking* significantly more than undergraduates' (Item 20). The mean ranks of graduate (162.09) and undergraduate (139.27) students differed significantly ($z=-2.379$, $p=0.017$), showing a significant difference by education status. Results of the Mann-Whitney test for Item 24 were in line with the results for Item 20. The mean ranks for undergraduate (168.24) and graduate (137.35) students were significantly different ($z=-3.177$, $p=0.001$) (Item 24). This indicates that when undergraduate students get a handout of the presentation, they are *more likely not to take notes* compared to graduate students.

When students do not get a handout of the presentation, compared to graduate students, undergraduates were significantly *more concerned about copying down notes* from the PowerPoint than listening to the instructor ($z=-2.295$, $p=0.022$) (Item 25). The mean ranks for undergraduate and graduate students were 163.45 and 141.27 respectively, confirming this significant difference.

Compared to graduate students, more undergraduate students reported that they were often *so busy taking notes* from the slide that they *did not have time to think* about the content (Item 26). The difference between the mean ranks for undergraduates (165.49) and (141.30) were significantly different ($z=-2.484$, $p=0.013$) at the $p<0.05$ level.

Mann-Whitney U tests did not find statistically significant differences between undergraduate and graduate students for Items 19, 21, 22, 23, and 27 related to value of PowerPoint handouts because the mean ranks for two groups did not differ significantly

for these items. Results showed that both undergraduate and graduate students learn more during a presentation if a presentation handout is given (Item 19), and find handouts useful not only for understanding the information by following along the presentation (Item 21), but also for using for after class reviews (Item 22). Both graduate and undergraduate students feel that they had what they needed for that class period when they receive a handout (Item 23).

On the other hand, both graduate and undergraduate students reported that they could not *copy down everything* on the slides because the instructor often moved on to the next slide before they were done (Item 27), when they were not given a handout.

Summary of Chapter 5

In this chapter, quantitative results from the questionnaire were presented. The results concerned students' perceptions about (a) PowerPoint's influence on student learning, instructional features, instructors' overall teaching, and specific aspects of instructors' performance, and (b) the value of PowerPoint handouts. Results regarding differences between perceptions of graduate and undergraduate students on all the topics listed above were also presented in this chapter.

CHAPTER 6: QUALITATIVE RESULTS FROM THE QUESTIONNAIRE

Overview

In the questionnaire administered to 304 teacher education students, in addition to the closed-ended items, there were two open-ended questions for participants to express additional comments about their perceptions of and attitudes towards use of PowerPoint in their teacher education experiences. This chapter serves to present findings concerning practices employed by instructors who use PowerPoint (a) effectively and meaningfully, and (b) ineffectively and poorly.

In the open-ended section of the questionnaire, students were asked to (a) think of a specific instructor in their teacher education program who uses MS PowerPoint ineffectively and poorly in the classroom, and (b) describe in detail how this instructor used PowerPoint. Ineffective and poor teaching with PowerPoint environment is mainly characterized by straight-lecturing for the entire class period, which forces students to become passive listeners and learners.

In a separate question, students were also asked to (a) think of a specific instructor in their teacher education program who uses MS PowerPoint effectively and meaningfully in the classroom, and (2) describe in detail how this instructor used PowerPoint. Effective and meaningful learning with PowerPoint environment provides students opportunities to ask questions and interact with problems and content, encouraging students to actively participate in the learning process. Direct quotes have been selected from the qualitative data that are illustrative of the perceptions and experiences of the majority of the students interviewed. Quotes were used as the main

tool in the write-up of the results to express the students' perceptions of PowerPoint in their teacher education experiences, and to strengthen the results.

Results

PowerPoint Practices that Reflect Ineffective and Poor Teaching

As Table 6.1. shows, instructors who use PowerPoint ineffectively and poorly in the classroom use it as (a) a crutch, (b) an information-depositing tool, and (c) as the sole instruction tool. Moreover, instructors who use PowerPoint ineffectively and poorly either do not provide any handouts or provide extensive handouts, which encourages passive learning.

<i>Categories</i>	
	PowerPoint as a crutch
	Being bombarded with information by PowerPoint
	PowerPoint as the sole instruction tool
	Poor use of PowerPoint handouts

PowerPoint as a Crutch

A number of students felt that their instructors used PowerPoint as a crutch to carry them through their presentations. Most often PowerPoint is used as a crutch for lack of content knowledge:

This instructor heavily relied on her slides for her lectures. In some cases it seemed to me that she was not familiar enough with the material. Often times, she lacked confidence and energy.

According to students, PowerPoint serves as a cheat-sheet for instructors who are unprepared to teach:

. . . When asked for clarification regarding one of her slides, she could not remember what she meant to say! It became clear that either she was using someone else's presentation or she hadn't reviewed her presentation before her lecture. It [PowerPoint] serves as a tool for an instructor that doesn't know the topic very well that has to use slides to "remember" the info.

Some students reported that instead of using PowerPoint as a teaching tool, some instructors put all their notes on the screen to remind themselves what to say and then read off their notes verbatim in class.

My . . . professor read directly from dull slides. He would lecture for hours. Discussions was discouraged in this class. This happened all day, every day for the entire semester. It was a useless class and a waste of my time.

According to students, nothing could stop script-reader instructors from finishing their slides without answering questions or engaging in discussion:

I had one instructor who used PowerPoint to completely guide his lecture. He read from the PowerPoint presentation word-for-word. Sometimes I just wanted to stop him and say, "Excuse me, but I am capable of reading the slides as well as you can." This instructor did not let us ask questions or allow discussions until he was done with his slides.

Students want their instructors to be prepared for the class and do not use a ready-to-use PowerPoint presentations that come with the textbook without modifying it to fit the purposes of the class:

This professor uses prefabricated presentations that came with the book. In fact,

they are available on the book's accompanying website. She reads directly from the slides. She add nothing to the material—I may as well have downloaded the presentations, read them on my own, and never gone to class.

Copying information directly from the textbook was also reported as an ineffective and poor use of PowerPoint by several students. A master's student said:

This instructor copied parts of the textbook and there was no summarization or reflection, it was strictly copied info! There was too much info on the slides and no room for discussion. The class felt long.

When information is directly copied from the textbook, and read verbatim, students felt that there was no point of going to class:

One of my teachers read verbatim of what was in the PowerPoint. She had about 40 slides per class. The information came straight from the text-no additional new information. What is the point of going to class?

Being Bombarded with Information by PowerPoint

Instructors, who see teaching as an act of information-giving, use PowerPoint to straight-lecture. This results in less than engaging, challenging, and rigorous learning. A graduate student reflects on his experiences with an instructor, who used PowerPoint as an information-depositing tool:

One of our required courses on . . . is taught by a kind professor whose course, while chockfull of information, seems to lack purpose. Rather than skills, we were bombarded with information. Rather than equipping students to do something, his PPT lectures were geared toward stuffing as much knowledge about topics into a

3-hour course as possible. “Tonight, we’re going to do PowerPoints on . . . and . . . ,” he would proudly announce. My stomach groaned, and I knew we were in for a long night. Most of the PPTs were paraphrases of the textbook and little more. After two weeks of class, I realized that coming to class having read the text was a waste of time and the professor wanted to plow through the material rather than address questions.

Students reported that teachers who do not provide any additional details and not allow discussion time to be engaged with course material foster superficial learning rather than deep learning. When instructors use PowerPoint solely to bombard students with information, they also limit the amount of reflection and critical thinking. An undergraduate student criticized one of his teachers whose teaching style fostered superficial learning and discouraged critical thinking:

One of my teachers straight-lectures from the PowerPoint and expects us to just accept the information without being critical. He skims through heavy slides of information and does not go into any detail on any of the topics. His teaching style fosters superficial learning. I think teachers should walk through the items with the class and promote class discussion.

Also, instructors who use PowerPoint as a straight-lecturing tool are more likely to read the slides verbatim. This phenomenon seems to be more common in undergraduate teacher education. An undergraduate reported:

I had a teacher who read from the slides, did not engage her students, and had us write what was on each page. The slides are jumbled mess of text. She would stand there and wait for us to finish writing. I felt this robbed my education.

An undergraduate student in science education points out that effective teaching, not merely the efficiency, should be the focus of instruction:

For the purposes of efficiency, this teacher put entire derivations of long formulas on one-slide in a “one-click-and-gone” fashion. Doing derivations on the board with chalk is slow, but I feel more engaged. Derivations on PowerPoint may be much faster, but more people feel disengaged.

PowerPoint as the Sole Instruction Tool

Students consider instructors who use PowerPoint as the only method of instruction to be ineffective and poor teachers. Undergraduate students reported that instructors who feel bound to PowerPoint as the only method of presenting concepts or ideas use it for the whole class period:

In my opinion, teachers are ineffective, when they use PowerPoint as their only means of teaching and when all they do is read the text straight off the slide, and have so much information on the slides. I would get more out of sitting home reading the book than coming to class.

Another undergraduate reported:

PowerPoint is used for the entire class and the students are expected to follow the fast pace and large content in one sitting. It becomes boring and there is no discussion or use of other mediums to supplement the material. 3 hours of words on a screen. No one said a word.

In some classes, PowerPoint is not only the only instructional mode, but it also determines the length of instruction. Another undergraduate student said:

In my ... class, when PowerPoint ended, class ended no matter what time it was

(3hr class); looking to see how many slides left (always got handouts) and tried not to ask questions so we could leave sooner.

When there is no discussion of the material in depth, students do not internalize what they have learned until they have the opportunity to discuss or reflect on the learning experience. An undergraduate student said:

My . . . instructor would not explain/discuss his slides well enough throughout the lecture. When I look back at them to review, they didn't mean anything to me. I guess there was no real learning going on.

Poor Use of PowerPoint Handouts

Qualitative results from the open-ended questions in the questionnaire showed extremes, with students who either loved or hated the PowerPoint handouts. When there was elaboration and discussion of the class material during PowerPoint presentations, handouts served as a note-taking tool. However, when instructors gave a handout in which they printed everything they said aloud, read slides verbatim and did not expand on the material through class discussion, the students, in particular undergraduate students felt that note-taking was unnecessary:

The teacher posted presentations online so it was unnecessary to take notes because she read directly from boring slides.

Most of the undergraduate students indicated that being given all the details and elaborations in PowerPoint upfront would almost make it pointless to go to class:

They would just read verbatim off the slides. The PowerPoint was sent to me via email the night before and since it said exactly what the teacher would be saying and teaching, I rarely went to class.

Undergraduates are also less likely to take notes and engage with the material when a handout is given. For students who assume that the slides are sufficient, PowerPoint seems to promote passive learning. An undergraduate student, commenting on the value of handouts, said:

Since the class I took did not require a textbook, I felt like the PowerPoint slides did an excellent job of highlighting the necessary information I needed to know. However, I did often “doze off” during these presentations because I didn’t need to take notes because the professor posted them on WebCT.

Compared to graduate students, undergraduate students’ goal in attending classes and taking notes revolve around exam specific issues. Undergraduate students tend to perceive note-taking as key to exam success. An undergraduate indicated his frustration with instructors who lecture without giving hints about what is important for the exam:

They lecture, providing me with no clue about what is important for tests and don’t give me time to copy notes. The slides do not provide me a basis to study off of.

Some undergraduate students indicated that they were less likely to pay attention to the presentation, when a handout is given:

At times I am less likely to pay attention, especially when notes are given to me, all that I need for an exam. It also lowers class attendance.

Some undergraduates even noted that they prefer *not* to be given a handout, especially if the instructor allows time for copying notes and processing the information:

My. . . professor uses PowerPoint very effectively. She uses the board to facilitate her lecture. Even though she does not give a copy of her slides, which usually I do

not like, I feel that because all of her lecture isn't PowerPoint, I can follow along what she is doing. Also she makes sure not to go too quickly and always allows for questions.

On the other hand, overloading the slides with information and straight-lecturing without providing a handout seems to be even worse:

My ... teacher places too much information onto the slides and does not give out a handout. Because of this, I spend the whole class writing and not listening to the lecture. Plus, I don't even get all of the notes.

PowerPoint Practices that Promote Effective and Meaningful Learning

As Table 6.2 shows, data analysis revealed that instructors who use PowerPoint effectively and meaningfully in the classroom use it as (a) an active teaching tool, (b) an outline, (c) a visual and interactive tool, (d) an organizational tool, and (e) an additional instruction tool. Moreover, these instructors use “guided-note” handouts to facilitate note-taking and active learning. These handouts do not include all the information; rather they serve as an outline for note-taking. Students also seem to greatly benefit from having access to PowerPoint slides ahead of time.

<i>Table 6-2 Categories of PowerPoint practices that promote effective and meaningful learning</i>	
<i>Categories</i>	<ul style="list-style-type: none"> ▪ PowerPoint as an active teaching tool ▪ PowerPoint as an outline ▪ PowerPoint as a visual and interactive tool ▪ PowerPoint as an organizational tool ▪ PowerPoint as an additional instructional tool ▪ Effective uses of PowerPoint handouts: <ul style="list-style-type: none"> ○ “Guided-note” handouts ○ Slides available online prior to class time

PowerPoint as an Active Teaching Tool

According to students, instructors who consciously build in discussions or activities into their presentations promote effective and meaningful learning. However, incorporating activities that get students involved and critically thinking about the topic they are supposed to learn requires extensive prior planning on the part of the instructor.

. . . Every few slides this teacher would have an activity slide that would help us review the past few slides to make sure we understood that content before we moved on. The activities were always well-thought and carefully-planned.

According to students, teachers who know their pedagogy are more successful in using PowerPoint as an active teaching tool:

My ...professor always used PowerPoint effectively. She gave dynamic lectures and tied in examples, questions and material with the PowerPoint. She also used video from websites for us to view the biology components in action. Her presentations were always well-prepared.

PowerPoint as an Outline

A high number of students reported that they benefit more when instructors use

PowerPoint as an outline rather than reprinting every word of their presentation. In other words, instructors who do not limit the information's scope to what's on the slides are considered more effective in promoting meaningful learning. Students indicated that they felt more engaged and attentive when PowerPoint was used as an outline while details and examples were provided additionally to help students understand the concepts:

She used PowerPoint to tell the overarching ideas and facts but she added detail as she went along that was not in the slides. This kept me engaged and forced me to pay attention because I had to write down additional information not on the slides. There were also a lot of group discussions which helped to clarify the topics.

Students also indicated that they liked PowerPoint presentations that were short, clear, well thought out and to the point. An undergraduate student, talking about her instructor who uses PowerPoint effectively and meaningfully said:

He used slides as an outline and spent ample time covering the material to fill in the outline. Each slide was short and to the point. I think when used this way, PowerPoint presentations are engaging and they really promote learning.

Students appreciate instructors who use PowerPoint as a guide but then elaborate on the slides, providing rich information that promotes understanding.

In my [. . .] class, there was much information to be covered. The professor put one or two key ideas on each slide and used PowerPoint as a guide. He always added to it and told personal narratives to break up the monotony. There were many questions on the PowerPoint that facilitated discussions. His PowerPoint presentations were short, and clear and served as a good outline for after class

reviews.

PowerPoint as a Visual and Interactive Tool

Students seem to benefit extensively when instructors take full advantage of the visual and interactive capabilities of PowerPoint to explain concepts that are difficult to explain otherwise:

The instructor in my research class used MS PowerPoint to explain those statistics concepts and terminology with graphics and that was helpful for that tough class.

A number of students also commented on how using visuals to help students make connections and understand was an efficient way to teach a concept. An undergraduate student said:

I think my biochemistry professor uses PowerPoint effectively and meaningfully. The slides are helpful in that they show colorful images of molecules, etc, that could not be drawn in class (or would be a waste of time). She elaborates on the images (i.e. an assay picture) by describing the process. She also shows experiments through PowerPoint by clicking on links to the Web. She always pauses to ask questions and take further advantage of chalkboard.

Another undergraduate student, who was talking about an instructor that was an effective and meaningful user of PowerPoint noted:

This professor takes advantage of PowerPoint's multimedia capabilities by displaying pictures, charts, video, audio that could not be communicated in her lecture and that was very effective. The video clips and images always tie into her lecture—helps me visualize.

PowerPoint as an Organizational Tool

Students indicated that they have a clear idea of what they will learn when instructors use an outline slide that sets the stage in the beginning of presentation and lets the students know what they will be covering in that class period:

My [...] professor always reviews the agenda for the day using an overall outline slide in the beginning of her presentation. Reviewing the agenda allows us to focus on what we will be learning. Her PowerPoints also review material from the previous class and inform of upcoming assignments. The class is very structured and I like it. I think all students appreciate her organizational skills.

Students also appreciate instructors who use PowerPoint to keep the class organized and on track.

Dr.[...] has a “housekeeping” slide at the beginning of class to verify dates of assignments , tests, projects, etc. I find that very helpful.

PowerPoint also helps instructors organize their instruction; especially those who are easily get off-track and lose the students’ attention easily:

This teacher had a tendency to get off track but she was much better organized when she did use PowerPoint.

PowerPoint as an Additional Instruction Tool

Students appreciate instructors who use PowerPoint as an additional instruction tool but not as the only method of instruction:

PowerPoint is a supplement, not a staple to the class, other mediums and methods are used, and the content is relative to the lesson. The class is always engaged with discussions and activities.

Also students prefer instructors who don't use PowerPoint all the time. Those who use it every class period as the sole instructional mode were rated as ineffective and poor teachers.

My . . . teacher doesn't use PowerPoint all the time. He uses it for reviewing key concepts, which is very helpful.

Effective Uses of PowerPoint Handouts

Students appreciate the instructors who provided them with handouts prior to presentation. It helps them review the class material ahead of time and take notes of the extra information provided during presentation:

Ms. . . .emails her presentations before class. I love getting them [handouts] ahead. I can look up info I might want to review before class. I love being able to take notes of her additional comments/instruction to the relevant slide w/out [without] concern for copying down the notes because I don't have a copy myself. Receiving a handout enables me to study more effectively and learn more because of the detail involved.

Students use PowerPoint slides that are available to them prior to class very creatively:

Dr. ...'s PowerPoints are available before class, enabling me to take my computer to class and add notes to the slides during the lecture. This really helps my learning.

Apparently, receiving a handout in class also helps students focus better on the material and participate:

This teacher always gave a copy of the presentation so that we could focus our

attention and participate in discussion without having to write everything down.

Students overwhelmingly agreed that “guided-note” handouts helped them follow along a PowerPoint presentation, and guided them in their note-taking, allowing time to engage with the course material. As noted by undergraduate students in the previous section, some students do not take notes when they receive complete handouts.

Therefore, instructors, who do not want to promote passive student behavior by giving complete handouts, create two versions of their presentations. A master’s student explained how her instructor used “guided-note” handouts:

One instructor I had used PowerPoint very effectively. She had the slides in note form available on her class website prior to class time. On the handouts, she did not include all of the information that the class version of the presentation had. The handouts included titles for each slide as well as main points in bullet form with space to take notes. During the class, the instructor showed us the full version of the presentation, which had more specific information that the students wrote down on their handouts. Because the handouts included some information but not all, the slides were not overwhelming. This allowed us to have time to write down what we needed.

Another master’s student explained how she benefited from “guided-note” handouts:

This instructor gave us handouts prepared in Microsoft Word, which included only the key points and discussion questions so we knew what we were supposed to get out of her lecture but we still took notes during her PowerPoint presentation, because she presented more complex ideas and made connections

between these ideas by giving examples. I think I learned more in that class because I felt more confident about the accuracy of the notes I took.

A number of undergraduate students indicated that they felt more confident about what they were supposed to get out of the lecture/discussion because PowerPoint communicated them the teacher expectations. An undergraduate student noted:

To have PowerPoint as a guide is a lot more helpful in aiding me through the lecture. I leave the class with confidence that I got the points I was supposed to get out of the lecture.

Summary of Chapter 6

The main purpose of this chapter was to interpret qualitative data obtained from student responses to open-ended questions about PowerPoint practices that promoted effective and meaningful learning as well as approaches that reflected ineffective and poor teaching. Table 6.3 presents the different approaches to PowerPoint that could either promote or hinder learning. Related excerpts that illustrate students' experiences in their learning with PowerPoint reflect how effective and meaningful approaches to PowerPoint can result in increased learning as well as better students' attitudes while ineffective and poor approaches result in decreased learning as well as poor student attitudes.

<i>Table 6-3 Comparison of different PowerPoint practices employed by instructors and illustrative excerpts</i>	
<i>Practices that Reflect Ineffective and Poor Teaching</i>	<i>Practices that Promote Effective and Meaningful Learning</i>
<i>It [PowerPoint] serves as a tool for an instructor that doesn't know the topic very well that has to use slides to "remember" the info.</i>	<i>She gave dynamic lectures and tied in examples, questions and material with the PowerPoint.</i>
<i>She reads directly from the slides. She add nothing to the material—I may as well have downloaded the presentations, read them on my own, and never gone to class.</i>	<i>She used PowerPoint to tell the overarching ideas and facts but she added detail as she went along that was not in the slides. This kept me engaged and forced me to pay attention.</i>
<i>One of my teachers read verbatim of what was in the PowerPoint. She had about 40 slides per class. The information came straight from the text-no additional new information. What is the point of going to class?</i>	<i>This professor takes advantage of PowerPoint's multimedia capabilities by displaying pictures, charts, video, audio that could not be communicated in her lecture.</i>
<i>[. . .] this teacher is constantly jumping around from one slide to another, which makes it hard to understand and follow. It is really difficult for us to see the connections when the information is presented in such an unorganized manner.</i>	<i>My [. . .] professor always reviews the agenda for the day using an overall outline slide in the beginning of her presentation. Reviewing the agenda allows us to focus on what we will be learning.</i>
<i>A professor in . . . doesn't allow students to interrupt slide presentation and when we do, he gets annoyed. We can <u>NEVER</u> ask questions.</i>	<i>PowerPoint is a supplement, not a staple to the class, other mediums and methods are used, and the content is relative to the lesson. The class is always engaged with discussions and activities.</i>
<i>The PowerPoint was sent to me via email the night before and since it said exactly what the teacher would be saying and teaching, I rarely went to class.</i>	<i>Because the handouts included some information but not all, the slides were not overwhelming. This allowed us to have time to write down what we needed.</i>

CHAPTER 7: DISCUSSION AND RECOMMENDATIONS FOR IMPROVING TEACHING AND CONDUCTING FURTHER RESEARCH

Overview

PowerPoint still remains the most widely used presentation software in higher education. It is not only extensively used, but also expected by students in higher education (Rickman & Grudzinski, 2000). Therefore understanding students' perceptions towards the use of PowerPoint and accompanying handouts in teacher education provides insights into how this tool can be used to promote effective and meaningful learning for teacher education students.

The main objectives of this current study were to: (a) understand teacher education students' attitudes about PowerPoint's influence on student learning, instructional features, instructors' overall teaching, and specific aspects of instructors' performance; (b) explore the value of PowerPoint handouts for students; and (c) examine differences between graduate and undergraduate students' perceptions on the two topics in the prior objectives.

This study employed both qualitative and quantitative methods to obtain a variety of data for triangulation purposes. Results from this effort have made it possible to validate findings across different data sets and draw conclusions based upon the findings. Major findings are discussed first. Then recommendations for improving teaching and conducting future research and conclusions are drawn from discussion of the findings.

Major Findings in the Context of Existing Research

The major findings of this research study are the following:

Overall Attitudes towards PowerPoint's Influence on Students and Instructors

In line with previous research (Atkins-Sayre et al., 1998; Daniels, 1999, Lowry, 1999; Luna & McKenzie, 1997; Sammons, 1995), this study has revealed that, in general, students have positive attitudes about the use of PowerPoint in their teacher education experiences.

Positive Influences on Student Learning

Atkins-Sayre et al. (1998) reported that students perceived PowerPoint as a useful cognitive aid to enhancing their understanding. Students in this study reported that they *understand the information better* and *stay more focused* on the content in general. Perhaps this is because instructors use clearer organization, and greater structure when they use PowerPoint. However, students did not necessarily feel *more interested* in the material, become *more involved* with the content or *formulate more or better questions* to ask when PowerPoint is used because as the qualitative data indicated, the level of student *interest, involvement* and *participation* all depend on how the instructors chose to use the medium. If they use PowerPoint in a way that promotes effective and meaningful learning, then students feel *more interested* in the material and become *more involved* with the topic in discussion. However, if they use it as a straight-lecturing tool, then there is less interest, involvement and participation.

Compared to undergraduate students, graduate students feel more involved with the content when PowerPoint is used but this difference might not be due to PowerPoint as a teaching tool but might come from different instructional practices used in graduate and undergraduate classes.

According to quantitative results, in general, students feel *more certain* about

what they are expected to know when PowerPoint is used but compared to graduate students, undergraduate students felt *more certain* about what they need to know when PowerPoint was used because as the qualitative results showed, undergraduate students see instructors' lecture notes as the lecturer's guide to what students need to know in order to succeed in class.

Positive Influences on Instructional Features

In line with the literature (Frey & Birnbaum, 2002; Lowry, 1999), students overwhelmingly agreed that PowerPoint had a significant positive impact on organization of the lessons. Both graduate and undergraduate students felt that lessons were *better organized, easier to understand, and easier to follow* when PowerPoint was used.

However, comparison of graduate and undergraduate students responses showed that undergraduates had fewer discussions in class when PowerPoint is used. Therefore, as quantitative results show compared to graduate students, significantly more undergraduate students felt that PowerPoint presentations stole time from instruction.

Positive Influences on Instructors' Overall Teaching and Specific Aspects of Instructors' Performance

As one of the participants during the interview indicated, PowerPoint serves as a graphic organizer, which forces instructors to plan, and design their instruction ahead of time and then deliver it in a structured and organized way. Therefore, both undergraduate and graduate students perceived that the instructors were *better prepared* for class instruction. PowerPoint also helps instructors to organize their *thoughts better*, which supports Frey & Birnbaum's (2002) finding that students perceived professors who used PowerPoint to be *more organized*. Moreover, students reported that their instructors

stayed on track better when PowerPoint was used. Qualitative results also confirmed this finding.

Recognizing Limitations of PowerPoint as a Teaching Tool

Instructors who recognize the limitations and constraints of PowerPoint are more likely to use it as an effective and meaningful teaching and learning tool in their teaching. PowerPoint is a linear presentation medium, which is said to force linear thinking (Tufte, 2003). After all, PowerPoint was not designed as a teaching tool. It was created for the business world to present graphical information in an effective, efficient and convenient way.

If instructors design and present their presentations in a way that leave relationships and associations between ideas, concepts, and theories unspecified, “generic, superficial, simplistic thinking”(Tufte, 2003, p. 5) would result. However, often times issues covered in teacher education are a complex set of dynamically interacting variables that are non-linear and multifaceted. Teaching approaches that leave the critical relationships and dynamic interactions unexplained can only promote superficial learning and fail to support critical thinking. Only instructors who know their subject matter, and understand key pedagogical principles related to PowerPoint can use this tool effectively and meaningfully despite its limitations.

Value of PowerPoint Handouts

PowerPoint allows instructors to provide handouts to their students without much extra effort because written handouts serve as the most efficient and effective way of providing students with information. When well-prepared, well-organized, and available ahead of time, handouts serve as an excellent learning tool for students before, during and

after class (Frey & Birnbaum, 2002; Levasseur & Sawyer, 2006; Navarro, 1998). This study showed that, overall, students not only perceived to learn more during a PowerPoint presentation when they are given a presentation handout, they also follow the information presented better, and take better notes. Qualitative results also showed that receiving a handout is crucial to students who are non-native speakers of English, because handouts serve as a visual learning aid, helping students get the information in more than one way.

Undergraduate Students' Perceptions of the Value of Handouts

Differ from Those of Graduate Students

Interestingly, results regarding the students' perceptions of PowerPoint handouts reflected the modality of teaching and learning in their teacher education experiences. The findings indicated that receiving a handout facilitates graduate students' note-taking while it often has a reverse effect on undergraduate students. The majority of undergraduate students do not take notes believing that instructors' handouts have everything that they need for a given class period. Several students indicated that since the handouts come from the instructor, the notes must be accurate and complete (Brazeau, 2006) and therefore are enough for the purposes of the exam. Instructors, who use PowerPoint in the information transmission mode, encourage students to be passive listeners by giving them a copy of their lecture notes that has all the information, which is presented, word-by-word. However, some undergraduate students who disliked being passive listeners showed a clear preference for instructors who do not provide handouts but allowed time for discussion and note-taking because they learn more from taking their own notes.

Qualitative and quantitative results showed that when undergraduate students do not get a handout, compared to graduate students, they are significantly more concerned about copying notes from the slide than listening to the instructor and thinking about the content (Navarro, 1998). They also prefer to copy down the whole slide word-by-word rather than taking their own notes. This may be mainly because they do not have good note-taking skills and therefore they cannot identify, collect, and organize information and relate it to their experiences successfully. This finding is in line with literature, which suggests that undergraduate students are relatively inefficient note-takers and fail to record most of the important information from lectures (Baker & Lombardi, 1985; Hartley & Cameron, 1967; Howe, 1970; Titsworth, 2004).

“Guided-Note” Handouts: A More Effective Way to Use Handouts to Promote Student Learning

As the qualitative and quantitative data showed, providing students with complete lecture notes in the form of handouts does not always facilitate student learning. Undergraduate students are less likely to pay attention to the content, when all lecture notes are given to them in advance. Moreover, availability of complete notes has a negative effect on undergraduate students' attendance (Brazeau, 2006; Fjortoft, 2005) because students question the purpose of going to class especially when instructors give a copy of their handouts and then read their slides verbatim in class. Brazeau (2006) discusses that “perhaps one key element necessary to facilitate learning, e.g., active learning, is diminished when students are provided all the information and not directly involved in the process of identifying, collecting, and organizing the information through the process of note-taking” (p. 1).

On the other hand, when students do not get a handout, they do not listen to the instructor or engage with the content because they try to keep pace with frenzied note-taking. This is especially true for undergraduate students as discussed earlier. Qualitative results showed that students strongly favor “guided-note” handouts, which is a modified form of instructor's notes (Neef, McCord, & Ferreri, 2005). “Guided-note” handouts serve as an excellent alternative to complete handouts, (which decrease the amount of note-taking) and no-handouts, (which force students to engage in frenzied note-taking). “Guided-note” handouts include only the outline of the presentation (e.g., headings and sub-headings), not the complete lecture notes so students are encouraged to take their own notes (Kobayashi, 2006) during presentation. By providing organizational cues for students to record main points, “guided-note” handouts assist students in the process of note-taking (Kobayashi, 2006) and allow them opportunities to engage with the material presented (Barbetta & Skaruppa, 1995; Neef, McCord, & Ferreri, 2005). Based on the findings of this study, it can be suggested that undergraduate students would gain greater benefits from “guided-note” handouts than graduate students, because undergraduates are more likely not to take notes when complete lectures notes are given to them.

Recommendations for Practice

Based on the results of this study, 4 recommendations for practice are offered. First, teacher educators should rethink their teaching philosophy before designing their PowerPoint presentations because their philosophy seems to be mirrored in how they use PowerPoint. Since technology tools such as PowerPoint amplify instruction, for better or for worse, the quality of instruction with PowerPoint can have a significant positive or negative effect on student perceptions and their learning.

Second, teacher educators, who use PowerPoint merely to transmit information need to adapt, revise and modify their current use of PowerPoint in a way that increases learning. As this study showed, consciously building in discussions or activities into PowerPoint presentations, providing students opportunities to ask questions, using PowerPoint as an outline, taking advantage of the multimedia capabilities of PowerPoint, and using this tool as a supplement rather than as the sole instruction tool seem to increase meaningful and effective learning, according to students.

Third, teacher educators should provide students with “guided-note” handouts in order to facilitate note-taking and help students organize information in their own ways. Attending to multiple sources during PowerPoint presentations, such as the instructor, the PowerPoint slides, and trying to keep up with note-taking undermines student learning because students have to split their attention between several sources if a handout is not provided. Attending to multiple sources is especially more challenging for students who are non-native speakers of English, because there is an added challenge of listening and taking notes in a second language. Therefore, teacher educators can assist both native and non-native English speaker students, in the process of note-taking by providing them with an outline of their presentation, in the form of guided-notes.

Fourth, teacher educators may also consider providing their students with PowerPoint slides before class to increase students’ engagement but this should be done carefully as students are encouraged not to attend class when they receive complete notes. When PowerPoint slides are available online before class, students can use them in different ways: (a) downloading to create paper handouts, (b) inserting their own notes onto slides, and (c) bringing the electronic version to class to take extra notes on

PowerPoint using their laptops. These opportunities give students incentive to engage with the course material more deeply and increase their preparation for class.

Recommendations for Further Research

This study revealed new issues for further investigation. First, the students in this research study came from teacher education programs in four different institutions on the East Coast of the United States. Further research is needed that examines whether the current findings hold true for the differences between graduate and undergraduate students from other institutions in other parts of the country. Furthermore, this study can be extended beyond teacher education into a broader examination of the use of PowerPoint in undergraduate and graduate programs in general. For instance, it would be interesting to find out if attitudes of teacher education students towards the use of PowerPoint and the value of handouts differed significantly from electrical engineering students or students in business administration.

Second, this study was limited to PowerPoint practices at academic institutions in the United States, but the issues discussed in this study can certainly extend beyond national boundaries. Studying teaching approaches to PowerPoint in other countries would give a broader picture of how students perceive PowerPoint in teacher education, as would studying the value of handouts that accompany PowerPoint presentations in the academic programs other than teacher education.

Third, the extent to which students who are speakers of languages other than English benefit from instruction with PowerPoint is another research area that would be important to investigate. It would also be useful to investigate the extent to which these students benefit from handouts that accompany PowerPoint presentations and if they

perceive greater benefits from handouts than do students who are native speakers of English.

A final theme for future research is the relationship between the quality of teacher education students' experiences with PowerPoint and their technology integration, in particular their use of PowerPoint in their own teaching as there seems to be a significant correlation between how teachers learn and practice (Crowe, 2003; 2004; Rosen & McGuire, 1990).

Summary of Chapter 7

This research study explored students' perceptions of use of PowerPoint in teacher education and highlighted the importance of handouts that accompany PowerPoint presentations on student learning. The findings showed that students have very positive attitudes, in general, towards the use of PowerPoint with respect to its influence on student learning, organizational features, instructors' overall teaching, and specific aspects of instructors' performance. "Guided-note" handouts as opposed to complete or no notes serve as a more effective way of using handouts to promote student learning. As a result, this research contributed towards better understanding of students' perceptions of the use of PowerPoint in teacher education, and design and development of handouts that accompany PowerPoint presentations.

APPENDICES

APPENDIX A: INTERVIEW QUESTIONS

PURPOSE:

This interview will assess what you think about use of MS PowerPoint as a teaching tool in the classroom.

INSTRUCTIONS:

The interview will be an informal discussion of your perceptions of PowerPoint as a learning tool.

TIMING:

This interview will take about 60 minutes.

INTERVIEW QUESTIONS BEGIN HERE!

BACKGROUND INFORMATION

1. What is your current position? (Graduate student, undergraduate student?)
2. What is your area of specialty?
3. For how long have you been in the program you are studying?
4. Are you teaching or have you ever taught? How many years of teaching experience do you have?

STUDENTS' POWERPOINT SKILLS AND KNOWLEDGE

5. Do you know how to use PowerPoint? (If yes, ask questions 6-8. If no, skip to question 9.)
6. When and how did you learn PowerPoint?
7. If you are teaching, have you ever used PowerPoint in your teaching?
8. How would you rate your PowerPoint skills and knowledge?

STUDENTS' PERSPECTIVE ON THE PURPOSE OF HAVING POWERPOINT IN INSTRUCTION

9. On average, how many classes do you take in a semester?
10. On average, how many PowerPoint presentations do you see in your classes per week?
11. Why do your instructors use PowerPoint in their teaching?
12. What is the main purpose of use of PowerPoint in your classes? Straight lecture?
Discussion?

POWERPOINT'S IMPACT ON LEARNING

13. Do you believe that PowerPoint improves instruction in your classes? If yes, in what

ways?

14. Do you believe that using PowerPoint adds any value to your learning? If yes, how?
15. Are there any ways that MS PowerPoint is more effective at getting messages across than any other instruction method?
16. If everything else is the same, would you prefer to take a course from a teacher who uses PowerPoint than a teacher who does not?

POWERPOINT'S IMPACT ON STUDENT/FACULTY AND STUDENT/STUDENT INTERACTION

17. What impact does PowerPoint have on student/faculty interactions?
18. What impact does PowerPoint have on student/student interactions? Does it change student interactions significantly? If yes, in what ways?
19. Does PowerPoint affect the amount of discussion in class? If yes, in what ways?
20. When a PowerPoint is presented, who speaks most of the time?

TIME SPENT WITH POWERPOINT IN CLASS

21. When a PowerPoint is presented in class, what percentage of the class time is spent on it?
22. When your instructor uses PowerPoint in class, are there any blackboards available that he/she can simultaneously use?
23. If a blackboard is available, do your instructors use it during a PowerPoint presentation? If yes, how often and for what purposes do they use it?

EFFECTIVENESS OF POWERPOINT PRESENTATIONS

24. On a Likert scale, from 1 to 5, with 1 poor, 2 below average, 3 average, 4 good and 5 excellent, how would you rate your instructor's use of PowerPoint as an instruction tool?
25. Do you believe that your instructors can improve their PowerPoint presentations? If yes, in what ways?

CRITERIA FOR DESIGNING INSTRUCTIONAL POWERPOINT PRESENTATIONS

26. What makes an instructional PowerPoint good, that is useful for your learning?
27. What makes an instructional PowerPoint presentation bad, that is not useful for your learning?

VALUE OF HANDOUTS THAT ACCOMPANY POWERPOINT PRESENTATIONS

28. Does receiving handouts that accompany PowerPoint presentations help your learning? If yes, in what ways?

APPENDIX B: M.S. POWERPOINT USE ANALYSIS SURVEY²

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PURPOSE:

The MS PowerPoint Use Analysis Survey is designed to assess what you think about use of MS PowerPoint as a teaching and learning tool in the classroom.

INSTRUCTIONS:

For each item mark the item that represents your approach. Complete all items. When you read the statements, try to think about what you generally think when MS PowerPoint is used in your classroom.

Part A: BACKGROUND INFORMATION

1. Which of the following most closely describes your current position?

- Undergraduate student
- Master's student
- Ph.D. student
- Other (Please indicate. _____)

2. What is your area of specialty? (Please indicate below.)

- Second Language Education
- Mathematics Education
- Social Studies Education
- Science Education
- Reading Education
- Other _____ (Please indicate.)

3. What is your age bracket?

- 18-25
- 26-35
- 36-45
- 46-55
- 55+

² As noted earlier, the original MS PowerPoint Use Analysis Survey was longer but only questions and findings concerning student perceptions of use of PowerPoint and the value of accompanying handouts are reported in this dissertation.

4. What is your gender?
 Male Female
5. Is English your first language?
 Yes No
6. Do you know PowerPoint? (Please skip Question 8, if your answer is No.)
 Yes No
7. If you know PowerPoint, how would you rate your PowerPoint skills and knowledge?
 Novice
 Advanced beginner
 Intermediate
 Fairly advanced
 Very advanced

Part B: MY EXPERIENCE WITH INSTRUCTORS WHO USE POWERPOINT IN MY CLASSROOM

8. How many instructors have you had to date in your current program (including this semester)?

9. How many of the instructors you have had in your current program use PowerPoint in their teaching (including instructors who do not use it every week)?
 None
 1-2
 3-4
 5-6
 more than 7
10. What impact do you think PowerPoint has on your instructors' teaching?
 worsens the teaching significantly
 worsens the teaching to some extent
 does not change the teaching significantly
 improves the teaching to some extent
 improves the teaching significantly

Part C: MY ATTITUDES TOWARDS POWERPOINT 'S INFLUENCE ON MY LEARNING

WHEN MY INSTRUCTORS USE POWERPOINT,

	Definitely false	More false than true	In between	More true than false	Definitely true
11. I feel we have <u>fewer discussions</u> in class.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I feel PowerPoint presentations <u>steal time</u> from instruction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I feel instructors <u>go through an entire presentation quicker</u> than if they were presenting without PowerPoint.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I feel I <u>understand</u> the information <u>better</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. I can <u>formulate more or better questions</u> to ask	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I take <u>better class notes</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I am more <u>certain about what I am expected</u> to know.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I feel that lessons are <u>better organized</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I feel that lessons are <u>easier to understand</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I feel <u>more interested</u> in the material.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. I feel that lessons are <u>easier to follow</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. I feel that <u>class time is used more effectively</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. I feel I stay <u>more focused</u> on the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. I become <u>more involved</u> with the content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. I feel the instructors are <u>better prepared</u> for class instruction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. I feel the instructors <u>organize their thoughts better</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. I feel the instructors <u>stay on track better</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. I benefit more when <u>only some part of class is presented</u> in PowerPoint.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. I feel that if instructors have a tendency to lecture, they <u>lecture regardless of the tool</u> (PowerPoint).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. I feel I still <u>benefit from a straight PowerPoint</u> lecture when it is well-prepared and engaging.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part D: MY ATTITUDES TOWARDS THE VALUE OF HANDOUTS THAT ACCOMPANY
POWERPOINT PRESENTATIONS

	Definitely false	More false than true	In between	More true than false	Definitely true
31. I <u>learn more</u> during a PowerPoint presentation when <u>I am given a presentation handout</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. When I get a handout of the presentation, I feel that <u>I have what I need</u> for that class period.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. When I get a handout of the presentation, I <u>don't take notes</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. When I don't get a handout, I am <u>more concerned about copying notes</u> from the PowerPoint than listening to the instructor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. When I am not given a handout, I am often so busy taking notes from the slide that I <u>don't have time to think</u> about the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. When I don't get a handout, I <u>cannot copy down everything on the slides</u> because the instructor often moves on to the next slide before I am done.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Having a PowerPoint handout <u>facilitates my note-taking</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. I find PowerPoint handouts very useful for <u>understanding the information</u> by following along the presentation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. I find PowerPoint handouts very useful for <u>after class reviews</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Getting a PowerPoint handout or outline of the presentation <u>improves my learning significantly</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. <u>My instructors that don't use PowerPoint give me a handout</u> of their lecture or presentation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

THANK YOU FOR COMPLETING THIS SURVEY!

APPENDIX C: APPROVED INFORMED CONSENT FORM FOR THE STUDENT INTERVIEWS FROM THE LARGE RESEARCH 1 UNIVERSITY

Page 1 of 2
 Initials _____ Date _____

INFORMED CONSENT FORM FOR STUDENT INTERVIEWS

Project Title	<i>Understanding the Perceived Effectiveness and Limitations of MS PowerPoint in Teacher Education</i>
Why is this research being done?	<i>This is a research project being conducted by Dr. Rebecca Oxford and Yesim Yilmazel-Sahin at the following institutions: University of Maryland, College Park, University of Maryland, Baltimore County, American University (AU), Catholic University of America (CUA) and College of Notre Dame (CND). We are inviting you to participate in this research because you are at least 18 years of age and you are a registered undergraduate or graduate student at one of the above institutions. The purpose of this research is to examine the perceived effectiveness and limitations of MS PowerPoint in teacher education.</i>
What will I be asked to do?	<i>You will be asked to participate in an interview at a time and location convenient to you. There are thirty (30) questions in the interview. You will be asked questions such as "Do you believe that PowerPoint improves instruction in your classes?" and "What makes an instructional PowerPoint presentation bad, that is not useful for your learning?" The total time for your participation will be about sixty minutes. The research will take place at the University of Maryland, College Park, the University of Maryland, Baltimore County, American University, Catholic University of America and College of Notre Dame.</i>
What about confidentiality?	<p><i>We will do our best to keep your personal information confidential. To help protect your confidentiality: (1) Your name will not be mentioned during the interview. (2) A code will be placed on the interview data. (3) Through the use of an identification key, the researcher will be able to link your interview to your identity. (4) Only the researcher will have access to the identification key. (5) Interview data will be kept in a locked filing cabinet at the student co-investigator's home. (6) Only the researchers will have access to the filing cabinet. (7) All the documents related to our study will be shredded three years after the conclusion of the study. If we write a report or article about this research project, your identity will be completely protected. No students or institutions will be named.</i></p> <p><i>A digital recorder will be used to record your interview for two reasons: (a) It will help us with transcribing and analyzing data. (b) It will provide a complete record of the interview. Your name will not be recorded, and the record will be destroyed by shredding at the end of three years.</i></p> <p>_____ <i>I agree to be recorded during my participation in this study.</i></p> <p>_____ <i>I do not agree to be recorded during my participation in this study.</i></p> <p><i>Your information may be shared with representatives of your institution (University of Maryland, College Park, University of Maryland, Baltimore County, American University, Catholic University of America and College of Notre Dame) or governmental authorities if you or someone else is in danger or if we are required to do so by law.</i></p>

INFORMED CONSENT FORM FOR STUDENT INTERVIEWS

Initials _____ Date _____

Project Title	<i>Understanding the Perceived Effectiveness and Limitations of MS PowerPoint in Teacher Education</i>
What are the risks of this research?	<i>You may feel experience anxiety or feel under pressure during the interview but this will be minimized through a relaxed setting and by maintaining confidentiality. The benefits to you include increased awareness of effective and meaningful use of MS PowerPoint as a teaching and learning tool in the classroom. We hope that, in the future, other people might benefit from this study through improved understanding of how MS PowerPoint can be used effectively and meaningfully in teacher education.</i>
Do I have to be in this research? Can I stop participating at any time?	<i>Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. Your participation is not a course requirement. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.</i>
What if I have questions?	<i>This research is being conducted by Rebecca Oxford and Yesim Yilmazel-Sahin at the University of Maryland, College Park, the University of Maryland, Baltimore County, the American University, the Catholic University of America and the College of Notre Dame. If you have any questions about the research study itself, please contact Rebecca Oxford at: The University of Maryland, 2311 Benjamin Building, 301-405-8157 or ro38@umail.umd.edu or Yesim Yilmazel-Sahin at: The University of Maryland, 2311 Benjamin Building, 301-949-4012 or ysahin@umd.edu. <i>If you have questions about your rights as a research subject or wish to report a research-related injury, please contact: Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (e-mail) irb@deans.umd.edu; (telephone) 301-405-0678 This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.</i></i>
Statement of Age of Subject and Consent	<i>Your signature indicates that: you are at least 18 years of age; the research has been explained to you; your questions have been answered; and you freely and voluntarily choose to participate in this research project.</i>
Signature and Date	NAME OF SUBJECT: _____ SIGNATURE OF SUBJECT: _____ DATE: _____



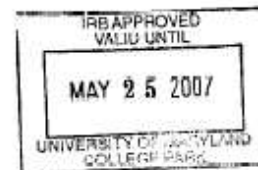
APPENDIX D: APPROVED INFORMED CONSENT FORM
FOR QUESTIONNAIRES FROM THE LARGE RESEARCH 1 UNIVERSITY

INFORMED CONSENT FORM FOR STUDENT QUESTIONNAIRE

Project Title	<i>Understanding the Perceived Effectiveness and Limitations of MS PowerPoint in Teacher Education</i>
Why is this research being done?	<i>This is a research project being conducted by Dr. Rebecca Oxford and Yesim Yilmazel-Sahin at the following institutions: University of Maryland, College Park, University of Maryland, Baltimore County, Catholic University of America (CUA) and College of Notre Dame (CND). We are inviting you to participate in this research because you are at least 18 years of age and you are a registered undergraduate or graduate student at one of the above institutions. The purpose of this research is to examine the perceived effectiveness and limitations of MS PowerPoint in teacher education.</i>
What will I be asked to do?	<i>You will be asked to complete a questionnaire at a time and location convenient to you. There are eighty-eight (88) questions in the questionnaire. You will be asked questions such as "Do you believe that PowerPoint improves instruction in your classes?" and "In general, how is PowerPoint used in your classes?" The total time for your participation will be about 25 minutes. The research will take place at the University of Maryland, College Park, the University of Maryland, Baltimore County, Catholic University of America and College of Notre Dame.</i>
What about confidentiality?	<i>To help protect your confidentiality, these steps will be taken: (1) Questionnaires will be carefully marked with ID numbers rather than participant names (2) Questionnaire data will be stored using only the ID numbers. (3) Through the use of an identification key, the researcher will be able to link questionnaire to participants' identities. (4) Only the researchers will have access to the identification key. (5) Questionnaire data will be kept for three years in a locked filing cabinet at the student co-investigator's home office and then will be destroyed by shredding (6) Only the researchers will have access to the filing cabinet. If we write a report or article about this research project, participants' identities will be protected to the maximum extent possible. Your information may be shared with representatives of your institution (University of Maryland, College Park, University of Maryland, Baltimore County, American University, Catholic University of America and College of Notre Dame) or governmental authorities if you or someone else is in danger or if we are required to do so by law.</i>
What are the risks of this research?	<i>You may experience anxiety or feel under pressure during the questionnaire, but this will be minimized by maintaining confidentiality.</i>
What are the benefits of this research?	<i>The benefits to you include increased awareness of effective and meaningful use of MS PowerPoint as a teaching and learning tool in the classroom. We hope that, in the future, other people might benefit from this study through improved understanding of how MS PowerPoint can be used effectively and meaningfully in teacher education.</i>

INFORMED CONSENT FORM FOR STUDENT QUESTIONNAIRE

	<i>Initials</i> <i>Date</i>
Project Title	<i>Understanding the Perceived Effectiveness and Limitations of MS PowerPoint in Teacher Education</i>
Do I have to be in this research? Can I stop participating at any time?	<i>Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. Your participation is not a course requirement. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.</i>
What if I have questions?	<i>This research is being conducted by Rebecca Oxford and Yesim Yilmazel-Sahin at the University of Maryland, College Park, the University of Maryland, Baltimore County, the Catholic University of America and the College of Notre Dame. If you have any questions about the research study itself, please contact Rebecca Oxford at: The University of Maryland, 2311 Benjamin Building, 301-405-8157 or roxford@umd.edu or Yesim Yilmazel-Sahin at: The University of Maryland, 2311 Benjamin Building, 301-949-4012 or ysahin@umd.edu.</i> <i>If you have questions about your rights as a research subject or wish to report a research-related injury, please contact: Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (e-mail) irb@deans.umd.edu; (telephone) 301-405-0678</i> <i>This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.</i>
Statement of Age of Subject and Consent	<i>Your signature indicates that: you are at least 18 years of age; the research has been explained to you; your questions have been answered; and you freely and voluntarily choose to participate in this research project.</i>
Signature and Date	NAME OF PARTICIPANT: _____ SIGNATURE OF PARTICIPANT: _____ DATE: _____



APPENDIX E: IRB APPROVAL LETTER FROM
THE LARGE PRIVATE UNIVERSITY



THE CATHOLIC UNIVERSITY OF AMERICA

*Office of Sponsored Programs and Research Services
Washington, D.C. 20064
202-319-5218*

December 14, 2006

Dear Ms. Yilmazel-Sahin:

Your research project titled "Understanding the Perceived Effectiveness and Limitations of MS PowerPoint in Teacher Education," was certified by the Committee for the Protection of Human Subjects (CPHS) as meeting the requirements of the Federal regulations governing protection of human subjects.

CPHS will maintain a copy of your submission on file. You are obligated to follow the research protocol and procedures for obtaining informed consent as you have specified. If you wish to initiate any changes in the research protocol or the informed consent procedure, you should submit this request to CPHS in writing.

This approval will remain active for a period of one year from the date of this letter. If the project continues beyond one year, please resubmit your materials for renewal in a timely fashion so that your research may continue uninterrupted.

Good luck with your research.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ralph Albano'.

Ralph Albano

APPENDIX F

Frequencies and percentages for graduate and undergraduate students on their attitudes toward PowerPoint's influence on student learning (Using 3- point scale)

(Variables 1-6)	Status		Definitely false & More false than true	In Between	Definitely true & More true than false
1. I feel I <i>understand</i> the information <i>better</i> .	Undergrad.	<i>n</i>	26	42	65
		%	(19.6%)	(31.6%)	(48.8%)
	Grad.	<i>n</i>	26	57	84
		%	(15.6%)	(34.1%)	(50.3%)
2. I can <i>formulate more or better questions</i> to ask	Undergrad.	<i>n</i>	37	52	45
		%	(27.6%)	(38.8%)	(33.6%)
	Grad.	<i>n</i>	35	72	60
		%	(21.0%)	(43.1%)	(35.9%)
3. I feel <i>more interested</i> in the material.	Undergrad.	<i>n</i>	35	62	37
		%	(26.1%)	(46.3%)	(27.7%)
	Grad.	<i>n</i>	40	75	54
		%	(23.7%)	(44.4%)	(32.0%)
4. I become <i>more involved</i> with the content	Undergrad.	<i>n</i>	51	44	39
		%	(38.1%)	(32.8%)	(29.10%)
	Grad.	<i>n</i>	42	59	65
		%	(25.3%)	(35.5%)	(39.2%)
5. I feel I stay <i>more focused</i> on the content.	Undergrad.	<i>n</i>	34	38	62
		%	(25.4%)	(28.4%)	(46.2%)
	Grad.	<i>n</i>	22	51	96
		%	(13.0%)	(30.2%)	(56.8%)
6. I take <i>better class notes</i> .	Undergrad.	<i>n</i>	21	23	90
		%	(15.7%)	(17.2%)	(67.1%)
	Grad.	<i>n</i>	30	29	109
		%	(17.8%)	(17.3%)	(64.9%)

APPENDIX F continued.

Frequencies and percentages for graduate and undergraduate students on their attitudes toward PowerPoint's influence on student learning (Using 3- point scale)

(Variable 7-8)	Status		Definitely false & More false than true	In Between	Definitely true & More true than false
7. I am <i>more certain</i> about what I am expected to know.	Undergrad.	<i>n</i>	12	18	104
		%	(8.9%)	(13.4%)	(77.7%)
	Grad.	<i>n</i>	25	37	107
		%	(14.8%)	(21.9%)	(63.4%)
8. I feel <i>I still benefit</i> from a straight PowerPoint lecture when it is well-prepared and engaging.	Undergrad.	<i>n</i>	10	32	92
		%	(7.4%)	(23.9%)	(68.7%)
	Grad.	<i>n</i>	21	31	117
		%	(12.5%)	(18.3%)	(69.2%)

APPENDIX G

Frequencies and percentages for graduate and undergraduate students on their attitudes about PowerPoint's influence on instructional features (Using 3- point scale)

(Items 9-14)	Status		Definitely false & More false than true	In Between	Definitely true & More true than false
9. I feel we have <i>fewer discussions</i> in class.	Undergrad.	<i>n</i>	42	52	40
		%	(31.4%)	(38.8%)	(29.8%)
	Grad.	<i>n</i>	86	52	31
		%	(50.9%)	(30.8%)	(18.4%)
10. I feel that lessons are <i>better organized</i> .	Undergrad.	<i>n</i>	11	25	98
		%	(8.2%)	(18.7%)	(73.1%)
	Grad.	<i>n</i>	13	39	116
		%	(7.8%)	(23.2%)	(69.1%)
11. I feel that lessons are <i>easier to understand</i> .	Undergrad.	<i>n</i>	19	42	73
		%	(17.7%)	(31.3%)	(54.5%)
	Grad.	<i>n</i>	18	59	92
		%	(10.7%)	(34.9%)	(54.4%)
12. I feel that lessons are <i>easier to follow</i> .	Undergrad.	<i>n</i>	11	31	92
		%	(8.2%)	(23.1%)	(68.6%)
	Grad.	<i>n</i>	22	32	114
		%	(13.1%)	(19.0%)	(67.9%)
13. I feel class time is spent <i>more effectively</i> .	Undergrad.	<i>n</i>	25	52	57
		%	(18.6%)	(38.8%)	(42.5%)
	Grad.	<i>n</i>	23	71	74
		%	(13.7%)	(42.3%)	(44.0%)
14. I feel PowerPoint presentations <i>steal time</i> from instruction.	Undergrad.	<i>n</i>	87	31	16
		%	(64.9%)	(23.1%)	(11.9%)
	Grad.	<i>n</i>	121	31	16
		%	(72.0%)	(18.5%)	(9.5%)

APPENDIX H

Frequencies and percentages for graduate and undergraduate students on their attitudes about PowerPoint's influence on instructors' overall teaching (Using 3- point scale)

<i>(Item 15)</i>			Worsens Significantly & Worsens to Some Extent	Not Change Significantly	Improves to Some Extent & Improves Significantly
15. What impact do you think PowerPoint has on your instructors' teaching?	Undergrad.	<i>n</i>	15	33	86
		%	(11.2%)	(24.6%)	(64.2%)
	Grad.	<i>n</i>	9	39	109
		%	(5.4%)	(23.2%)	(70.4%)

APPENDIX I

Frequencies and percentages for graduate and undergraduate students on their attitudes about PowerPoint's influence on specific aspects of instructors' performance (Using 3- point scale)

<i>(Items 16-18)</i>	Status		Definitely false & More false than true	In Between	Definitely true & More true than false
16. I feel the instructors are <i>better prepared</i> for class instruction.	Undergrad.	<i>n</i>	18	33	83
		%	(13.4%)	(24.6%)	(62.0%)
	Grad.	<i>n</i>	20	48	100
		%	(11.9%)	(40.5%)	(59.6%)
17. I feel the instructors <i>organize their thoughts</i> <i>better.</i>	Undergrad.	<i>n</i>	12	25	95
		%	(9.1%)	(28.0%)	(72.0%)
	Grad.	<i>n</i>	15	41	112
		%	(8.9%)	(24.4%)	(66.7%)
18. I feel the instructors <i>stay on track better.</i>	Undergrad.	<i>n</i>	12	27	93
		%	(9.1%)	(20.5%)	(70.5%)
	Grad.	<i>n</i>	14	31	121
		%	(8.4%)	(18.7%)	(72.9%)

APPENDIX J

Frequencies and percentages for graduate and undergraduate students on their perceptions of value of PowerPoint handouts (Using 3- point scale)

(Items 19-25)	Status		Definitely false & More false than true	In between	Definitely true & More true than false
19. I learn more during a PowerPoint presentation when I am given a presentation handout.	Undergrad.	<i>n</i>	13	45	76
		%	(9.7%)	(33.6%)	(56.7%)
	Grad.	<i>n</i>	10	36	113
		%	(11.9%)	(21.3%)	(66.9%)
20. Having a PowerPoint handout facilitates my note-taking.	Undergrad.	<i>n</i>	13	31	90
		%	(9.7%)	(23.1%)	(67.2%)
	Grad.	<i>n</i>	17	20	132
		%	(10.1%)	(11.8%)	(78.1%)
21. I find PowerPoint handouts very useful for understanding the information by following along the presentation.	Undergrad.	<i>n</i>	13	30	91
		%	(9.7%)	(22.4%)	(67.9%)
	Grad.	<i>n</i>	21	27	121
		%	(12.4%)	(16.0%)	(71.6%)
22. I find PowerPoint handouts very useful for after class reviews.	Undergrad.	<i>n</i>	9	23	102
		%	(6.7%)	(17.2%)	(76.1%)
	Grad.	<i>n</i>	8	20	140
		%	(4.8%)	(11.8%)	(82.8%)
23. When I get a handout of the presentation, I feel that I have what I need for that class period	Undergrad.	<i>n</i>	19	36	79
		%	(14.2%)	(26.9%)	(59.0%)
	Grad.	<i>n</i>	37	38	92
		%	(22.2%)	(22.8%)	(55.1%)
24. When I get a handout of the presentation, I don't take notes.	Undergrad.	<i>n</i>	71	24	38
		%	(53.4%)	(18.0%)	(28.6%)
	Grad.	<i>n</i>	121	23	24
		%	(72.0%)	(13.7%)	(14.3%)
25. When I don't get a handout, I am more concerned about copying notes from the PowerPoint than listening to the instructor.	Undergrad.	<i>n</i>	16	22	94
		%	(12.1%)	(16.7%)	(71.2%)
	Grad.	<i>n</i>	42	21	106
		%	(24.9%)	(12.4%)	(62.7%)

APPENDIX J continued.

Frequencies and percentages for graduate and undergraduate students on their perceptions of value of PowerPoint handouts (Using 3- point scale)

<i>(Item 26-27)</i>	Status		Definitely false & More false than true	In between	Definitely true & More true than false
26. When I am not given a handout, I am often so busy taking notes from the slide that I don't have time to think about the content.	Undergrad.	<i>n</i>	21	20	93
		%	(15.6%)	(14.9%)	(69.4%)
	Grad.	<i>n</i>	34	31	104
		%	(20.1%)	(18.3%)	(61.6%)
27. When I don't get a handout, I cannot copy down everything on the slides because the instructor often moves on to the next slide before I am done.	Undergrad.	<i>n</i>	20	28	85
		%	(15.1%)	(21.1%)	(63.9%)
	Grad.	<i>n</i>	25	31	112
		%	(14.8%)	(18.5%)	(66.7%)

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