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# RESEARCH NOTE

## POWER POINT IN LEGAL EDUCATION: PEDAGOGICAL PARADOX—AN EXPLORATORY STUDY<sup>©</sup>

BY DAVED M. MUTTART\*

### I. INTRODUCTION

This article relates the results of an exploratory study of the pedagogical effectiveness of slide projection software (“PowerPoint”) at Osgoode Hall Law School.<sup>1</sup>

Current literature, popular and professional, portrays PowerPoint variously as a universal panacea for all that ails education<sup>2</sup> and as a mortal threat to critical academic discourse.<sup>3</sup> Why has software that is essentially an electronic version of acetate transparencies and overhead projection generated such controversy?<sup>4</sup>

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<sup>1</sup> When I refer to PowerPoint use, I am referring to the projection of computer-generated slides onto a screen as part of a lecture. While a variety of software is available, Microsoft PowerPoint is the predominant program used at Osgoode Hall Law School.

<sup>2</sup> See for example, William R. Andersen, “Administrative Law Discussion Forum: Computer Graphics in the Teaching of Administrative Law” (2000) 38 *Brandeis L.J.* 229.

<sup>3</sup> See for example: James Eagar, “The Right Tool for the Job: The Effective Use of Pedagogical Methods in Legal Education” (1997) 32 *Gonz. L. Rev.* 389

<sup>4</sup> The first version of PowerPoint was limited to the production of overhead transparencies. Ian Parker, “Absolute Powerpoint: Can a software package edit our thoughts?” *New Yorker* (28 May 2001) 76 at 80. There is no significant difference in student performance between lectures using PowerPoint as distinguished from lectures using overheads. See Attila Szabo & Nigel Hastings, “Using IT in the Undergraduate Classroom: Should We Replace the Blackboard with PowerPoint?” (2000) 35 *Computers & Educ.* 175. See also C. Ahmed, “Powerpoint versus Traditional Overheads. Which is More Effective for Learning?” (Paper Presented to the Conference of the South Dakota Association for Health, Physical Education and Recreation, November, 1998) [unpublished]. However, as Szabo and Hastings note, there may be case specific instances where PowerPoint is more effective (*ibid.* at 187).

On the positive side, PowerPoint is said to allow larger blocks of material to be organized into a format that is easily presented to students. It may thus lead to improved student performance. Szabo and Hastings note the following characteristics of slide presentation software that may be beneficial for learning: “attention capturing and maintenance, motivation to attend lectures, organisation of the delivery of the lectures, proper pacing of the delivery of the lectures, and understanding of the lecture material.”<sup>5</sup>

The very act of using PowerPoint compels the instructor towards a minimal level of organization and thus may give fuller emphasis to key concepts. Its attention-grabbing characteristics improve class atmosphere by reducing distraction. Students report that PowerPoint lectures are easier to follow and understand.<sup>6</sup>

Opponents criticize PowerPoint as stifling, instead of encouraging, the development of critical thinking in students. It has been said to promote informational lectures and mindless memorization,<sup>7</sup> to encourage passive learning,<sup>8</sup> and to reinforce the tendency to trust ideas, instead of challenging them.<sup>9</sup> It is alleged that PowerPoint leads users to over-simplify, thereby frustrating the ability of the professor to present complex ideas and to encourage students to think about these ideas.<sup>10</sup> PowerPoint’s graphics are so powerful that they may tend to freeze students’ minds, making them unable to have open, critical minds on the topic.<sup>11</sup> If slides are provided before class, there is less incentive for students to prepare for class or to pay attention during class. One law professor notes that students copy the text rather than listen to the instructor; student-teacher interaction is

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<sup>5</sup> Szabo & Hastings, *supra* note 4 at 178.

<sup>6</sup> *Ibid.*

<sup>7</sup> See e.g. Gerald F. Hess & Steven Friedland, *Techniques for Teaching Law* (Durham, N.C.: Carolina Academic Press, 1999) at 149.

<sup>8</sup> See Maria Perez Crist, “Technology In The LRW Curriculum - High Tech, Low Tech, Or No Tech” (1999) 5 *Legal Writing: The J. of the Legal Writing Institute* 93 at 115. See also Douglas L. Leslie, “Approaches to Teaching Contracts: How Not to Teach Contracts, and Any Other Course: PowerPoint, Laptops, and The Casefile Method” (2000) 44 *St. Louis U. L.J.* 1289. See also Michael L. Richmond, “Teaching Law to Passive Learners: The Contemporary Dilemma of Legal Education” (1996) 26 *Cumb. L. Rev.* 943 [Richmond].

<sup>9</sup> Thomas A. Stewart, “Ban It Now! Friends Don't Let Friends Use PowerPoint” *Fortune* 143:3 (5 February 2001) 210.

<sup>10</sup> *Ibid.* For example, one professor omitted an otherwise excellent book from his lecture because its ideas were not suited to a PowerPoint presentation: Parker, *supra* note 4 at 87.

<sup>11</sup> *Supra* note 2 at 235.

It is said that PowerPoint has the potential to edit ideas and that complex thoughts are not PowerPoint friendly. The slides present a world that has been condensed, simplified, and smoothed over.<sup>13</sup> PowerPoint distracts students; they stare at the screen instead of listening to the lecture.<sup>14</sup>

Osgoode has not escaped the ongoing uncertainty regarding the advantages and disadvantages of PowerPoint. In a recent survey of faculty, it was found that:

Of those who never use it, perhaps a little more than half do so on pedagogical grounds, and the rest express some interest in learning how to use the program. (Interestingly, there appears to be some cross-over taking place here, with a contingent of non-users wanting to learn and a few regular users dubious of its advantages.)<sup>15</sup>

I conceived this exploratory study, in part, to determine whether this pedagogical uncertainty could be reduced. I was particularly interested in exploring the following questions raised by the existing literature:

1. Will PowerPoint reduce class participation and stifle intellectual activity or development?
2. Will more material be covered in each course?
3. Will students better retain material taught with the assistance of PowerPoint?
4. Will engaged students improve but passive learners decline and learn only the bare facts?
5. Will good teachers decline in effectiveness while poorer teachers improve?<sup>16</sup>

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<sup>13</sup> Parker, *supra* note 4 at 76, 86. See Edward R. Tufte, "The Cognitive Style of PowerPoint," online: The Work of Edward Tufte and Graphic Press <<http://www.edwardtufte.com/tufte>>, which theorizes that this simplification led NASA engineers to underestimate the dangers to be faced by the Columbia Space Shuttle upon re-entry.

<sup>14</sup> Simon R. Fodden, (Faculty Survey, Summer 2002) at 2 [on file with the author].

<sup>15</sup> Fodden, *ibid.*

<sup>16</sup> Parker, *supra* note 4 at 87.

## II. METHODOLOGY FOR CURRENT STUDY: THREE COMPONENTS

My study had three components: an e-mail survey of professors at Osgoode, an analysis of student first-year course evaluations, and a web survey of all Osgoode students in the winter term of 2003.

The e-mail survey of professors consisted of four questions relative to the advantages and disadvantages of using PowerPoint and its impact on teaching and learning. I also followed up with informal discussions with several professors, both in person and via e-mail. The opinions and observations of these professors yielded useful qualitative and background information.

The analysis of student course evaluations focused on students taught by fifteen professors who had taught a substantial number of first-year classes during the period of study from 1998 to 2003. At the end of each course, students were asked to fill out a course evaluation. Most of the questions yield a numeric answer indicating how well the professor performed in certain areas. Quantitative analysis was performed on some of these specific answers. Space is also included in the evaluation form for more open-ended comments from the students and these were scanned for any trends.

I selected the first-year program at Osgoode because the students are divided into sections and they remain in the same section for all their mandatory first-year courses. I restricted myself to the period after the winter 1998 term as the Student Evaluation of Course and Instructor Form was revised in March of 1998.<sup>17</sup> I then selected those courses that have tended to have stable content and professors who had taught at least three sections over the past six years. This yielded fifteen professors who had taught sixty-six classes. Nine had never used PowerPoint, one had used it throughout the six-year period, and five converted mid-way through.

I then analyzed questions from the student evaluations that I believed would be affected by a change in teaching method both over time and in comparison with the evaluations of other professors who had taught the same sections but had not adopted PowerPoint.<sup>18</sup> Thus, those who had

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<sup>17</sup> For a description of the evaluation process at Osgoode Hall Law School, see Timothy Fitzsimmons "Student Evaluations: Advise and Appraise" *Obiter Dicta* (3 February 2003) 5. Student evaluations are a valid means of comparison: see Marlene Le Brun & Richard Johnstone, *The Quiet (R)evolution: Improving Student Learning in Law* (North Ryde, NSW: The Law Book Company, 1994) at 337.

<sup>18</sup> Questions tracked from student evaluations:

2. How effectively did this instructor communicate her/his ideas?
6. How often did you find yourself stimulated to think about the issues raised in class outside

not varied their method would be used as a “control group” because, *ceteris paribus*, their evaluations should remain relatively unchanged. For two of the professors who adopted PowerPoint, I was able to compare their evaluations directly with evaluations of control-group professors who had taught the same section of students.

None of the questions in the course evaluations are specifically designed to measure the effects of PowerPoint. Nevertheless, I hypothesized that the use of PowerPoint, if its pedagogical impact was significant, would affect student responses to several questions. For example, I hypothesized that the top-down, information-heavy nature of PowerPoint would reduce student participation, and therefore, one of the questions I dealt with was whether the professor being evaluated encouraged student participation in class.

While some interesting trends emerged, I believe that the type and organization of the information I was able to obtain as well as the small sample size of the PowerPoint adopters I was able to track, indicate that statistical analysis would not be warranted.

I also conducted a web survey of students. The survey was advertised through posters on bulletin boards and other sites on campus. The advertising directed the students to an internet website where they filled in a form. As well, students were able to give individual comments online. I asked eleven specific questions and one open-ended question seeking additional comments. The web survey was focused on PowerPoint. It therefore provided a useful addition to the more neutral questions on the student evaluations.

#### A. *Component I: Responses from Professors*

From the fifteen responses received from professors, it was obvious that many had given careful thought as to the advantages and disadvantages of using Powerpoint. The following sections summarize the perceived advantages and disadvantages of using Powerpoint as recorded in professors' responses:

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- classroom hours?
7. How much did this instructor encourage student participation in the class?
  8. Was the instructor prepared for class?
  10. How effective as a teacher was this instructor, relative to other instructors?
  11. Would you like to take another course taught by this instructor (assuming the subject matter interested you)?

## 1. Advantages

- It keeps me organized.
- It allows me to cover more material.
- It improves the structure of my lectures.
- Students can use the slides as an outline; this assists them to be better organized.
- It decreases the number of panicky or “lost” students.
- It is possible to get basic ideas across more quickly thereby freeing up time for more in-depth discussions.
- The students who are already engaged become more engaged by using the slides as a launching pad for further thought.

### One professor wrote:

The biggest change, from my perspective, is that I am able to cover a whole lot more material in a clearer and more effective manner. (At least that is my perception.) I really like PowerPoint because it helps to keep me on track, and I think I am able to communicate my ideas more effectively with the students since they both hear me and see the points on the screen. I believe that PP has been a great assist to my teaching. ...

I do not detect any difference in class participation as a result of using PP. Nor do I think the students are any more or less passive as a result.

## 2. Disadvantages

- The less engaged students become more passive.
- Students are entranced by the screen; it is not possible to engage students verbally.
- The slides, not the professor, now direct the lecture.
- Students insist on copying every word on the slide preventing the lecture from moving forward.
- It is a dumbing down of the intellectual enterprise.
- It interferes with students thinking for themselves.

### One professor who has stopped using PowerPoint wrote:

Students were “mesmerized” by [PowerPoint], and this did not seem to be alleviated by my handing out paper copies of the slides ahead of time. They wanted to write down everything on the slide, and I do not think that they wrote down much else. They did not watch me, and were not thinking. If I asked questions, it became obvious that few were actually intellectually keeping up with the lecture.

For me, getting rid of PowerPoint has removed a barrier between myself and my class. I use technology a great deal and I love it. I rely on my class website, I post materials, I email materials etc. I enjoy the technology classrooms for the document projector, and for the internet in class.

### 3. Advantages and Disadvantages

Another professor who continues to use PowerPoint emphasized that some students benefit while the progress of others ends up being hampered when computer slide presentation software is used:

The discipline that PowerPoint adds to my class preparation has assisted me greatly in covering topics within the time allotted to them ... PP slides serve as useful lecture outlines for the students—a means of organizing the complex information presented in the course materials in a structured fashion. It gives the students a basic architecture—a skeleton—that they can then flesh out with their own notes. I find the first year students appreciate this in first semester (when many are typically “at sea,” lost without a compass), and also in second semester Constitutional Law, where the volume of information they need to absorb is quite overwhelming. ...

In my view, PowerPoint impacts on the way students learn. The distribution of lecture outlines exacerbates the gap between the most and least attentive (or computer savvy) students in the section. The most attentive and engaged students use them the way I wish them to—they download the Word version of the slides ahead of class, they fully absorb the lecture outlines, and use them as a launching pad for further notes and thinking. They become more actively engaged. The worst students either don't make use of them, or make too much use of them—i.e., they treat them as an end in themselves, or as obviating their own need for critical reflection and engagement. They become more passive, as in: “I have the PP outlines, so why worry?”

#### B. *Component II: Student Evaluations*

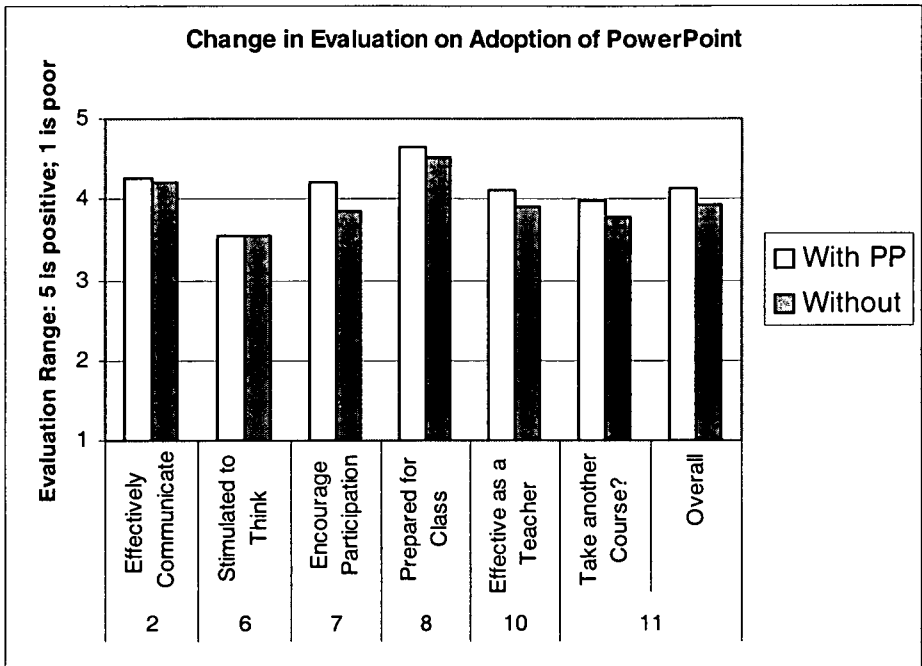
I compared student responses to several questions on course evaluations relative to one professor who used PowerPoint throughout the period of the study (Winter 1998 to 2002-2003), to professors who never used PowerPoint, and to five professors who adopted PowerPoint during this period.

There was no consistent change in the student evaluations measured when the professors who adopted PowerPoint are compared with non-adopting professors. Student evaluations remained consistently high for the two professors who had scored well prior to adopting PowerPoint. Two professors who were improving improved further. For the fifth professor, his performance the year he adopted PowerPoint was essentially the average of previous years. It is important to note that in no instance was there a decline in perceived instructor effectiveness. The performance of non-PowerPoint users varied, some improved and some declined in



perceived instructor effectiveness of the adopters.

When two adopting professors were compared with non-adopting professors who taught the same sections of students, the results were mixed: in one case, the evaluations of the professor who adopted PowerPoint rose dramatically while those of the non-adopting professor remained



unchanged; in the other case, the opposite occurred with the evaluations of the adopting professor remaining unchanged while those of the non-adopting professor improved significantly.

Similarly, when the evaluations of the professors who adopted PowerPoint and those who did not are combined and compared, the difference is only slight (see graph above). Interestingly, student perception of professorial encouragement of class participation actually increased when PowerPoint was adopted.

Students reported that they were stimulated to think just as much in classes when PowerPoint was being used as they were in classes when PowerPoint was not used. Students perceived a rise in professorial encouragement of in-class discussion when PowerPoint was employed.

## 1. Student Comments in Course Evaluations

Information obtained from a review of the open-ended course evaluation comments revealed only one or two comments requesting the use of PowerPoint.<sup>19</sup> When professors used PowerPoint, there were generally more positive than negative comments relating to the projection of computer generated slides. Many students appreciated the posting of slides to the web and complained when this was not done. One professor had received consistent complaints that his students found it hard to hear him and that he should use a microphone or a better microphone. These complaints almost entirely vanished when the professor adopted PowerPoint.

### C. *Component III: Osgoode Student Web Survey*

A total of 139 students responded to the web survey compiled for this study. This constitutes just under twenty per cent of Osgoode's student body. Fifty-three of the one hundred and thirty-nine students also submitted additional, sometimes detailed, comments.

The student web survey discloses that use of PowerPoint affects the manner in which students perceive that they learn the material. As shown below, there is a strong sense that PowerPoint enhances their learning.

Does the use of PowerPoint affect the manner in which you learn the material or what aspects of the material are emphasized?

10	6	30	44	48
<i>no effect</i>		<i>some effect</i>		<i>significant effect</i>

Does the use of PowerPoint enhance or detract from your learning of the material?

66	24	20	15	13
<i>enhances</i>		<i>no impact</i>		<i>detracts</i>

Overall, students report that they prefer to take courses where PowerPoint is used. They believe that PowerPoint aids the instructor's ability to communicate his or her ideas and that it improves his or her use

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<sup>19</sup> This is consistent with a survey conducted by Rickman and Grudzinski: John Rickman & Mike Grudzinski, "Student Expectations of Information Technology Use in the Classroom" (2000) 1 *Educause Q.* 24.

of examples and illustrations. These results are consistent with a survey conducted by Atkins-Sayre *et al.* and by Szabo and Hastings, but as noted earlier, the students' beliefs may not be accurate.<sup>20</sup>

Do you prefer to take courses where PowerPoint (or similar slide projection) is used?

67	23	24	14	10
<i>Prefer</i>	<i>no preference</i>			<i>Do not like</i>

Does the use of PowerPoint aid or hinder the instructor's communication of her/his ideas?

73	26	17	12	9
<i>PP aids</i>				<i>PP hinders</i>

The use of PowerPoint affects the use of examples and illustrations by the instructor.

60	29	37	4	7
<i>Better with PP</i>		<i>same</i>		<i>Better without</i>

The use of PowerPoint does not substantially affect the amount of pre-class preparation by students nor the amount of time they thought about course materials outside class. There may be a slight increase in their stimulation during the class itself. This is important because thinking about the subject increases retention of the material.<sup>21</sup>

Consistent with the quantitative analysis of the student evaluations, there is a slight increase in participation in class. PowerPoint seems to have no effect—pro or con—on facilitating awareness of social or human issues.

Does the use of PowerPoint lead to an increase or decrease in the amount of pre-class preparation you do?

17	16	93	5	7
<i>less</i>	<i>same amount</i>			<i>more preparation</i>

How often do you think about the course material outside of the class hours?

17	12	92	9	6
<i>PP facilitates</i>				<i>PP hampers</i>

How often do you find yourself stimulated to think during class?

23	21	65	13	13
<i>more with PP</i>				<i>more without</i>

<sup>20</sup> See W. Atkins-Sayre *et al.*, "Rewards and Liabilities of Presentation Software as an Ancillary Tool: Prison or Paradise?" (Paper presented to the 84th Annual Meeting of the National Communication Association, November 21-24, 1998) at 25; Szabo & Hastings, *supra* note 4 at 186.

<sup>21</sup> Wilbert J. McKeachie *et al.*, *Teaching Tips: Strategies, Research and Theory for College and University Teachers*, 9th ed. (Lexington, Mass.: D.C. Heath and Company, 1994) at 32.

Does the use of PowerPoint tend to encourage or discourage student participation in the class?

28	16	75	11	8
<i>PP encourages</i>				<i>more without PP</i>

Does the use of PowerPoint facilitate awareness of social and human issues related to the legal process?

17	11	93	9	6
<i>PP facilitates</i>				<i>PP hampers</i>

Both the above results and the vast majority of the fifty-three written comments indicate a strong desire to see more use of PowerPoint. Given that only one-third of Osgoode professors use PowerPoint regularly, this is consistent with the Rickman and Grudzinski survey that shows that students seek information technology usage forty per cent of the time.<sup>22</sup> However, a substantial minority of students found PowerPoint slides counterproductive, as shown by the written comments and survey results above. These students feel that PowerPoint gets in the way of the professors' enthusiasm and distracts from the points they are trying to make. There is certainly a sense that it is very possible to teach quite well without using any form of information technology.

Students indicate that PowerPoint lectures are better organized and easier to follow, but many caution that it is important to properly prepare the slides and to present them effectively. "Good" use of PowerPoint is helpful; "improper" use is unhelpful. A common complaint is that professors put too many points on one slide. Many students note that the quality of the instructor is the most important variable, and report having stimulating learning experiences both with and without PowerPoint.

The most widespread and strongly felt opinion is that PowerPoint is most effective when the slides are posted on the web prior to the lecture. Because pre-class posting reduces the need to take notes, students are better able to listen to the lecture and to think about the points being presented.

Representative comments from three students are as follows:

PowerPoint is a useful tool. However, it is only a tool. The instructor's use of that tool makes all the difference. Professors should only use PowerPoint if they feel comfortable incorporating it in a balanced manner into the rest of their teaching plans. I have had wonderful courses where I learned a lot without the use of a PowerPoint presentation. In fact, having a PowerPoint presentation going would have only hindered the prof's

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<sup>22</sup> See *supra* note 19. The actual preferred use of PowerPoint will likely be different for Osgoode and will likely vary from university to university and faculty to faculty. Student preferences at any given institution may also vary over time.

enthusiasm. I have also taken courses where the subject matter was dry and complex and the PowerPoint slides helped organize thoughts and maintain focus.

PowerPoint use by the professors is my saviour! I find that it allows me to focus on understanding and taking in the material that is being discussed as opposed to trying to write it all down. It is especially helpful when instructors make the PowerPoint slides available prior to the lecture.

The main benefit of PowerPoint is that it allows me to think more about what the professor is saying in class rather than attempting to scribble down everything that he or she says. This benefit only occurs where the slides are available before the class. When the slides are not available before class, PowerPoint hinders my ability to learn because I cannot focus on the lecture, but rather am racing to get both the projected and the spoken words committed to paper.

There was significant agreement between students and professors that PowerPoint leads to more organized lectures. There was mutual recognition that slides posted to the web could be used for examination summaries. Both groups also contain members with divergent views as to the overall efficacy of PowerPoint.

### III. DISCUSSION AND CONCLUSION

#### A. *Discussion*

The debates surrounding the use of PowerPoint have contributed to anxiety among professors as to whether or not they should use PowerPoint. I submit that this exploratory study should reduce that anxiety. However, PowerPoint is only one teaching tool among many. The observations of the professor who cited PowerPoint's advantages and disadvantages seem apt:

I don't think there is anything inherently good or bad about PP, it all depends upon how well it is used, and how well it is integrated into our other pedagogical techniques. Like most pedagogical techniques, it probably works much better for some students than others. We need to mix up our teaching tools and strategies if we want to reach all of the students in our classes. ... PowerPoint's an empty vessel, into which professors pour their skills or lack thereof.

Teacher characteristics seem more important than whether or not PowerPoint is used.<sup>23</sup>

This exploration does not support the idea that good teachers who use PowerPoint will decline in effectiveness, while poorer teachers will improve. None of the highly evaluated teachers experienced a decline in

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<sup>23</sup> In this regard, see also Hess & Friedland, *supra* note 7 at 12-17.

their evaluations when they adopted PowerPoint. There was some slight improvement in the evaluations of two professors, but their trend-lines did not support attribution of this improvement to PowerPoint use. The fact that the evaluations of the professor who used PowerPoint throughout were in the lower range shows that using PowerPoint will not always result in positive student evaluations.

The proposition that engaged students will improve while passive learners will learn only the bare facts, found only marginal support. Some of the comments from the web survey indicated that reading the slides before class helped students to focus on the class discussion. There was some slight indication that engaged students improved while passive learners learned only the bare facts. The student web survey disclosed some perceived reduction of pre-class preparation but increase in thinking about the course material (both in and out of class).

Class participation was not negatively impacted by PowerPoint, suggesting that it does not necessarily lend to passive learning, and there was some support for the belief that more material will be covered in each course.

Consonant with previous studies, a large majority of law students reported that PowerPoint helps them learn and remember what they are taught. However, there remains no convincing empirical support for actual, as opposed to perceived, learning enhancement.

Since students have a variety of learning styles, it is likely a good idea to ensure that a wide variety of teaching styles are available to them. PowerPoint may be one such style. Students who were familiar with PowerPoint in their undergraduate disciplines reported that PowerPoint eased their transition into law school. If the Osgoode surveys are representative, law students want at least one-third of their courses to be delivered by PowerPoint.

Many students noted that the posting of PowerPoint slides on the internet greatly facilitated the preparation of their exam summaries. However, forcing students to compile their own summaries from scratch may be more productive pedagogically. Thus notwithstanding the emerging andragogical view that adult learners' preferences concerning their learning should be respected, there should be no automatic posting of detailed course notes.

Specific problems, such as poor voice projection or disorganized presentation might be remedied through the use of PowerPoint. It is a

matter of choosing the right tool for the job.<sup>24</sup> If a professor's teaching is felt to need improvement, PowerPoint might be worth a try. If one is teaching a subject area for the first time, PowerPoint may be a useful guide to assist in the organization of the material. But if PowerPoint is getting in the way, its use should be discontinued.

### B. *Conclusion*

PowerPoint is a useful educational tool but is neither a universal key to good pedagogy nor does it necessarily represent a slippery slope to superficiality. Some, but not all courses should be available via PowerPoint. Because PowerPoint seems to lead to better-organized lectures that students can more easily absorb, at least some courses should use it in the first term of law school. Properly used, PowerPoint may result in student perception of improved teaching performance. Instructors who already fare well in student evaluations will likely not notice any change in their evaluations if they adopt PowerPoint.

PowerPoint is neither a magic bullet nor a poison pill. It will not, in and of itself, necessarily stifle intellectual activity or development. Used properly, it may actually increase student participation.

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<sup>24</sup> One professor believed that she needed to justify her non-use to her students: she felt that the students perceived that the best teachers always use PowerPoint. This study would seem to indicate that such a justification is unnecessary but an explanation may nonetheless be useful in directing the students to the professor's learning objectives for the course.