

Exploring Undergraduates' Perceptions of White board and PowerPoint Lecture Style Presentations: A Case Study in Malaysia

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ABSTRACT

Lecture is a widely used teaching method in universities worldwide as an intellectual discourse for delivering new knowledge. The effectiveness of a lecture depends on the teaching tools used in facilitating the learning process. At the same time, course content plays an important role in determining the effectiveness of a teaching tool. The present paper reports a cross-sectional study on Engineering undergraduates' perception of whiteboard and PowerPoint lecturing in enriching their learning experience. Questionnaires were distributed to 67 Engineering undergraduates. Interviews were conducted with seven Engineering undergraduates and seven lecturers. The survey and interview data collected were subjected to quantitative and content-based analyses, respectively. The findings concluded that whiteboard and PowerPoint lecturing tools complement each other in technical courses.

Keywords: Blackboard lecturing, engineering, PowerPoint lecturing, traditional teaching, whiteboard lecturing

INTRODUCTION

For decades, lecturing has been a widely used teaching method in universities

worldwide by lecturers for undergraduate or even postgraduate programmes. Lecturing is a process in extending or delivering a new subject matter before an audience of new learners. It is beneficial before they attend tutorials or problem-solving classes as students are exposed to concepts foundational to the subject matter in this process (Schwerdt & Wuppermann, 2011). Nevertheless, the effectiveness of lecturing depends on the types of tool used

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in facilitating the teaching and learning process. Whiteboard and Power Point Slides are teaching aids used frequently in giving lectures to undergraduates in most universities nowadays.

A few studies have been conducted to investigate the different aspects of whiteboard and PowerPoint lecturing, including the effects on learners' self-efficacy, attitudes, academic performance and motivation as well as their perception of the teaching and learning process. In terms of time, some students have expressed that whiteboard lecturing is inefficient (Masoud Azizinezhad & Masoud Hashemi, 2011; del Campo et al., 2012). This is because all new concepts and important points (including examples and elaboration) are hand-written on the whiteboard during lecturing. Writing down the points on a whiteboard causes short or long pauses during lecturing. More time is involved or used in between the lecture if a question or an example of paragraphs or sentences are part of the subject matter. For example, this would be the case in language classrooms. However, the slow pace of the lesson allows learners to follow the lesson easily (Kahraman et al., 2011) and hence, more information implied is noted manually. Meanwhile, PowerPoint lecturing provides a fast-moving and smoother lesson without the need to pause to write down points for the learners. Under this condition, however, it is very difficult for the learners to take notes (Susskind, 2008; del Campo et al., 2012). In the event of technical malfunction, PowerPoint lecturing cannot be carried out as planned

and time is consumed in rectifying the problem or configuring the computer to the projector. In addition, classes could be cancelled due to the inability of the lecturer to teach without PowerPoint slides.

Studies have shown that traditional lecturing methods using the blackboard or whiteboard is more beneficial in terms of information retention and performance. Compared when taught using PowerPoint slides, learners retain more information when a lecture is delivered using the board (Savoy et al., 2009; Azizinezhad & Hashemi, 2011). This could be explained by the notion of active learning; learners stay alert by taking notes during the lecture. Learners' productivity drops during PowerPoint lecturing (Kahraman et al., 2011; Bartsch & Cobern, 2003). As mentioned above, the fast pace of PowerPoint lecturing hinders following a lesson completely and hence, affects learners' comprehension (Kahraman et al., 2011). Irrelevant multimedia items, such as sound effects, act as detrimental obstruction to getting the intended information (Bartsch & Cobern, 2003). The rate of information retention is affected when learners focus more on reading the slides than paying attention to the additional explanation given by their lecturer (Savoy et al., 2009). However, Apperson et al. (2006) claimed that there are no significant differences on students' academic performance between classes conducted with whiteboard and those conducted using PowerPoint.

On the other hand, PowerPoint is more effective than whiteboard when a lesson

involves presenting or lecturing a complex description of a figure as well as how it works (Savoy et al., 2009; Kahraman et al., 2011). This is particularly shown in terms of the clarity of a topic, which is enhanced through the presentation of slides. For example, Apperson et al. (2006) suggested that preference go to PowerPoint lecturing when clarity and organisation are the main concern. Yee et al. (2013) also emphasised that a systematic and organised PowerPoint lecturing facilitates information retention among learners. Furthermore, learners could really benefit from the slides as the topic is summarised in a more structured order.

As stated thus far, numerous studies have shown the positive and negative sides of whiteboard and PowerPoint lecturing. To the best of our knowledge, there are limited studies carried out in investigating the effectiveness of both whiteboard and PowerPoint lecturing in delivering technical course content, especially in Engineering courses. As emphasised in the existing literature (Tang & Austin, 2009; Kahraman et al., 2011; Çiğdem Uz et al., 2010; Fateme Samiei Lari, 2014; Vecdi Can et al., 2012), course content plays an important role in determining the effectiveness of a teaching tool in facilitating the learning process. To address this aim, the present paper reports a cross-sectional study on Engineering undergraduates' perception of the effectiveness of whiteboard and PowerPoint lecturing to enrich their learning experience. The survey and interview data collected were subjected to quantitative and content-based analyses, respectively.

METHODOLOGY

Participants

Table 1 displays the demographics of the participants involved in this study to investigate their perceptions of the effectiveness of PowerPoint and whiteboard lecturing in teaching and learning. The participants were categorised under three groups. Group 1 consisted of 67 Engineering undergraduates who responded to the distributed questionnaires. Most of the participants were male (72%), while only 28% were female. A total of 79% of them were majoring in Mechanical Engineering and only 21% of the respondents were studying Civil Engineering, Electrical Power Engineering and Computer and Communication Engineering. Half of them were second-year students. The next biggest group was the freshman group of first-year students at 33%.

Groups 2 and 3 participated in the conducted interview for the purpose of data triangulation and explanation; the participants were seven Engineering undergraduates and seven lecturers, respectively. For Group 2, there was a balance of four male participants and three female participants. They were majoring in Civil Engineering, Electrical and Electronic Engineering and Mechanical Engineering. As for Group 3, there were five female and two male lecturers from different departments (Languages and Communication, Social Sciences, Civil Engineering, Mechanical Engineering, Electrical Power Engineering and Information System).

Table 1
Demographic information of the three groups of participants (N=81)

	N	Freq.	Percent %
Group 1: Survey Participants (Undergraduates)			
Gender			
Male		48	72
Female		19	28
	67		
Programme			
Civil Engineering		9	13
Mechanical Engineering		53	79
Electrical Power Engineering		2	3
Computer & Communication Engineering		3	5
	67		
Year			
First Year (Freshman)		22	33
Second Year (Sophomore)		3	4
Third Year (Junior)		33	50
Fourth Year (Senior)		9	13
	67		
Group 2: Interview Participants (Undergraduates)			
Gender			
Male		4	57
Female		3	43
	7		
Programme			
Civil Engineering		3	43
Mechanical Engineering		1	14
Electrical and Electronic Engineering		3	43
	7		

Table 1 (continue)

	N	Freq.	Percent %
Year			
Freshman		3	43
Sophomore		4	57
	7		
Group 3: Interview Participants (Lecturers)			
Gender			
Male		2	29
Female		5	71
	7		
Department			
Civil Engineering		1	14.2
Mechanical Engineering		1	14.2
Electrical Power Engineering		1	14.2
Information System		1	14.2
Social Sciences		1	14.2
Languages and Communication		2	29
	7		

Data Collection

The data were collected at three stages using two different types of instrument, namely a questionnaire and an interview. All of the data were collected from different individuals with their profile presented in Table 1.

Questionnaire. For the first stage of data collection, a questionnaire containing 11 items was designed to obtain data on the impact of PowerPoint and whiteboard as lecturing tools in teaching and learning based on the perception of Engineering undergraduates (Refer to Appendix A). This questionnaire was presented with

given options or answers to the respective questions. There were two sections in the questionnaire. The first section consisted of four demographic questions. Meanwhile, the second section consisted of seven questions on the types of teaching tool used in the Technical Communication classes and attitudes towards the two lecturing tools.

The first stage of data collection began by administering the questionnaire to 173 engineering undergraduates enrolled in three separate classes of the same course by the end of the semester. The questionnaires were attached with a cover letter and were sealed in envelopes before they were distributed to the potential respondents at the end of the class. The researcher explained the purpose of the questionnaire as well as the procedure to be followed to all respondents. The respondents were given one week to respond to the questionnaire on their own. The filled questionnaires were returned to the researchers within two to seven days. The return rate of completed questionnaire was 40% despite the enclosed token of appreciation that served as motivation to increase the response rate (Dillman, 2000). Statistical analysis of generating the frequency and percentage for each item was carried out from the data collected in this study.

Interviews. In the second stage of data collection, interviews were conducted with seven engineering undergraduates to support and explain the data collected from the questionnaires. The interview consisted of eight primary questions, of

which seven were the same questions from the questionnaire (Refer to Appendix B). In the interview, the participants shared their perception of the effectiveness of PowerPoint and whiteboard as lecturing tools in teaching and learning based on their experience in bachelor courses they had taken. Prior to the interview session, a cover letter attached with the interview questions was given to the participants. This was meant to seek consensus from the respondents to participate in the interview, which was audio recorded. The length of the interviews was between 15 and 30 minutes.

For the last stage of data collection, interviews were conducted with seven lecturers to identify similarities and differences compared to the data collected from the undergraduates in both the questionnaire and the interview (Refer to Appendix C). Similar to the interview conducted at Stage 2, this interview consisted of eight primary questions on courses taught, teaching materials used as well as their frequency and the advantages and disadvantages of using PowerPoint and whiteboard in the context of learning and teaching at the university. The procedure for this interview was similar to the interview process at Stage 2 as stated in the previous paragraph.

Finally, data analysis on both the interview data was done after the entire interview was completed. Both interviews with the undergraduates and lecturers were thoroughly analysed using content analysis. The researchers began the process by reading the short notes taken during the

interviews to highlight the responses, which were similar to or supported the highest percentage of the questionnaire results. Finally, the interview data were analysed for any similar responses given.

RESULTS AND DISCUSSION

The impact of Using the Whiteboard on Teaching and Learning

Table 2
Undergraduates' perception of the advantages and disadvantages of using the whiteboard in teaching and learning (N=67)

	<i>f</i>	%
What do you think are the advantages of using a whiteboard in teaching and learning?		
More authentic	15	22
More interactive	24	36
Students can understand better	32	48
More information can be delivered	19	28
More convenient for the teacher to explain a concept clearly	40	60
Others (Advantages of using whiteboard)	6	9
What do you think are the disadvantages of using a whiteboard in teaching and learning?		
Less stimulating	9	13
Less information can be delivered to the students	10	15
Less systematic in explaining a concept to the students	36	54
It takes more time for the teacher to explain a concept clearly	36	54
The students cannot focus on the teacher's explanation due to the need to take down notes	31	46
Others (Disadvantages of using whiteboard)	5	7

Table 2 shows the questionnaire data of undergraduates' opinion on the positive and negative impacts of using the whiteboard as a traditional teaching tool in Engineering. It was found that the whiteboard served as an important teaching tool for lecturers to explain a new concept clearly for a group of Engineering respondents (60%). This result is agreeable with the interview data collected from both the lecturers and undergraduates. Analysis of the interview data concluded that a readily available whiteboard is essential for every Engineering course, especially for courses with calculations. A whiteboard

provides space for lecturers to give examples for impromptu questions raised by students on the newly introduced concept as well as for writing down additional information that lecturers think of. Courses with calculations, such as Electronic and Design, Linear Algebra and Signal and System require lecturers to show the work steps carefully and systematically as it would be difficult for students to visualise the steps in their mind.

Table 2 also shows that more than 50% of the questionnaire respondents felt that lecturing with a whiteboard was

less systematic (54%). This result could be related to the high volume of words written on the board in responding to students' questions as well as in writing down additional information that lecturers think of. In such a spontaneous situation, the points are mostly written on white spaces only. It was reported by most of the student interviewees that some lecturers' handwriting could not be read due to the small font size of the handwritten words.

At the same time, whiteboard lecturing is considered less time efficient as it takes longer for lecturers to explain a concept clearly to students. This result supports the claim made by Masoud Azizinezhad and

Masoud Hashemi (2011) and del Campo et al. (2012) that whiteboard lecturing is time consuming. However, the slow pace of whiteboard lecturing is seen as a learning opportunity as it gives more time for learners to write down notes according to an international student interviewee. This validates Kahraman et al.'s (2011) claim that the fast pace of PowerPoint lecturing has made it difficult for students to follow the lesson due to not having time to take down important notes.

The Impact of Using PowerPoint on Teaching and Learning

Table 3

Undergraduates' perception of the advantages and disadvantages of using PowerPoint in teaching and learning (N=67)

	<i>f</i>	<i>%</i>
What do you think are the advantages of using PowerPoint in teaching and learning?		
More interactive	34	51
The students can focus better	10	15
The students can understand better	7	10
More information can be delivered to the students	26	39
More convenient for the teacher to explain a concept clearly	28	42
Others (Advantages of using PowerPoint)	3	4
What do you think are the disadvantages of using PowerPoint in teaching and learning?		
Less stimulating	15	22
It consumes time in set-up	40	60
Less information can be delivered to the students	13	19
Less systematic in explaining a concept to the students	18	27
It takes more time for the teacher to explain a concept clearly	9	13
Others (Disadvantages of using PowerPoint)	13	19

In Table 3, the majority of the questionnaire respondents (51%) agreed that PowerPoint lecturing is more interactive in terms of the use of graphics or visual elements, such

as pictures of a machine and diagrams of a model, in line with Yee et al.'s (2013) findings. Interaction between a lecturer and students is made possible through the use of

graphics that capture the students' attention. With this, students become more interested in listening to the description of the graphics and hence, more questions tend to be asked for further details. In this context, graphics play a role as a stimulus for curiosity.

Another important finding of the questionnaire based on the students' experience was that the most obvious drawback of PowerPoint lecturing is the time consumed in setting up the projector and laptop (60%). This is largely due to the fact that there are still classrooms not equipped with a projector and computer at the participants' university. In this case, lecturers who would like to lecture with PowerPoint slides will have to borrow the devices and equipment from the IT Department and set up everything all by themselves. Not only does set-up consume time, it can also lead to compatibility issues at times. According to the interview data, there was a high tendency that a class would be cancelled due to the inability of the lecturer to lecture when technical malfunctions happen as emphasised by del Campo et al. (2012).

Analysis of the interview data also revealed that the other technical drawback of PowerPoint lecturing is related to the slide design principle (Çiğdem Uz et al., 2010). Students found it difficult to read words on the slides when they were typed in small font sizes. In some classes, students were overwhelmed with the heavy load of information on a single slide, when too much information was packed on every

slide. This situation was worsened if the lecturer simply read aloud everything on the slides. Hence, according to the Engineering students, the principle of slide design affected the effectiveness of PowerPoint lecturing.

CONCLUSION

Based on the results reported in the present study, it can be concluded that whiteboard and PowerPoint lecturing tools can complement each other in an Engineering programme. It is impossible for a single teaching tool to suit all teaching content perfectly (Savoy et al., 2009). For optimal teaching and learning to take place, a whiteboard is needed from time to time in order for lecturers to provide detailed explanation along with PowerPoint slides, such as in calculation-based courses. The main points presented in the slides will ensure that the lecture flows smoothly in tandem with visual illustrations captured on the slides. The issue of setting up devices and equipment as well as the compatibility of the PowerPoint applications can be easily solved by equipping classrooms with their own technological system.

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APPENDIX A

Sample of the Questionnaire

The purpose of this questionnaire is to elicit student perception of whiteboard and PowerPoint usage in Technical Communication classes. Please respond to all sections of the questionnaire. The information will be used for research purposes only. The identity of respondents will be kept confidential.

SECTION 1

Please tick one.

1. Your gender? Male Female
2. Your age?
 Under 25 26-30 31-35 36-40 41-45
 46-50 51-55 56-60 Over 60
3. Your Programme?
 Civil Engineering
 Mechanical Engineering
 Electrical Power Engineering
 Electrical and Electronic Engineering
 Computer and Communication Engineering
4. Year of Study?
 First year, first semester
 First year, second semester
 Second year, first semester
 Second year, second semester
 Third year, first semester
 Third year, second semester
 Forth year, first semester
 Forth year, second semester
 Others. Please specify

SECTION 2

You may tick more than one.

1. What teaching materials / aids did your lecturer use in this classroom?
 Whiteboard
 Blackboard
 Textbook
 OHP transparency
 PowerPoint slide
 Worksheet/Handout
 Authentic article (journal, magazine etc.)
 Video clip
 Audio CD
 Others. Please specify

APPENDIX A (*continue*)

2. How often did he or she use the whiteboard?
 - € All the time
 - € Often
 - € Sometimes
 - € Rarely
3. How often did he or she use PowerPoint?
 - € All the time
 - € Often
 - € Sometimes
 - € Rarely
4. What do you think are the advantages of using a whiteboard in teaching and learning?
 - € More authentic
 - € More interactive
5. What do you think are the disadvantages of using a whiteboard in teaching and learning?
 - € Less stimulating
 - € Less information can be delivered to the students.
 - € Less systematic in explaining a concept to the students.
 - € It takes more time for the teacher to explain a concept clearly.
 - € The students cannot focus on the teacher's explanation due to the need to take down notes.
 - € Others: Please specify
6. What do you think are the advantages of using PowerPoint in teaching and learning?
 - € More interactive
 - € The students can focus better.
 - € The students can understand better.
 - € More information can be delivered to the students.
 - € More convenient for the teacher to explain a concept clearly
 - € Others: Please specify
7. What do you think are the disadvantages of using PowerPoint in teaching and learning?
 - € Less stimulating
 - € It consumes time in set-up
 - € Less information can be delivered to the students.
 - € Less systematic in explaining a concept to the students
 - € It takes more time for the teacher to explain a concept clearly.
 - € Others: Please specify

The End

If you have already completed this questionnaire, please return it to us. We are especially grateful for your help because your perception help us understand better the impact of using whiteboard and PowerPoint as teaching aids in technical language teaching and learning.

APPENDIX B

Sample of Interview Questions for Undergraduates

The purpose of this interview is to elicit student perception of whiteboard and PowerPoint usage in teaching university courses. The information will be used for research purposes only. The identity of respondents will be kept confidential.

3. What are the courses that you have taken?
4. What teaching materials / aids did your lecturers use in the classroom?
5. How often was the whiteboard used?
6. How often was PowerPoint used?
7. What do you think are the advantages of using a whiteboard in teaching?
8. What do you think are the disadvantages of using a whiteboard in teaching?
9. What do you think are the advantages of using PowerPoint in teaching?
10. What do you think are the disadvantages of using PowerPoint in teaching?

APPENDIX C

Sample of the Interview Questions for Lecturers

The purpose of this interview is to elicit lecturer perception of whiteboard and PowerPoint usage in teaching university courses. The information is used for research purposes only. The identity of respondents will be kept confidential.

1. What are the courses that you have taught?
2. What teaching materials / aids did you use in the classroom?
3. How often did you use the whiteboard?
4. How often did you use PowerPoint?
5. What do you think are the advantages of using a whiteboard in teaching?
6. What do you think are the disadvantages of using a whiteboard in teaching?
7. What do you think are the advantages of using PowerPoint in teaching?
8. What do you think are the disadvantages of using PowerPoint in teaching?