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Author(s)	Adam Wong
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## **Applying Whole-Brain-Teaching in Self-Financed Top-Up Degrees - An Exploratory Action Research**

**Adam Wong**

School of Professional Education & Executive Development  
College of Professional & Continuing Education  
The Hong Kong Polytechnic University  
Kowloon, Hong Kong  
spklwong@speed-polyu.edu.hk

### **ABSTRACT**

As more and more students bring electronic gadgets to the classroom, more and more find teachers struggle to keep students actively engaged in the learning process. Whole brain teaching (WBT) is a relatively new strategy adopted by teachers in the United States. Its purpose is to increase student engagement and, in turn, increase student achievement. Currently, there is very limited literature about the WBT in academic databases. The current literature is mainly about WBT practices in secondary education or lower levels. This is the report of an attempt to use some of the WBT techniques in post-secondary education.

Two WBT techniques were used in teaching the course of Project Management at the top-up degree level. After the course ended, self-administered questionnaires were used to collect student feedback from students. Thirty-five questionnaires were returned, representing a response rate of 85%. The data were analysed using SPSS.

This is one of the first attempts to apply WBT in post-secondary education. The results show that students have generally positive attitudes towards WBT. This is encouraging because it implies that WBT is potentially suitable for Hong Kong students at the top-up degree level. Most items in the questionnaire have high reliability when measured by Cronbach's Alpha. The questionnaire and experience can be used by future educators to further research into this area.

**KEYWORDS:** Whole Brain Teaching, Education, Herrmann's Four-Quadrant Whole Brain Model, Learning Preferences

## 1 INTRODUCTION

In the inaugural issue of the “Action Research”, Brydon-Miller, Greenwood, & Maguire defined as “a participatory, democratic process concerned with developing practical knowing ... in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities” (Brydon-Miller, Greenwood, & Maguire, 2003, pp. 10-11). Therefore, the nature of action research involves the researcher and the members of a community in order to bring about change that benefit the individual in that community. In the context of this research, the community is a class of full-time students studying at SPEED (School of Professional Education & Executive Development) of the Hong Kong Polytechnic University.

In the university, the faculty and students are participants in a dynamic process of teaching and learning. This process can be improved through the contribution of both faculty and students to each other's learning (Steyn & Maree, 2002). It is with this principle in mind that the author sets out to change the teaching methods with the aim to improve student learning. The outcome of the research will in turn help the author to learn how to teach future students more effectively and efficiently.

The students in this research are top-up students who have finished seventeen years of education, which starts from kindergarten and finishes at community college. Therefore, on one hand these students arrive at the School with established thinking style preferences and ensuing learning styles that influence all cognitive activities. On the other hand, the faculty of the School have established ways of thinking, which are reflected in their teaching styles. Therefore, the match or mismatch of faculty teaching styles with student learning styles can facilitate or hinder the effectiveness of student learning. In order to accommodate individual students' diverse thinking style preferences and to encourage the utilisation of their less preferred competencies, Herrmann's four-quadrant whole brain model can be utilised (Steyn & Maree, 2002).

## 2 LITERATURE REVIEW

### 2.1 Whole Brain Teaching

Whole Brain Teaching was formerly known as “Power Teaching”. It is an educational reform created in 1999 by Crafton Hills College philosophy teacher Chris Biffle and elementary school teachers Jay Vanderfin and Chris Rekstad. WBT is a participatory instruction method, in which the teacher uses techniques to keep students engaged in learning, and to make classrooms easy to manage. WBT is based on Herrmann's four-quadrant whole brain model (Davis, 2011; Pretorius, Steyn, & Johnson, 2012; van Oordt, van Oordt, & du Toit, 2014). It combines auditory, verbal, and visual elements of teaching instruction (Palasique, 2009).

A search of in the ProQuest database on 5th June, 2015 using the phrase “Whole Brain Teaching” or “Power Teaching” returned 55 articles. A closer examination found that only 19 of these are articles related to Whole Brain Teaching (WBT). It can be seen that WBT is still an exploratory research area.

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## 2.2 Herrmann's four-quadrant whole brain model

Herrmann (1991)'s model is based on ongoing research since the 1970s on the functioning of the human brain that indicated that specialised cognitive functions could be associated with different parts of the brain. For about 90% of the population, the left brain hemisphere is responsible for logical, analytical, quantitative and fact-based knowledge; whereas the right brain hemisphere predominantly supports and co-ordinates intuition, emotion, spatial perception and kinaesthetic feelings. Herrmann (1991) combined this knowledge with how the brain is physiologically organised in order to develop a four-quadrant whole brain model (Steyn & Maree, 2002).

Based on Herrmann's model, Lumsdaine and Lumsdaine (1995) define four student learning modes – External Learning, Internal Learning, Interactive Learning, and Procedural Learning.

- External learning is related to learning through listening (lectures) and reading of textbooks, scientific literature, etc.
- Internal learning is related to learning through insight, understanding concepts holistically and intuitively, synthesis of data and personalising content into context.
- Interactive learning comes from experience, hands-on activities, discussion and feedback.
- Procedural learning is characterised by a methodical approach, practice, repetition and testing.

If learning activities include different modes of student learning, which means catering for different thinking and learning preferences, a whole brain approach is followed and competence in mastering concepts is fostered (Steyn & Maree, 2002).

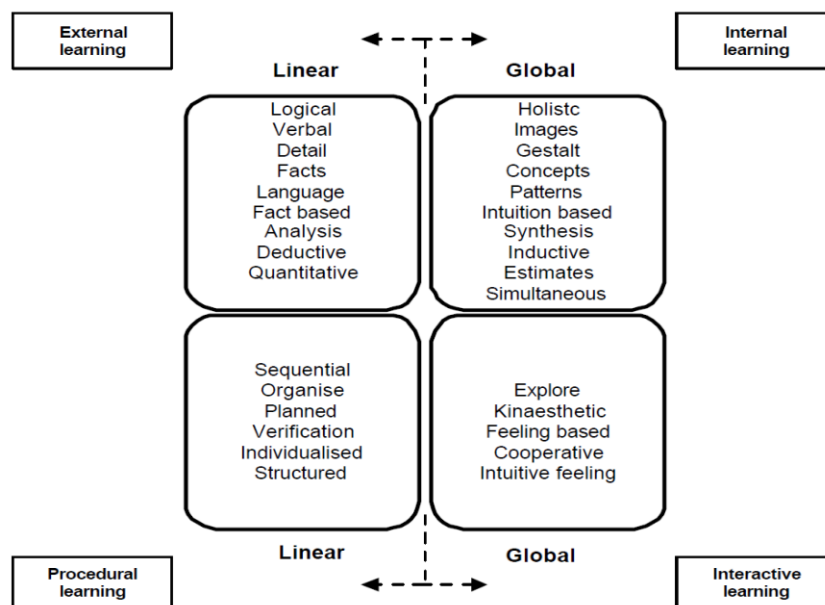


Figure 1: Herrman's Four-Quadrant Whole Brain Model with the Four Learning Modes  
Source: Steyn and Maree (2002)

The traditional way in classroom learning is “chalk and talk”, in which the teacher writes on the chalkboard and talks while the students listen. This single modal teaching is verbal in nature. Therefore it involves only the top-left quadrant of Herrman’s (1991) model. Students usually find this mode of teaching boring, and therefore they are not engaged in the learning process. The principle of WBT is to involve all four quadrants of the brain to increase student engagement. This can be achieved by employing multi-modalities in the classroom (Calhoun, 2012). The multi-modalities include Guided Meditation, Charts and diagrams (visual), Music, discussions (aural), Gesture, drama, stories (kinesthetic) (Palasigue, 2009).

### 2.3 WBT in Practice

For classroom management, Whole Brain Teaching has five classroom rules (Biffle, 2013). These rules are needed because the classroom can become noisy as students are encouraged to achieve high energy level participation in the class activities. The five WBT techniques are listed below:

1. Follow directions quickly!
2. Raise your hand for permission to speak.
3. Raise your hand for permission to leave your seat.
4. Make smart choices!
5. Keep your dear teacher happy!

All these rules have diagrams and gestures to accompany them (Biffle, 2013). There is a website ([www.http://www.wholebrainteaching.com](http://www.wholebrainteaching.com)) that provides access to these diagrams and other supporting materials for teachers who want to adopt WBT in their teaching. These rules are to be adopted with the teacher’s discretion because they are mainly for student at primary and secondary schools. Figure 2 shows the diagrams that represent the rules.



Figure 2 : The diagrams that represent the rules in WBT.

For teaching activities, WBT consists of a number of techniques that are listed below (Palasigue, 2009). For this research, the author only applied two of the four techniques, namely – Attention Getter, and Micro-teaching. It is because these two techniques are more suitable for post-secondary students.

Attention Getter	The teacher says “Class”, and the class replies “Yes”.
Mirroring	Students repeat the words/gestures of the teacher’s.
Hands and eyes	Students stop their activities and focus on the teacher.
Micro-teaching	Students teach each other in turns.

### 2.3.1 Attention Getter

This is the most effective tool the author has learned from Whole Brain Teaching. The purpose of this technique is to get the students attention. This is a way to get the students looking at the author and grinning rather than continuing their conversations. When the author says, "Class!" and they say "Yes!" They have to say it the way the author says it. For example, if the author says "Classity-class-class!" they have to say "Yessity-yes-yes!" If the author says it loudly, they have to respond loudly. If the author whispers, they have to respond in a whisper. They have to match the author's tone and intensity (Palasigue, 2009).

### 2.3.2 Micro-teaching

This is also called "Micro-lecturing". Firstly, the teacher divides the class in teams of two. One student is a One, the other is a Two. When the teacher says "Teach!", the class has to say "Okay!". Then student One will turn to student Two and start teaching the concept that the author has just taught. When the teacher says "Switch!", student Two becomes the teacher and tries to teach student One (Palasigue, 2009).

## 3 METHODOLOGY AND DATA COLLECTION

The author adopted WBT to teach the subject of "SPD4438 Project Management" at SPEED. During the teaching of the subject, the author used two of the WBT techniques – "Attention Getter" and "Micro-teaching".

After the whole course was completed, a survey was conducted by another lecturer during the lecture of another subject on 22nd April, 2015. The survey was a paper-based self-administered questionnaire. No personal identity information was collected so that the students would not have to worry that their answers would affect their results in the subject. The complete questionnaire is shown in the appendix. The questions Q4 to Q16 were about Micro-teaching. The questions Q18 to Q25 was about the Attention Getter. The answers to these questions are rated on a Likert 5-point scale, in which, "5" means "Strongly Agree", "4" means "Agree", "3" means "Neutral", "2" means "Disagree", and "1" means "Strongly Disagree". The questions Q17, Q26 and Q27 were open-ended questions.

## 5 RESULTS AND DISCUSSIONS

Thirty-five of the forty-one students returned the questionnaire. The answers to the open-ended questions Q26 and Q27 are listed below. The responses to Q4 to Q16, and Q18 to Q25 are summarised in Table 1.

About "Micro-teaching"

- *I need time to digest. I don't know how to teach another student.*
- *Give more time in the "Teach-OK" session.*
- *All students should teach in English.*

About "Attention Getter"

- *Use some other words such as "Class-Good".*

Table 1 Responses to the questions on "Micro-Teaching" and "Attention Getter"  
(SD = Strongly Disagree, D=Agree, N=Neutral, A=Agree, SA=Strongly Agree)

Technique	Question	SD 1	D 2	N 3	A 4	SA 5	Mean Score
Micro-Teaching	I know I should teach another student.	0%	6%	43%	34%	17%	3.63
	I participate actively.	3%	17%	46%	23%	11%	3.23
	I try to teach another student.	0%	6%	31%	57%	6%	3.63
	It makes the lesson more interesting.	6%	31%	37%	23%	3%	2.86
	It is fun.	11%	23%	40%	23%	3%	2.83
	It helps me understand the contents.	0%	14%	34%	40%	11%	3.49
	I actually learn more when I teach others.	0%	9%	40%	40%	11%	3.54
	It helps me prepare for project presentation.	6%	29%	40%	23%	3%	2.89
	It helps me express myself better at work.	6%	11%	34%	46%	3%	3.29
	I have no trouble in finding someone to teach.	0%	11%	40%	29%	20%	3.57
	There is always someone willing to teach me.	0%	11%	51%	29%	9%	3.34
	I want the lecturer to use it more frequently	6%	40%	31%	14%	9%	2.80
	I suggest it be used next year.	6%	34%	26%	17%	17%	3.06
Attention Getter	When the lecturer says "Class", I say "Yes".	11%	11%	29%	29%	20%	3.34
	I say "Yes" the way the lecturer says "Class".	9%	14%	31%	34%	11%	3.26
	I like the lecturer to use different voices.	11%	17%	31%	26%	14%	3.14
	It makes the lesson more interesting.	9%	29%	26%	31%	6%	2.97
	It helps me to get my attention back.	3%	14%	31%	46%	6%	3.37
	It makes everyone to focus on the teaching.	3%	20%	37%	29%	11%	3.26
	The lecturer should use it more frequently.	9%	31%	31%	17%	11%	2.91
	I suggest it be used next year	9%	26%	29%	23%	14%	3.09

The above results show that most students had generally positive or neutral attitudes about the WBT technique. Out of the 21 questions, 15 questions receive an average score of 3 or higher. The students knew what they should do for Micro-teaching and Attention-Getter (Scores are 3.63 and 3.34 respectively).

The data was entered into SPSS version 22 and the Cronbach's Alpha (CA) was calculated. The CA is a measurement of reliability. It measures the degree to which a group of related items are measuring the same underlying construct. The generally accepted criteria is that if CA of a group of items is greater than or equal to 0.70, the group of items are measuring the same underlying construct (Hair, 2011). If the CA is between 0.65 and 0.69, it is marginally accepted that the group of items are measuring the same underlying construct (Hair, 2011). Based on these criteria, the scores of related items and the combined average scores are listed in Table 2.

Table 2 Cronbach's Alpha and Average Score of the Questions

Technique	Question	Cronbach's Alpha	Combined Average Score
Micro-Teaching	I participate actively.	0.561	
	I try to teach another student.		
	It makes the lesson more interesting.	0.890	2.85
	It is fun.		
	It helps me understand the contents.	0.681	3.52
	I actually learn more when I teach others.		
	It helps me prepare for project presentation.	0.814	3.09
	It helps me express myself better at work.		
	I have no trouble in finding someone to teach.	0.762	3.46
	There is always someone willing to teach me.		
	I want the lecturer to use it more frequently	0.697	2.93
	I suggest it be used next year.		
Attention Getter	When the lecturer says "Class", I say "Yes".	0.811	3.30
	I say "Yes" the way the lecturer says "Class".		
	I like the lecturer to use different voices.	0.569	
	It makes the lesson more interesting.		
	It helps me to get my attention back.	0.859	3.32
	It makes everyone to focus on the teaching.		
	The lecturer should use it more frequently.	0.874	3.0
	I suggest it be used next year		

For Micro-Teaching, the highest combined average score is 3.52 for the statements "It helps me understand the contents" and "I actually learn more when I teach others". This is important because the objective of the teaching is to equip students with the knowledge of the subject.

For "Attention-Getter", the highest combined average score is 3.32 for the statements "It helps me to get my attention back" and "It makes everyone to focus on the teaching". This is important in terms of classroom management because WBT involves peer-to-peer activities such as micro-teaching, and the classroom can get quite noisy and students may not be able to stop their activities and put their focus back on the teacher. The score shows that "Attention-Getter" is very effective in getting the student's attention back.



## 4 CONCLUSION AND FURTHER STUDIES

Although WBT originated from primary and secondary school education, the results of this single case exploratory study indicates that the WBT techniques of Attention-Getter and Micro-teaching can be effective when teaching top-up degree students. The author's own observations showed that most of the students did participate when the WBT techniques are used. Many students actually tried to teach each other in English, which is not their first language. However, there are also a few students who did not participate at all. Even when the students did not think that Micro-teaching is not fun, they agreed that they were able to learn more about the subject. They also agreed that Attention-Getter helped them to get their attention back on the teacher.

Another achievement of this research is the creation of a questionnaire. When measured by Cronbach's Alpha, 8 of the 10 groups of statements are found to be reliable in measuring the underlying constructs. The questionnaire can be improved and used by other education researchers to study the use of WBT techniques.

### Limitations

This is a single case exploratory study, so the results cannot be generalised to top-degree teaching in general. Also, as the author is inexperienced in using the techniques, the results may change after the author has improved his WBT techniques.

### Further Actions

The author plans to make the following improvements in the future:

- Anonymous Tracking
- Mime teaching
- Granular Timing

"Anonymous Tracking" means the author wants to compare the student's self-reported participation in the survey with the student's performance at the subject, without revealing the identity of the student to avoid bias. This will be an improvement over the current use of self-assessment such as "It helps me understand the contents" and "I actually learn more when I teach others". Also, it can help to find out if there is any correlation between participation and performance in formal assessment tasks.

"Mime teaching" means the author would allow students to rehearse silently how to teach their partner, without actually teaching their partners. This is in response to one of the answers to the open-ended question. The students said that they needed time to digest the contents before teaching another and that they needed more time for micro-teaching.

"Granular Timing" means the time allowed for each Micro-teaching will be pre-determined and make-known to students before the start of each Micro-teaching session. However, this is only feasible after the teacher has taught the subject and applied the WBT techniques many times.

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## Appendix – The Questionnaire

***Student's Perception of a New Teaching Strategy****Dear Students,*

*My name is Adam Wong. I am conducting a study on use of a new teaching strategy in top-up degrees. I would greatly appreciate if you can use a few minutes to complete this questionnaire about the subject of PM (Project Management) that you just finished this semester.*

*Your participation in this survey is entirely voluntary and confidential. Individual responses will not be identified in the final report. Your answers will not affect your grades in any way. For questions, please call me at 3746 0700 or send an email to [spklwong@speed-polyu.edu.hk](mailto:spklwong@speed-polyu.edu.hk).*

*Thank you,**Adam Wong*

For each of the following question, put a tick mark ✓ in the box that is the best answer. Select only one answer.						
1.	Age (as of today)	(Please enter a whole number such as 21)				
2.	What best describes your sub-degree (Higher Diploma or Associate Degree)?	<input type="checkbox"/> IT related <input type="checkbox"/> Non-IT related				
3.	What is the 5 <sup>th</sup> digit in your student number?	(Please enter a whole number from 0 to 9)				
In the following questions: <b>SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree</b>						
4.	During “Teach-OK”, I know what I should teach another student	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
5.	I participate actively in “Teach-OK”	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
6.	I try to teach another student in “Teach-OK”	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
7.	Teaching others makes the lesson more interesting.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
8.	Teaching others is fun.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
9.	Teaching others helps me understand the contents	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
10.	I actually learn more when I teach others	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
11.	Teaching others helps me prepare for the project presentation	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
12.	Teaching others helps me express myself better at work	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
13.	I have no trouble in finding someone to teach	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
14.	There is always someone willing to teach me	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>

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15.	<i>I want the lecturer to use “Teach-OK” more frequently in PM (Project Management).</i>	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
16.	<i>I suggest “Teach-OK” be used in PM next year</i>	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
17.	For “Teach-OK”, I suggest...					
18.	When the teacher says “Class”, I say “Yes” in reply.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
19.	I will say “Yes” in the same way the teacher says “Class”.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
20.	I like the lecturer to use different voices to say “Class-Yes”	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
21.	"Class-Yes" makes the lesson more interesting.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
22.	"Class-Yes" helps me to put my attention back to the lesson.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
23.	"Class-Yes" makes everyone to focus on the teaching.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
24.	The lecturer should use "Class-Yes" more frequently in PM.	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
25.	I suggest "Class-Yes" be used in PM next year	SA <input type="checkbox"/>	A <input type="checkbox"/>	N <input type="checkbox"/>	D <input type="checkbox"/>	SD <input type="checkbox"/>
26.	For "Class-Yes", I suggest...					
27.	Other suggestions for more interesting lessons in future					
Thank you for completing the survey and contributing to the research. Have a nice day!						
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--- End of Questionnaire ---						
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