Developments in Business Simulations and Experiential Learning, Volume 32, 2005

TEACHING PRACTICES: A CLUSTER ANALYSIS OF TEACHING STAFF IN HONG KONG

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ABSTRACT

The authors used three teaching dimensions: Information Technology Factor, Student Activity Factor, and Traditional Teaching Factor in classifying teaching staff into different teaching style groups with similar characteristics in their preferences of teaching methods using cluster analysis. They are Information Technology Group, Student Activities Group, Traditional Teaching Group, and All Adopted Group. Based on contingency table with chi-square test, certain characteristics among the teaching faculty staff can be identified among different faculties in Hong Kong.

Keywords: multimedia, teaching style, teaching practices

INTRODUCTION

Educators continue to search for different teaching practices that will contextualize learning and motivate their students to learn better and hopefully all these efforts could increase the number of students attaining mastery levels of achievement (Scheidet, 2003). As a matter of fact, students are getting exposed to the use of multimedia and their expectations of classroom teaching practices will tend to vary. Snyder and Vaughan (1998) in their previous study on student expectations on multimedia indicated that students that had used multimedia before would prefer to have such included in their ideals of the optimal classroom teaching practices.

As discussed by other researchers (Kuehn, 1994, Ramarapu, Cites & Overby, 1996, Snyder & Vaughan 1998), programs based on computer-assisted instruction and multimedia tend to be popular in education. The importance of multimedia is used in information presentation and the coordination of all these audio-visual technologies combined to apply in the medium of multimedia (Bruder, 1991, Synder, 1996, Snyder & Vaughan, 1996, Snyder & Vaughan, 1998). In the previous Hong Kong study by Chang, Choi, Alice, and Ng in 2004 on teacher expectations of classroom teaching practices, three common factors: Information Technology Factor, Student Activity Factor, and Traditional Teaching Factor were identified for both current and ideal teaching practices. These three independent factors represented the principle dimensions of teaching methods. Based on these dimensions, the authors in this study continue to examine Hong Kong teaching staff expectations of classroom teaching practices using cluster analysis.

DATA COLLECTION

A modified survey questionnaire in Multimedia and Student Expectations by Snyder and Vaughan (1998) and Chang, Choi, Chu, and Ng (2004) was used in this study. The authors used the modified instrument to conduct with colleagues in six faculties of The Hong Kong Polytechnic University. These faculties are Faculty of Applied Science & Textiles, Faculty of Business & Information Systems, Faculty of Communication, Faculty of Construction & Land User, Faculty of Engineering, and Faculty of Health & Social Studies. A total of 1,025 questionnaires were administered. Of the 124 responses received, 122 usable questionnaires were analyzed. The followings are the breakdown of responses among different faculties: (1). 38 responses were from the Faculty of Applied Science & Textiles; (2). 25 were from Faculty of Communication; (3). 21 were from the Faculty of Business & Information System; (4). 14 were from Faculty of Engineering; 12 were from Faculty of Construction & Land User; and 12 were from Faculty of Health & Social Studies).

The survey instrument consisted of 36 questions on the subject of current classroom teaching practice and student ideal classroom teaching practice as well as 6 demographic and general questions. Each question was to be answered with a five-point Likert scale – (5) Extensively, (4) Periodically, (3) Occasionally, (2) Rarely, and (1) None at all. Please refer to the survey questionnaire listed in the Appendix one.

RESULTS & DISCUSSION

Eighteen variables for current and ideal classroom teaching practice by academic staff in The Hong Kong Polytechnic University were recorded and factor analysis was used to explore the common factors among the eighteen variables. The authors used the Principal Component extraction method and Varimax rotation method to analyze the data. Results were displayed in table 1 and 2.

Table 1: Factor Result of Current Classroom Teaching Practice

Rotated Component Matrix[a]

	Component		
	1	2	3
C Lecture			.858
C handouts or outlines			.652
C class discussions		.820	
C in-class exercise		.615	
C outside classroom assign		.638	
C group activities		.856	
C student presentation		.699	
C projector & transp			.709
C video		.538	
C presentation software	.629		
C e-mail	.654		
C computer projects	.793		
C computer simulations	.658		
C computer act in class	.737		
C internet resources	.720		
C world wide web	.666		
C teleconferencing	.482		
C distance learning			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Table 2: Factor Result of Ideal Classroom Teaching Practice

Rotated Component Matrix[a]

	Component		
	1	2	3
I Lecture			.777
I handouts or outlines			.759
I class discussions		.714	
I in-class exercise		.633	
I outside classroom assign		.680	
I group activities		.798	
I student presentation		.673	
I projector & transp			.770
I video		.459	
I presentation software	.559		
I e-mail	.733		
I computer projects	.792		
I computer simulations	.800		
I computer act in class	.803		
I internet resources	.755		
I world wide web	.727		
I teleconferencing	.528		-.452
I distance learning	.579		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Three independent factors were extracted from the variables of teaching methods: Information Technology Factor; Student Activity Factor; and Traditional Teaching Factor. These three factors represented the principal dimensions of teaching methods. Lectures in this study can be classified into different teaching style groups with different emphasis are respectively named as (1) Information Technology Group, (2) Student Activities Group, (3) Traditional Teaching Group, and (4) All Adopted Group with similar characteristics in their preferences of teaching methods using K-Means cluster analysis. The final number of clusters was determined by considering the ANOVA results of the respective clustering variables, the size of each cluster, and the distinctive nature of the clusters.

Table 3 and Table 4 shows the cluster centres with their factor scores in current and ideal teaching practices. The sample here consists of a mix of respondents from different departments with different preferences for their teaching practices.

In the case of their current teaching practices (Table 3), the Traditional Teaching Group appears to be the largest group among the rest of the clustering groups. This implies that traditional teaching method such as lecture, written handouts or outlines, class discussions, outside classroom assignments, and student presentations etc, is still used and adopted extensively by most of the Hong Kong faculty members.

As for the ideal teaching practices (Table 4), the Information Technology group becomes the largest group. Indeed, more faculty members tend to believe that Information Technology would be helpful and effective for their teaching practices in the future.

Table 3 **Final Cluster Centers**

	Cluster			
	1	2	3	4
C IT Factor	.86546	-.64808	-.57214	.22062
C Student Act Factor	-.65111	.93694	-.60809	.76884
C Trad Teach Factor	-.64354	-1.03600	.53041	.59462

Number of Cases in each Cluster

Cluster	1	24
	2	18
	3	38
	4	30
Valid		110
Missing		14

Table 4 **Final Cluster Centers**

	Cluster			
	1	2	3	4
I IT Factor	.60762	-1.22970	-.38299	.65528
I Student Act Factor	-.29290	.81912	-.90296	.79804
I Trad Teach Factor	-.93332	-.39246	.58837	.83597

Number of Cases in each Cluster

Cluster	1	34
	2	21
	3	31
	4	26
Valid		112
Missing		12

The authors wish to know if the clustered faculty members actually came from a certain age group, rank in university, gender, and different faculties. Thus, after classifying the teaching faculty staff using the three dimensions of teaching methods, each of the faculty members was assigned a membership number. Using contingency table with chi-square test, the authors are able to distinguish certain characteristics among the teaching faculty staff.

Results show that teaching staff from Faculty of Applied Science and Textiles (FAST) tends to use more Traditional Teaching Method (count = 19), while teaching staff from Faculty of Engineering (FENG) prefers to use Information Teaching Method (count = 7). In Faculty of Health & Social Science (FHSS), teaching staff tend to adopt more of Student Activity Method (count = 7). As a matter of fact, this is true under the current teaching preferences (Table 5).

Table 5 **C Cluster member * Faculty Crosstabulation**

			Faculty				
			Faculty of Applied Science & Textiles	Faculty of Engineering	Faculty of Business & Information Systems	Faculty of Health & Social Studies	Total
C Cluster member	IT gp	Count	6	7	5	3	21
		Expected Count	8.3	3.1	4.7	5.0	21.0
	Stud Act gp	Count	3	0	4	7	14
		Expected Count	5.5	2.0	3.1	3.3	14.0
	Trad Teach gp	Count	19	2	6	5	32
		Expected Count	12.6	4.7	7.2	7.6	32.0
	All high	Count	7	4	5	6	22
		Expected Count	8.7	3.2	4.9	5.2	22.0
Total		Count	35	13	20	21	89
		Expected Count	35.0	13.0	20.0	21.0	89.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.495[a]	9	.015
N of Valid Cases	89		

a. 9 cells (56.3%) have expected count less than 5. The minimum expected count is 2.04.

The Chi-square tests for independence between the 'cluster membership' of current and ideal teaching practices and the demographic data were performed. It was found that membership of the four teaching style groups was actually independent of the age, rank and gender. The only significant case is the dependency between the faculty members' belongings and the teaching style group as shown in Table 5.

In their ideal teaching practices, their style of teaching practices are quite uniformly distributed across all faculties. Please refer to table 6 below for details.

Table 6 **I Cluster member * Faculty Crosstabulation**

			Faculty				
			Faculty of Applied Science & Textiles	Faculty of Engineering	Faculty of Business & Information Systems	Faculty of Health & Social Studies	Total
I Cluster member	IT gp	Count	6	5	7	8	26
		Expected Count	9.9	3.8	6.1	6.1	26.0
	Stud Act gp	Count	7	2	2	5	16
		Expected Count	6.1	2.3	3.8	3.8	16.0
	Trad Teach gp	Count	11	3	8	4	26
		Expected Count	9.9	3.8	6.1	6.1	26.0
	All high	Count	10	3	4	4	21
		Expected Count	8.0	3.1	5.0	5.0	21.0
Total		Count	34	13	21	21	89
		Expected Count	34.0	13.0	21.0	21.0	89.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.486[a]	9	.690
N of Valid Cases	89		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is 2.34.

CONCLUSION

The study reported a continuation of analysis on Hong Kong teaching staff teaching practices. Lectures in this study can be classified into different teaching style groups with different emphasis are respectively classified as (1) Information Technology Group, (2) Student Activities Group, (3) Traditional Teaching Group, and (4) All Adopted Group with similar characteristics in their preferences of teaching methods using cluster analysis.

As this is one of the continuation studies on the classroom teaching practices in presenting course information to students by their lectures, future research is expected to expand on how multimedia could actually impact on student learning experiences on a longitudinal basis. An extension of this research is to explore more in depth on the issue of how all these new technology combined in multimedia could benefit the teaching and learning in the classroom setting as Townsend & Townsend suggested the six benefits of using multimedia in teaching in 1992.

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Appendix One – Survey Questionnaire

The questions 1 to 18 for current classroom teaching practice and questions 19 to 36 for ideal classroom teaching practice.

I currently use the following techniques to present my course information:

		Extensively (Almost Daily)	Periodically (Once/wk)	Occasionally(6-7 times/qtr)	Rarely (1-2 times/qtr)	None at all
1.	Lecture	❑	❑	❑	❑	❑
2.	Written handouts or outlines	❑	❑	❑	❑	❑
3.	Class discussion	❑	❑	❑	❑	❑
4.	In-class exercises	❑	❑	❑	❑	❑
5.	Outside classroom assignments	❑	❑	❑	❑	❑
6.	Group activities in class	❑	❑	❑	❑	❑
7.	Student presentations	❑	❑	❑	❑	❑
8.	Overhead projector and transparencies	❑	❑	❑	❑	❑
9.	Videos	❑	❑	❑	❑	❑
10.	Computer presentation software	❑	❑	❑	❑	❑
11.	Electronic-mail	❑	❑	❑	❑	❑
12.	Computer projects	❑	❑	❑	❑	❑
13.	Computer simulations	❑	❑	❑	❑	❑
14.	Computer activities in class	❑	❑	❑	❑	❑
15.	Internet Resources	❑	❑	❑	❑	❑
16.	World Wide Web	❑	❑	❑	❑	❑
17.	Teleconferencing	❑	❑	❑	❑	❑
18.	Distance Learning	❑	❑	❑	❑	❑

In my ideal classroom, I would use the following techniques to present course information:

	Extensively (Almost Daily)	Periodically (Once/wk)	Occasionally(6-7 times/qtr)	Rarely (1-2 times/qtr)	None at all
19. Lecture	❑	❑	❑	❑	❑
20. Written handouts or outlines	❑	❑	❑	❑	❑
21. Class discussion	❑	❑	❑	❑	❑
22. In-class exercises	❑	❑	❑	❑	❑
23. Outside classroom assignments	❑	❑	❑	❑	❑
24. Group activities in class	❑	❑	❑	❑	❑
25. Student presentations	❑	❑	❑	❑	❑
26. Overhead projector and transparencies	❑	❑	❑	❑	❑
27. Videos	❑	❑	❑	❑	❑
28. Computer presentation software	❑	❑	❑	❑	❑
29. Electronic-mail	❑	❑	❑	❑	❑
30. Computer projects	❑	❑	❑	❑	❑
31. Computer simulations	❑	❑	❑	❑	❑
32. Computer activities in class	❑	❑	❑	❑	❑
33. Internet Resources	❑	❑	❑	❑	❑
34. World Wide Web	❑	❑	❑	❑	❑
35. Teleconferencing	❑	❑	❑	❑	❑
36. Distance Learning	❑	❑	❑	❑	❑

1. During the last calendar year, I used a computer an average of

   ❑ 3 hours or less per week ❑ 6 to 10 hours per week

   ❑ 4 to 6 hours per week ❑ more than 10 hrs per week

2. Do you have a computer at home?

   ❑ Yes ❑ No

3. Gender:

   ❑ Male ❑ Female

4. Age:

   ❑ 20 - 29 years old ❑ 40 - 49 years old ❑ 60 - 69 years old

   ❑ 30 - 39 years old ❑ 50 - 59 years old ❑ 70 years or older

5. Please indicate your rank:

   ❑ Assistant Professor ❑ Associate Professor ❑ Professor

   ❑ Assistant Lecturer ❑ Lecturer ❑ Senior Lecturer

   ❑ Principle Lecturer ❑ Assistant Professor II

6. Please indicate the Faculty you teach in:

   ❑ Faculty of Applied Science & Textiles ❑ Faculty of Business & Information Systems

   ❑ Faculty of Communication ❑ Faculty of Construction & Land User

   ❑ Faculty of Engineering ❑ Faculty of Health & Social Studies

Thank you