A Method of Developing Learning Outcomes that Involves Students' and Teachers' Participation

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Abstract

This paper reports a two-part study to explore various graduate outcomes for courses offered by an academic department of a professional teacher training institute in Hong Kong. The method involves a Delphi study through which academic staff identified outcomes for all and any courses offer by the department. The outcomes gathered were reduced into a list by the research team with consensus sought from staff members. A survey was designed to invite responses from all students and staff of the department to rate the relative importance of the found outcomes. 86 students and 16 staff members made responses to the survey. Factor analysis was used to reduce the large numbers of outcomes suggested. A 5-factor solution with acceptable goodness-of-fit properties was proposed which covers *Teacher Professionalism, Student-Centered Practices, Assessment and Evaluation, Curriculum Planning, and Curriculum Theory and Knowledge*. The data suggested that students' conception of learning outcomes largely resembled the conceptions of their teachers, though staff members show a tendency to distinguish the factor areas more robustly. The results are being used to inform course development within the department.

Outcome-based approach to teaching and learning in higher education

Outcome based approaches (OBA) to learning and teaching (Quality Assurance Council, 2008; University Grants Committee, 2008) or outcome based education (OBE) (Spady, 2002; Tavner, 2005) has become a leading topic of higher education reform in Hong Kong (authority needed). OBA is meant to be based on a student-centred orientation to learning and teaching.

Hence, the key to implementing OBA is to get the intended outcomes right. Intended outcomes that are sufficiently clear and well particularized communicate to students what the teachers expect from them in terms of knowledge and performance. Teaching and learning activities, as well as assessment, follow directly from the learning outcomes to ensure a high level of 'alignment' from learning to learning outcomes, which is totally 'learner-oriented'.

However, there is another dimension to setting the right intended outcomes. It is the questions of deciding what should be the content in the learning outcomes and who make the decisions. Biggs and Tang (2007) suggest that teachers, being the 'content expert', are best able to decide on selecting the actual topics to teach, as it is 'obviously a matter of specific content expertise and judgment (p. 82). This issue, however, is perhaps not one that is best resolved through the expert determination of teachers in isolation. First, whether implicit or explicit, the setting of any standards (or

expected outcomes) influences the content covered in the curriculum. Different stakeholders can disagree substantially as to what is or is not suitable for inclusion in the curriculum, as the dispute over the American history standards illustrate (Lewis, 1995; Marzano & Kendall, 1997). Second, a major criticism directed at OBE in US in 1990s was that the standards were often vague and abstract, and included affective and value-laden concepts that are hard to comprehend or measure (Spady, 1994). If OBL is to be effective in improving student learning, it is crucial that students are able to fully appreciate what is expected of them. Involving them in the setting of the outcomes is thus help produce outcomes that are both more acceptable and comprehensible to them.

Despite the ideological debates, few empirical studies have been found on how OBA is practiced and how statements for learning outcomes are constructed. An earlier classroom study by Drew (Drew) has experimented the involvement of students in curriculum development in a Liberal Studies course in Hong Kong, by using a series of learner-oriented activities including brain storming and discussion of learning topics, locating project issues, and suggesting group activities. Drew arrived at the conclusion that students were potential contributors to course development if they were given freedom and appropriate encouragement. Rust, Price and O'Donovan (2003) found that university students were able to appreciate the visible criteria of

assessment such as structure, presentation and referencing but had difficulty in applying the higher-order criteria such as analysis and evaluation. these two studies suggest that students have some insights into learning objectives or outcomes but may lack the depth of knowledge to be the sole judge of valid outcomes. It is also worth considering that, in the field of teacher education, senior undergraduate students have had some practical experience of being teachers and so may have gleaned insights into the relative importance of various learning outcomes relative to the task of becoming a professional teacher. Hence, it would appear useful to consider not only the views of instructors but also those of higher education students in formulating outcome statements in a teacher education setting.

The Study

This paper presents a study into the views of both students and instructors as to the nature of learning outcomes for an academic department in a teacher education institute in Hong Kong. This paper reports results from a two-stage investigation; that is, Stage 1 was a multi-round Delphi survey using instructors to identify outcomes for the department and Stage 2 was a factor-analysed survey of the relative importance of departmental outcomes with responses from both senior undergraduate students and instructors in the department. The goal of the study was to elicit from both groups their views of valued outcomes for the department and to consider the nature of

discrepancies, if any, between the two groups. The long-term goal of the study was to inform potential changes to intended outcomes or course design within the department. Assuming that the courses taught in the department accurately reflected the valued outcomes of the department instructors, it was anticipated that students would endorse similar outcomes to the instructors. However, given the considerable expertise of the instructors, it was expected that they would make greater distinctions in the relative importance of the various outcomes categories of the department.

Study Context

The Department of Curriculum and Instruction had just created a new set of formal generic and high-level outcomes for itself. These statements had been developed by a committee of academic staff and were endorsed by a department meeting. The outcomes were:

1. Demonstrate an understanding of the key concepts, theories and policies in curriculum studies (including areas of Curriculum, Assessment and Teaching and Learning (NOTE: "Teaching and Learning" includes concepts like classroom management, teaching strategies, managing diversity, creativity and becoming a professional teacher).
2. Apply professional knowledge, key concepts, and skills of curriculum studies in the classroom and school contexts.

3. Explore the connection between theories and practices in curriculum studies.

4. Adopt a positive and caring attitude and deploy effective strategies in creating a conducive teaching and learning environment to meet the needs of diverse learners.

5. Identify the characteristics of local contexts in relation to the international trends of development in curriculum studies.

6. Reflect on current issues and problems in curriculum studies and propose solutions.

Participants

Academic Staff. All (24) teaching staff in the department were invited to participate in both the Delphi and survey studies. The two rounds of the Delphi study elicited responses from seven and 12 staff respectively. Responses to the digital survey were obtained from 16 academic and teaching fellows in the Department of Curriculum & Instruction. While, 16 is a very small sample, this is a 70% return rate and provides a margin of error of approximately 14%. Hence, in the absence of a complete census, some credibility has to be given to the results of this sample as an indication of what the department's academic staff believe to be important.

Students. All final year graduating students from BEd and PGDE programmes (n ~1000) who had one of the department core courses in their programme were

invited to participate in the survey study. A total of 86 students responded to the survey, with a response rate of about 10%. About 80% of respondents were from PGDE programmes, the rest from BEd programmes. 90% of the respondents studied in a full-time mode. Most of the students (about 80%) have no prior formal teaching experience.

Study 1: The Delphi Study of Department Outcomes

A major aim of the present study was to ensure that all possible legitimate outcomes were identified and to establish consensus among departmental members as to the department's outcomes. The Delphi method, a structured group communication process designed to generate consensus among a group of individuals, was employed (Kerr, Aronoff, & Messé, 2000). In a typical Delphi study, a panel of experts (in this case the department instructors) contributes information and expert knowledge individually to the issue under study to a central moderator who then collates the responses and reflects it back to all panelists for further response. Anonymity for individual respondents is maintained. The core characteristic of the Delphi method is that participants are given multiple opportunities to examine an issue and respond to other participants' opinions, which fosters independent and considered thought formation processes rather than any biases associated with face-to-face communication processes (Linstone & Turoff, 1975). In the present study, three

rounds of data collection were conducted.

An email was sent to all academic staff in the department informing them of the objectives of the research project. Staff were invited to provide 'at least 3 items' in response to the question "What are the learning outcomes you find important regarding the courses delivered by our Department?". Just 7 out of 24 teaching staff replied and provided outcome statements. The 7 responses were compiled into preliminary thematic groups to aid comprehension. The compiled list of results was merged with the official departmental outcomes and sent to all staff members who were asked to add any important outcomes that may have been left off the list, evaluate the appropriateness of each group of outcomes, and suggest a title for each group of outcomes, assuming the grouping was legitimate. Responses were received from 12 academic staff. Modifications to the statements and groupings were made and 5 groups of outcomes were generated, as follows:

1. Curriculum studies: theories and knowledge
2. Curriculum studies: applying pedagogical skills
3. Assessment
4. Lesson and curriculum planning
5. Attitudes, values and skills of a professional teacher / learner diversity

The grouped outcomes bore a good resemblance with the officially adopted departmental outcome statements developed by a committee of academic staff. The outcomes were:

1. Demonstrate an understanding of the key concepts, theories and policies in curriculum studies (including areas of Curriculum, Assessment and Teaching and Learning).

2. Apply professional knowledge, key concepts, and skills of curriculum studies in the classroom and school contexts.

3. Explore the connection between theories and practices in curriculum studies.

4. Adopt a positive and caring attitude and deploy effective strategies in creating a conducive teaching and learning environment to meet the needs of diverse learners.

5. Identify the characteristics of local contexts in relation to the international trends of development in curriculum studies.

6. Reflect on current issues and problems in curriculum studies and propose solutions.

Study 2: Survey of Department Students and Staff

Using the statements generated by the Delphi study, a web-based survey questionnaire was developed for both the teaching staff of the department and all final-year students who had taken at least one department core course in their degree. A total of 42 items for the five constructs were developed to cover all the important learning outcomes suggested by department staff. Nearly all outcomes provided by the department staff were written in English. However, since most students had Chinese as their mother tongue the items were translated into Chinese by the research team. Three bilingual language experts evaluated the functional equivalence (Jin & Nida, 2006) of each pair of items and minor modifications to the Chinese versions

were made after research team discussions.

The survey asked participants to indicate the importance of each outcome using a six-point positively-packed importance rating scale. Positively-packed scales have more positive options (i.e., slightly, moderately, mostly, and strongly important) than negative options (i.e., mostly and strongly unimportant) and are known to be appropriate when it is likely that participants will endorse all statements (Brown, 2004; Lam & Klockars, 1982).

Exploratory and confirmatory factor analysis were used to reduce the dimensionality of the 42 item questionnaire. A complication in conducting factor analysis is the expectation that there be 10 cases for each item (Costello & Osborne, 2005). Accurate simplification of the data was complicated by the low *N* relative to variables (i.e., ratio of approximately 2:1) and good models may have had poor fit because of this phenomenon. Parcelling of factors into mean scale scores permitted comparison of student and staff responses to the survey questionnaire. Comparison was carried out through nested multigroup confirmatory factor analysis which determines whether differences in responding between groups is attributable to chance (Vandenberg & Lance, 2000).

Findings

Statistical Analysis of Survey Questionnaire

Exploratory factor analysis was conducted using maximum likelihood extraction and oblique rotation. Initially, seven factors had eigenvalues greater than 1, but this was rejected since one factor only had 2 unique items and the first factor was not logically coherent. Restricting the extraction to six factors, was rejected because two factors had only two items with loading values >.30. A five factor solution was accepted because each factor had at least 5 items loading >.30 with logical coherence.

Confirmatory factor analysis of the inter-correlated, five-factor solution was conducted. A conceptual approach to model trimming was taken to ensure that the model most closely reflected the outcome intentions of the academic staff and was well-fitting to the student responses. After removing items that did not have strong logical coherence with their factor or which duplicated meanings, 28 items were identified as reflecting five outcome factors. The five-factor model had marginal to acceptable goodness-of-fit properties (N=86; k=28; χ^2 = 589.6; df = 340; χ^2/df = 1.73, p = .19; CFI = .86; gamma hat =.83; RMSEA =.093; SRMR =.066).

The five factors, their contributing items, and their conceptual sources are displayed in Table 1. As can be seen, only the Curriculum Theory and Knowledge factor was made up of items taken solely from its intended grouping (i.e., Curriculum studies: theories and knowledge). The Student-Centered Pedagogy factor had five out of seven items taken from the original outcome group of Attitudes, values and skills of a

professional teacher and learner diversity; while the Curriculum Planning factor had four out of five items taken from the original outcome group of Lesson and curriculum planning. Hence, we conclude that the measurement model of student responses to the survey questionnaire had robust alignment with three of the original five factors proposed by staff in the Delphi study.

Insert Table 1 about here

The factor inter-correlations (Table 2) ranged from moderate to strong (i.e., $.57 \leq r \leq .87$). These values indicated that while there was considerable overlap among the factors, there was much less overlap especially between the Student-Centred factor and all other factors (i.e., $.57 \leq r \leq .72$). The relatively low value of correlations (i.e., $r < .90$) supported the acceptance of the five factor model.

Insert Table 2 about here

To improve the cases to variable ratio closer to 10:1, the factor items were parceled into five mean scale variables for all items contributing to each factor, giving a ratio of about 17:1. The reduced model consisting of one factor with five parceled variables had excellent fit to the data (N=86; χ^2 =9.90; df = 5, p = .08; χ^2/df =1.98, p=.16; CFI = .98, gamma hat =.98; RMSEA =.107; SRMR =.028). The fit of the summed scale scores model suggests that the less-than-ideal fit results obtained for the 23 item, five-factor model is probably related to the low ratio of cases to variables.

Hence, we concluded that the five factors were a good summary of student categorization of the relative outcomes for the Curriculum and Instruction department.

Comparison of Student and Staff Responses to the Survey Questionnaire

In order to evaluate whether the student model applied equally to the instructors it was necessary to use the simplified one factor, five-item model as the basis of comparison. The fit indices of the two-group analysis were acceptable to good (Group 1 n=86 students; Group 2 n=16 staff; χ^2=17.37, df=10, p=.07; χ^2/df=1.74, p=.19; CFI=.98; gamma hat=.99; RMSEA=.086; SRMR=.028). While RMSEA was larger than conventionally expected for imputing configural invariance (i.e., RMSEA≤.05), the probability of the real value being less than .05 was p=.18 indicating that the true value was highly likely to meet the threshold for configural invariance. Hence, it was decided to proceed to testing for equivalent regression weights (i.e., metric equivalence). Constraining the regression weights to be equivalent for both groups did not disturb the fit of the model by more than chance (i.e., ΔCFI = .003); whereas, scalar equivalence for regression intercepts was rejected (i.e., ΔCFI = .044). This meant that the model (Figure 1) was not equivalent for the students and staff and that the two samples came from different populations.

Insert Figure 1 about here

It can be readily observed, despite constraining the models for equivalent

measurement weights, that the path loading to the Theory variable was notably different between staff and students; whereas all other values were reasonably similar. For staff the Theory factor was only weakly part (β=.35) of the same cluster of outcomes as the four other factors; whereas for students the path to the Theory factor was nearly twice as strong (β=.63). It was around this one factor that there appeared to be significant differences between staff and students in how they conceived of the outcomes for the Curriculum & Instruction department.

Further comparison of the two groups was carried out be examining the mean level of importance given to each of the five outcome scales (Table 3). The mean scores for both groups consistently exceeded 4.00 (i.e., moderately important). The difference in mean score between the groups was statistically significant for only one scale (i.e., Teacher Professionalism). Further evidence in similarity between staff and students can be seen in the identical rank order of mean scores for the five outcome types. However, the difference in mean score between 1st place (i.e., Teacher Professionalism) and last place (i.e., Curriculum Theory) was much larger for staff than students (i.e., Cohen's *d* about four times larger). Hence, as expected, the academic staff made a much clearer differentiation in the importance of the different outcome areas than the students.

Insert Table 3 about here

Discussion

This study developed a questionnaire about the importance of five major categories of departmental outcomes from a Delphi study of academic staff responses. The factor analysis of senior undergraduate student responses to the survey identified five factors which were reasonably similar in meaning to the five categories. Multi-group invariance testing of the model found that staff and students answered quite differently, especially around the Curriculum Theory factor. Analysis of variance of the five factor scores showed significantly different mean scores around the Teacher Professionalism factor. Furthermore, academic staff had much greater variation in mean importance of the five factors than the students showed.

The place of curriculum theory in the outcomes of the department in the view of the staff is of great interest. The Curriculum Theory factor had a much weaker loading on the general departmental outcomes factor for staff than students and received a significantly weaker endorsement from the staff relative to the much more highly valued Teacher Professionalism factor. Clearly, it is worthwhile to further investigate the role played by the Theory factor in the Curriculum and Instruction curriculum.

It is plausible that the greater distinction between factors by academic staff is entirely consistent with their much greater understanding of the relative importance of the various factors. However, the lack of similar distinction by the students may be a

function of departmental course design rather than lack of expertise. For example, if the outcomes, teaching and learning activities, and assessments of the various departmental courses tend to place greater emphasis on the theoretical knowledge component rather than the teacher professionalism aspect, it is entirely plausible that students would not distinguish as strongly the relative importance of theory versus professional action. One way to examine this hypothesis would be to examine the focus of the departmental courses relative to these five factors. If few courses address the teacher professionalism factor then it is understandable that students would not give it as high a rating as the staff.

Nonetheless, in general the students gave very similar ratings to the academic staff. This validates in part the notion of obtaining feedback from students about the desired outcomes of academic coursework.

References:

Biggs, J., & Tang, C. (2007). *Teaching for quality learning at university: what the student does*. Maidenhead: McGraw-Hill.

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis [Electronic Version]. *Practical Assessment Research & Evaluation, 10* from http://www.pareonline.net/pdf/v10n17.pdf.

Drew, P. Y. (1992). Student participation and curriculum planning: A practice of student and teacher co-operation *Education Journal, 20*(2), 131-138.

Lewis, A. C. (1995). An overview of the standards movement. *Phi Delta Kappan, 76*, 744-750.

Linstone, H. A., & Turoff, M. (Eds.). (1975). *The Delphi method: techniques and applications*. Reading, MA: Addison-Wesley.

Marzano, R. J., & Kendall, J. S. (1997). *The fall and rise of standards-based education: A National Association of School Boards of Education (NASBE) issues in brief.* Aurora, CO: Mid-continent Research for Education and Learning.

Quality Assurance Council. (2008). *Quality Assurance Council audit manual.* Hong Kong University Grants Committee.

Rust, C., Price, M., & O'Donovan, B. (2003). Improving students learning by developing their understanding of assessment criteria and processes. *Assessment & Evaluation in Higher Education, 28*, 148-164.

Spady, W. (1994). *Outcomes-based education: Critical issues and answers*. Arlington, VA: American Association of School Administrators.

Spady, W. G. (2002). Outcome based education. In J. W. Guthrie (Ed.), *Encyclopedia of Education* (2nd ed., Vol. 5, pp. 1827-1831). New York: Macmillan Reference.

Tavner, A. C. R. (2005). Outcomes-based education in a university setting [Electronic Version]. *Australasian Journal of Engineering Education* from http://www.aaee.com.au/journal/2005/tavner05.pdf.

University Grants Committee. (2008). *Task Force on Outcome-based Approaches in Student Learning (OBATF).* Hong Kong University Grants Committee. July 27, 2010, Retrieved from http://www.ugc.edu.hk/eng/ugc/oba.htm

Table 1. Trimmed C&I Learning Outcomes Model: Conceptual approach

Original Factor	Items	CFA loadings
Factor 1 Teacher Professionalism (*Prof. Teach*)		
D	q42 Develop and communicate appropriate learning objectives	.88
S	q34 Be able to apply teaching strategies effectively	.88
S	q33 Be able to conduct whole-class teaching, group work and individual instruction	.85
D	q32 Be an ethical and responsible teacher	.80
A	q5 Be able to set appropriate learning objectives for effective assessment of different educational purposes	.77
D	q1 Be able to reflectively evaluate one's own teaching and learning practices	.58
Factor 2 Curriculum Theory and Knowledge (*Theory*)		
T	q10 Appreciate the relationships between Hong Kong society and school curriculum, teaching, and assessment	.79
T	q9 Develop theoretical knowledge about curriculum design	.77
T	q28 Understand how Hong Kong curriculum, teaching, &	.69

Original Factor	Items	CFA loadings
	assessment policies and practices reflect global trends	
T	q13 Understand the key government policies related to curriculum, teaching, & assessment	.65
T	q11 Develop theoretical knowledge of assessment	.58
Factor 3 Student-Centered Pedagogy (Stu. Cen.)		
A	q40 Be able to create and administer assessments that are suitable for a diverse range of learners	.84
D	q41 Be able to create equitable learning opportunities for diverse learners	.82
D	q27 Be able to cater for learner diversity	.82
D	q24 Appreciate and accept learner diversity	.82
D	q4 Be able to use teaching practices that cater for a diverse range of learners	.77
D	q16 Be caring and considerate towards students	.73
S	q8 Be able to use curriculum theories to create and implement learner-centered classroom practices	.58
Factor 4 Assessment and Evaluation (*Evaluate)*		

Original Factor	Items	CFA loadings
A	q36 Be able to understand and use appropriate assessment tools to evaluate learners' holistic development	.89
S	q39 Be able to apply knowledge about teaching and learning in the classroom effectively	.83
P	q19 Be able to design curricula that benefits learner's development	.79
A	q35 Develop and communicate appropriate criteria for evaluating learning	.76
A	q15 Be able to report accurately and effectively about student progress to parents, students, and administrators	.72
Factor 5 Curriculum Planning (*Cur. Plan.*)		
P	q30 Be able to create learning units that are suitable for diverse range of learners	.84
P	q25 Be able to arrange lessons in an appropriate sequence	.81
P	q38 Be able to create lessons that are aligned to the curriculum	.76
P	q29 Be able to write clear teaching plans for lessons	.71

Original Factor	Items	CFA loadings
A	q18 Be able to assist students to achieve their best on public or end-of-year examinations	.65

Note. Key to Original Groupings: T=Curriculum studies: theories and knowledge; S=Curriculum studies: applying pedagogical skills; D=Attitudes, values and skills of a professional teacher / learner diversity; A=Assessment; & P=Lesson and curriculum planning.

Table 2. Inter-factor correlations for the Importance of Outcomes Derived from Student Responses

	Outcome Importance Factors				
Factors	1	2	3	4	5
1. Teacher Professionalism	—				
2. Curriculum Theory and Knowledge	.85	—			
3. Student-Centered Pedagogy	.57	.61	—		
4. Assessment and Evaluation	.87	.83	.64	—	
5. Curriculum Planning	.84	84	.72	79	—

Table 3. The Importance of Outcome Factor statistics for students and staff

Scale	Student			Staff			Difference		
	M	*SD*	Rank	*M*	*SD*	Rank	*F*	*p*	Cohen's *d*
1. Teacher Professionalism	4.62	.90	1	5.20	.48	1	6.18	.02	.80
2. Curriculum Theory and Knowledge	4.31	.85	5	4.31	.65	5	.001	.98	.01
3. Student-Centered Pedagogy	4.54	.89	2	4.88	.56	2	2.16	.14	.46
4. Assessment and Evaluation	4.46	.89	3	4.76	.40	3	1.80	.18	.43
5. Curriculum Planning	4.38	.93	4	4.68	.63	4	1.50	.22	.38

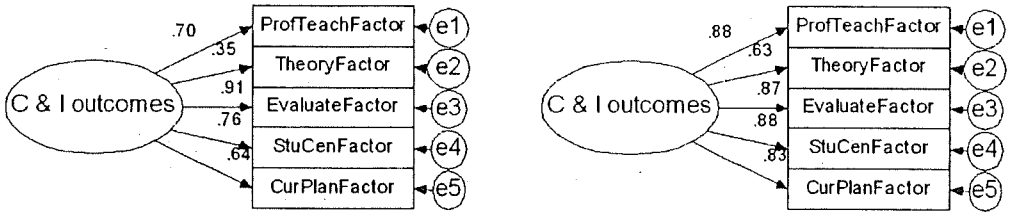
Effect size for difference between highest and lowest ranked factor:

Cohen's d = .38 Cohen's d = 1.56

Note. Student n=86; Staff n=16.

Figure Captions

Figure 1. Conceptually trimmed single factor model of C&I department outcomes.



A=Students **B**=Staff

Note. Values shown are after constraining measurement weights to be equivalent.