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REVIEW ARTICLE

Pain and Joy in Implementation of Curriculum Reform: The University of Hong Kong Medical Faculty Experience

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ABSTRACT

The University of Hong Kong (HKU) Li Ka Shing faculty of medicine (established 1886), introduced curriculum reform in 1997, and implemented problem-based learning (PBL) as a part of hybrid curriculum. The reform made significant modifications to time-tabling including reorganization of basic sciences program into system-based blocks structured around PBL tutorials, lectures, practicals, demonstrations and relevant anatomy dissections. Assessment was also integrated at the faculty rather than departmental-based for the first three medical years.

During the reform, apprehension and concern in relation to outcomes and quality of graduates were raised, particularly on students' basic science foundation and whether students would be able to cope with demands related to PBL. To address these concerns, a study was undertaken to evaluate new graduates' performance from two aspects: (1) knowledge-based performance before their internship, and (2) on-the-job performance during their internship, under the old and new curriculum.

To evaluate intern's knowledge-based performance, a written test consisting of multiple choice questions and short answer questions, based on combination of basic sciences knowledge and clinical scenarios was given to two cohorts of old (2000–2001) and new (2002–2003) graduates. To evaluate graduate's on-the-job performance, scores from internship performance over the past 9 years were retrieved from the faculty. Results from the first 2 years of new curriculum graduates and the last two cohorts of old curriculum graduates demonstrated that they had similar basic sciences knowledge-based performance. On the other hand, new curriculum graduates did significantly better in their on-the-job internship performance. Areas of strength within our graduates were attitude to staff, sense of responsibility and attitude to patients.

Keywords: Curriculum reform, Problem-based learning, University of Hong Kong, Medical education.

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INTRODUCTION

A graduation dinner organized by the medical students of faculty of medicine, The University of Hong Kong (HKU) on 27 June 2002 had a special significance. It was the first batch of the Bachelor of Medicine and Bachelor of Surgery (MBBS) graduates, who joined new medical curriculum in 1997. A remarkable evening—reflective, enjoyable, and above all, filled with an air of certain sense of achievement for both students and faculty. Students recalled their pioneer spirits undergoing problem-based learning (PBL) tutorials, special study modules, continuous assessments, evaluation and also apprehension about the outcomes.

Students, who joined the new curriculum had put their trust into the faculty's wisdom in changing course structure and innovative learning methods. The journey from implementation to consolidation of the new and innovative curriculum was of course full of challenges, with pain and joy.

The stimulus for reform originated from a document 'Tomorrow's doctor', published by General Medical Council of United Kingdom.[1] A review undertaken at the medical faculty of HKU in 1993 also noted:

- Teaching was compartmentalized with no integration
- Students were too passive
- Curriculum was overcrowded
- There was lack of emphasis on primary healthcare issues
- Teachers taught more than necessary
- There was too much emphasis on big bang examinations
- The curriculum was too rigid and didactic
- Student self-learning was not encouraged.

Once the faculty approved implantation of reforms, dean of the faculty made 'failure is not an option' as a slogan for implementation; and reform process played out a real-life drama of proposals, counter proposals, deliberation, skepticism, disappointment, compromise, excitement, planning, implementation, hope and, above all, determination to succeed.[2]

Facing the Challenges

Staff Development Programs

Staff development workshop under auspices of Medical Education Unit [now Institute of Medical and Health Sciences Education (IMHSE)] were organized and run in a seamless manner; to train all basic sciences and clinical teachers in curriculum planning PBL tutorship, PBL case-writing, scenario-based exam questions, objective structured clinical education (OSCE), integrated lectures, simulated communication and clinical skills, academic counseling and effective continuous assessment, etc.

Curriculum Change to Integrated System Blocks and Clerkships

Old curriculum containing preclinical, paraclinical and clinical syllabi was changed to integrated system blocks. This change needed collaboration and participation of all basic and clinical departments working together to shortlist essential lectures, PBL tutorials and practicals, ultimately resulting in reduction of large number of lectures (Table 1).

Problem-based Learning

Concept of problem-based learning tutorials was fairly unknown and challenging to many staff members, particularly to basic science teachers who had to facilitate tutorials based on case scenarios. On other hand, clinical staff erroneously felt that they already 'teach' by PBL method, not realizing that the process of PBL meant to direct students to 'active learning'; not teacher-centered passive learning. Massive efforts were put into action in case-writing and PBL tutor workshops to highlight the process of facilitation in PBL. Nearly, 200 teachers became certified PBL tutors over the period of 6 months. In addition, four PBL cases were written for each system blocks to bring about integration of anatomy, physiology, biochemistry, pharmacology, pathology, microbiology and clinical sciences.

Physical Facilities

Faculty now has a 'state of art' faculty of medicine building, inaugurated in 2002, with academic, administrative and research blocks, all in one complex. Academic block provides a generous space to purpose-built PBL tutorial

Table 1: Integrated system-based curriculum structure

Year 1							
September		*January*				*May*	*June*
Introduction to health and disease block		Formative exam	System-based course			First exam	SSM
			Respiratory system	Cardiovascular system	Gastrointestinal system		
Year 2							
September						*May*	*June*
System-based course						Second exam	SSM
Urogenital system	Musculoskeletal system	Central nervous system	Head and neck system	Hematology/ immunology system	*Endocrine system*		
Year 3							
Late-August	*Mid-October*	*January*	*Mid-March*			*May*	*June*
Integrated block	Formative exam	Junior clerkship				Third exam	SSM
		Medicine-related block	Surgery-related block	Multidisciplinary block			
Year 4							
Mid-July			*January*				*June*
Senior clerkship			Specialty clerkship				
General medicine	Surgery	Multidisciplinary	Medicine	Obstetrics and gynecology			Pediatrics
Year 5							
Mid-July			*January*	*March*		*April*	*June*
Specialty clerkship			Revision	Final examination		SSM	Pre-internship program
Psychiatry	Surgery	F med/orth Sur/private					

rooms, clinical and virtual reality skills laboratories for medical and nursing students, computer assisted learning laboratory with nearly 50 internet ports, a conference center, seminar rooms, teleconference facility, exhibition hall, student amenities and a modern library. The facility, funded by Hong Kong jockey club, University of Hong Kong and many alumni and friends of the faculty has truly provided a conducive and excellent environment to complement learner-centered education philosophy.

Outcome Evaluation

There was some apprehension and concern in relation to outcomes and quality of graduates, who would undergo these reforms, particularly basic science foundation that students would have achieved through reduced number of didactic lectures to around 60% and selective practicals. Opinions were also expressed that new graduates may be unable to cope with demands related to PBL. To address these concerns, a study was undertaken to evaluate graduates' performance from two aspects: (1) knowledge-based performance before the internship, and (2) on-the-job performance during their internship, under the old and new curriculum.

Evaluation of Graduates' Performance before the Internship

Evaluation of students' performance was carried out during the pre-internship program of 3 weeks held in the month of June for all graduates after their final examination and just before the beginning of 1 year internship. A written test consisting of multiple choice questions (MCQs) and short answer questions, based on combination of basic sciences knowledge and clinical scenarios, was given to two cohorts of old and two cohorts of new graduates during their pre-internship program (Table 2).

Random samples of 60 MCQs of 'one best answer type' were selected to test students' knowledge in anatomy, physiology, biochemistry, pathology, microbiology and pharmacology in clinical context related to various body systems. The objective was to document adequacy or deficiency, if any, of basic sciences knowledge in new curriculum graduates as compared to old curriculum graduates when they complete the MBBS course.

Table 2: Number of interns attending written test

Curriculum	*Years*	*Number of interns*
Old	2000	143
	2001	140
New	2002	135
	2003	142

Besides MCQs, a survey of 'practical tasks' which students had observed/assisted/performed during MBBS course; and challenging questions on prescription practice, inter-professional communication and evidence-based information were included in the second part of written test.

Evaluation of Graduates' Performance during the Internship

Evaluation of interns' performance related to their on-the-job activities was documented every 3 months by their supervisors from 13 major hospitals in Hong Kong. Their performance assessment was based on eleven domains, namely—professional knowledge, clinical skills, attitude to patients, attitude to staff, willingness to learn, organizational ability, clinical judgment, attendance at educational activities, use of medical language, communication skills and sense of responsibility. The performance in each domain was ranked individually as unacceptable (score 0), needing help and counseling (score 1), poor (score 2), average (score 3), good (score 4), and excellent (score 5).

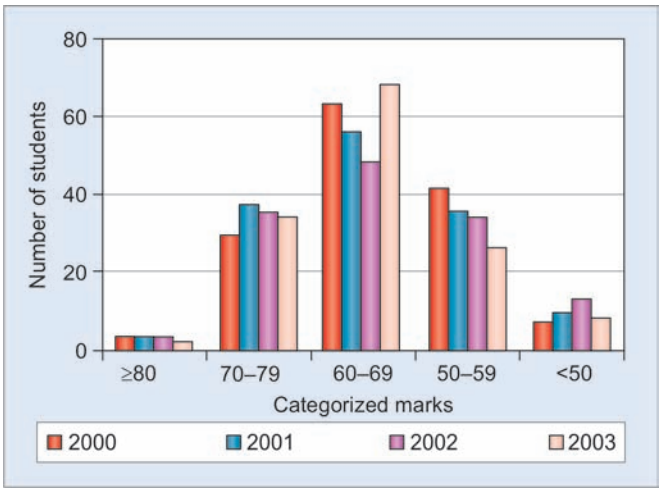
Mean scores in each domain from respective years of old curriculum interns (1999/2000–2001/2002) and new curriculum interns (2002/2003–2008/2009) were analyzed for comparison. Statistical analyses were performed using the statistical package for the social sciences (SPSS) computer program. We compared the mean scores of performance between the old and new curriculum using t-tests with significance level set at a p-value < 0.05. Effect sizes were determined to show the magnitude of the differences between different curricula for each analysis. Cohen stated that a strong effect size is 0.80, a moderate effect size is 0.50 and a weak effect size is 0.25.[3] Analysis of variance (ANOVA) was employed to evaluate the change in mean scores of performance over a period time. Objective of this exercise was to validate the perception, that clinical performance and other professional attributes of the new curriculum graduates should be better due to early clinical exposure and PBL structure with the integrated curriculum. In addition, we tried to identify the areas of strength and weakness of our graduates during their on-the-job performance.

RESULTS

Graduates' Performance Just Before the Internship

Scores derived from MCQ tests were organized into five groups of marks: < 50%, 50 to 59%, 60 to 69%, 70 to 79% and ≥ 80%; and were incorporated into the graph (Graph 1).

Statistical analyses of the cumulative scores of old and new curriculum graduates did not reveal any



Graph 1: Knowledge-based assessment during the preinternship program

significant difference. However, further review of scores of top 10 and bottom 10 students revealed, that some of the students from the first batch of new curriculum had relatively low scores as compared to other groups, mainly related to questions on microbiology and anatomy.

Besides the MCQ, survey of 'practical tasks' which students had observed/assisted/performed during MBBS course; and challenging questions on prescription practice, interprofessional communication and evidence-based information were included in the second part of written test. New curriculum graduates did better in these areas as they had opportunities to observe practical tasks earlier in year one and two along with PBL tutorials.

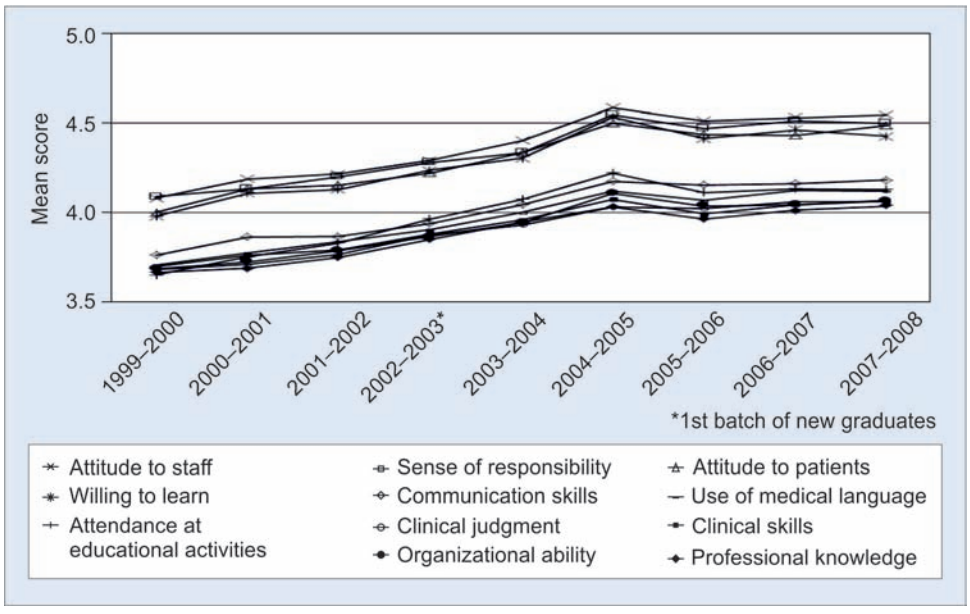
Internship Performance

Table 3 shows the results of t-test analyses. The mean scores of new curriculum were significantly higher than the old curriculum ($p < 0.01$), with effect sizes ranging from 0.46 to 0.57. Among the eleven domains, professional knowledge, clinical judgment, clinical skill and organizational ability were the areas of weakness within our graduates, no matter under the old or new curriculum. On the other hand, domains, such as attitude to staff, sense of responsibility, attitude to patients and willingness to learn were the areas of strength. The effect of new curriculum brought about seven percent

Table 3: Comparisons of internship performance between old and new curriculum

	Mean score			
Domains	*Old (99/00–01/02) n = 507*	*New (02/03–07/08) n = 969*	*Percent change*	*Effect size*
Attitude to staff	4.16	4.48*	7.69	0.52
Sense of responsibility	4.14	4.44*	7.25	0.46
Attitude to patients	4.10	4.40*	7.32	0.53
Willing to learn	4.07	4.39*	7.86	0.51
Communication skills	3.83	4.11*	7.31	0.47
Use of medical language	3.77	4.06*	7.69	0.53
Attendance at educational activities	3.75	4.10*	9.33	0.57
Clinical skills	3.75	4.00*	6.67	0.52
Organizational ability	3.74	4.01*	7.22	0.46
Clinical judgment	3.72	4.00*	7.53	0.52
Professional knowledge	3.71	3.97*	7.01	0.54

'*' represents that mean score of new curriculum was significantly higher than the old curriculum, analyzed by t-test ($p < 0.01$)



Graph 2: Internship performance from the year 1999–2000 to the year 2007–2008

improvement in the mean score in most of the domains. Ten percent improvement was obtained in the domain attendance at educational activities (Table 3).

A time-course for internship performance (mean scores of various domains) taken subsequently over 9 years has shown that mean scores tend to increase significantly over time from the first batch of new curriculum graduates (2002/2003) at all the domains ($p < 0.05$, by ANOVA). However, mean scores reached maximum in the year 2004/2005, and maintained a relatively stable level over the next 3 years (Graph 2).

DISCUSSION AND SUMMARY

It has been nearly 18 years, since the so-called new curriculum was introduced at the faculty of medicine, The University of Hong Kong. With further consolidation over the years, the curriculum has now become well established competency-based curriculum, incorporating online curriculum map. Although some studies in literature had questioned and expressed concern about the negative effect of PBL curriculum, which may result in weaker knowledge-base in students, especially of basic medical sciences,[4-7] the statistical analyses of the cumulative scores on knowledge-based assessment of old and new curriculum graduates, in this study, did not reveal any significant difference. The findings also reflected, that reduced number of didactic lectures to around 60% and selected practicals did not make students to 'learn less' in basic medical sciences. Also, there was a positive effect on knowledge application as witnessed during the professional activities of the interns.

In conclusion, initial pain and hard work of curriculum reform ultimately resulted into a joyous venture.

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