Implementation of Flipped Classroom and Small Class Teaching for Education of Evidence-Based Medicine in Medical Students and Residents

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Topics

- The application status of evidence based medicine (EBM)

- Teaching models
  - Conventional type：morning meeting、 cycle course、 order-in mode(到府服務)
  - Flipped classroom and small class teaching

Current Application of EBM

The Role of EBM Center

1 **Patient**
Shared
Decision Making

2 **Clinical Care**
Quality
Improvement

3 **Research**

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The application status of EBM

The Application Status of EBM

- EBM center is on line!
  - Shared Decision Making (SDM)
  - Order-in mode(到府服務)
  - EBM clinic：5 days a week for appointment
  - Translation medicine

Cycle course

Workshop

Competition

Conference

時間	地點	主題/進行方式	備註
6 月 28 日（四）13:00-17:00	台北榮總致德樓	BEME 工作坊	
6 月 29 日（五）09:00-17:00	台北榮總致德樓	BEME 及臨床實證演講	協辦：台灣考科藍
6 月 30 日（六）13:00-17:00	台北國際會議中心	臨床實證演講及工作坊	協辦：台灣考科藍

案由二、107 年度實證醫學中心舉辦相關活動，提請討論。

說　明：實證醫學中心 107 年度各組活動時程初步規劃如下：

組別	活動名稱	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月
教學組	2018國際醫學教育研討會						■						
	實證醫學核心課程			■	■	■			■	■			
	院內實證醫學競賽			■									
	醫策會賽手訓練						■	■					
	醫策會競賽								■				
	系統性回顧工作坊											■	
研究組	統合分析諮詢	■	■	■	■	■	■	■	■	■	■	■	■
轉譯組	實證照護指引制定訓練班					■							
	實證實踐訓練班						■						
	臨床指引實踐工作坊									■			
	醫病共享決策實踐工作坊											■	

Different Programs in EBM

實證中心課程分類統計
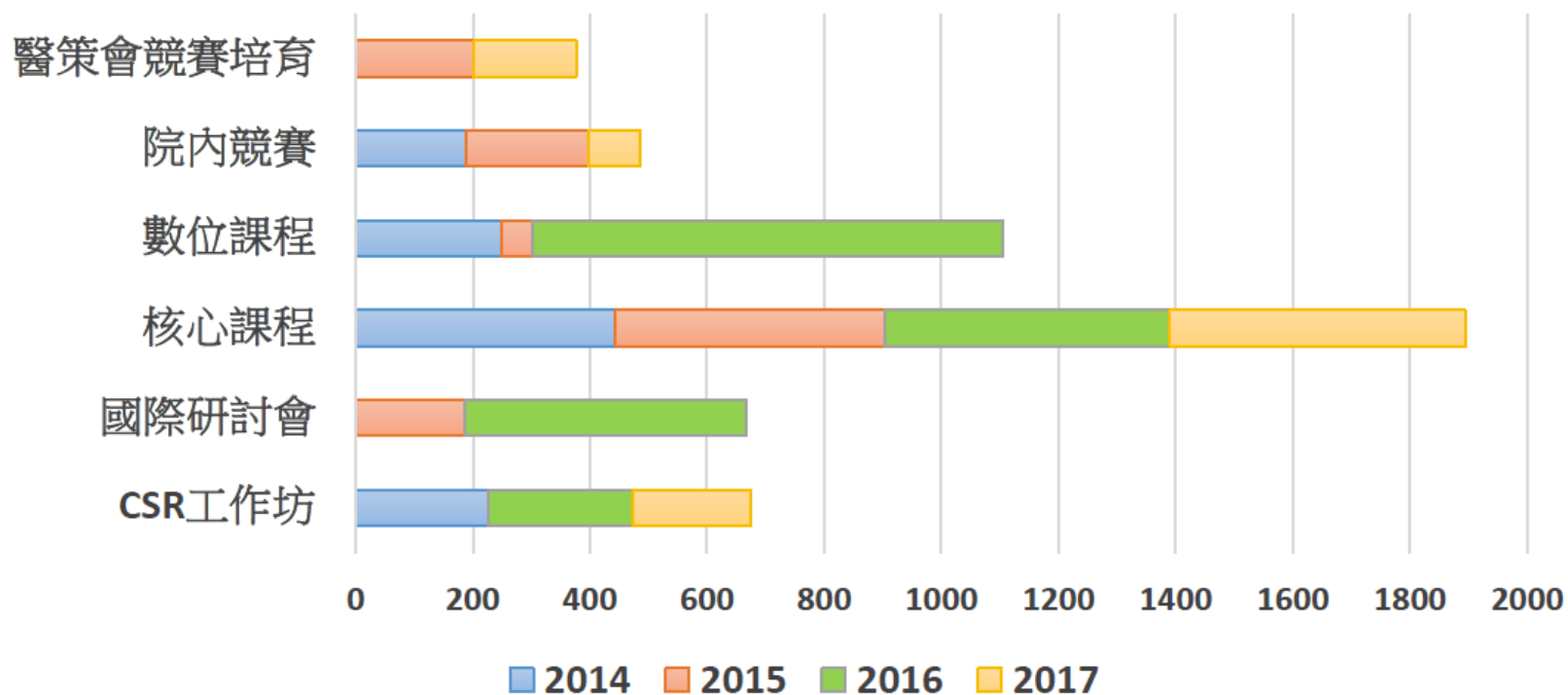
Professional Categories in EBM

實證課程學員職類統計
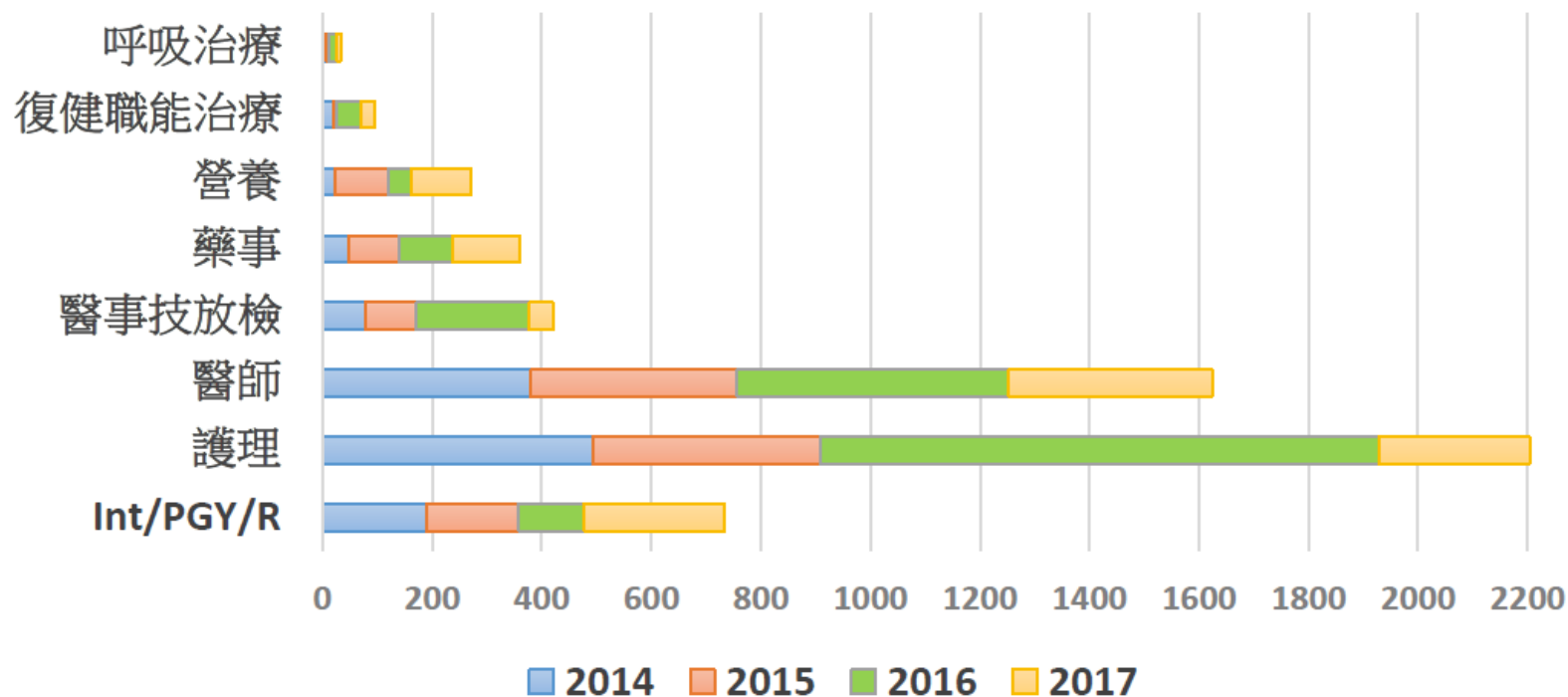
呼吸治療
復健職能治療
營養
藥事
醫事技放檢
醫師
護理
Int/PGY/R

0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200

□ 2014 □ 2015 □ 2016 □ 2017

Benefit of Implementation of EBM

- EBM helps integrate different specialties and facilitate the process of health-care policy.

- EBM can elucidate the faults and mistakes in medical care.

- EBM can reduce the unneeded cost and improve the unmet need.

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Teaching models: Conventional type

Conventional Type

- Morning meeting
  - EBM morning meeting is held in each Tuesday in General Internal Medicine ward (GM)
  - On-line video, oral presentations, and feedback discussion

Conventional Type

- Cycle course and workshop
  - Cycle course: 1 hour per week last for 7-8 weeks. Over 1500 people have attended this course in recent 7 years.
  - Workshop: each year with different topic

- Order-in mode(到府服務)
  - Customized lecture

民國 105 年實證醫學課程表					
課程	日期	星期	課程名稱	上課地點	授課教師
第一次循環課程	3/17	四	實證醫學（含 SR 簡介）	致德樓第四會議室	徐德福醫師
	3/24	四	診斷類(Diagnosis)文獻評讀	致德樓第四會議室	鄒樂起醫師
	4/7	四	治療類(Therapy)文獻評讀	致德樓第四會議室	曹彥博醫師
	4/14	四	文獻搜尋策略	致德樓第十會議室	周昀昀小姐
	4/21	四	預後類(Prognosis)文獻評讀	致德樓第四會議室	鄭浩民醫師
	4/26	二	危害類(Harm)文獻評讀	致德樓第四會議室	陳威志醫師
	5/5	四	系統性文獻回顧(Systematic Review)	致德樓第四會議室	林小玲督導長
工作坊	7/30	六	實證醫學系統性回顧工作坊	致德樓第四會議室	

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Pitfalls of Conventional Type

- Lack of real-time feedback and discussion

- Same teaching material for different student

- Lengthy program, lethargic students, heart-breaking teachers

Teaching models: Flipped Classroom

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EBM Flipped Classroom

- Before-class: Separated 10 minutes video and reading materials

- In-class: Interactive discussion

- After-class: feedback and homework

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課前預習作業單

文章：Clin Rheumatol 2014;33;975-9

The application of dual-energy computed tomography in th[e] arthritis

1. 試著用 VIP 來評讀這篇文章。
2. 作者使用的 gold standard 你覺得合不合理？如果是[你] 呢？
3. 整理出 sensitivity、specificity、positive predictive val[ue], value, LR+, LR-。
4. 如何判斷 gout 的 pre-test probability？
5. 請計算做過一次這樣的檢查以後的 pre-test P, pre-test odds, post test p, post test odds
6. 這樣的檢查做幾次會有比較好的結果呢？需要重複一直做嗎？

ORIGINAL ARTICLE

The application of dual-energy computed tomography in the diagnosis of acute gouty arthritis

Huaxiang Wu · Jing Xue · Lu Ye · Qijing Zhou · Dan Shi · Rongzhen Xu

Abstract The aim of the study was to investigate the sensitivity and specificity of dual-energy computed tomography in the diagnosis of acute gouty arthritis, and the related risk [...] high sensitivity and specificity for the crystals and diagnosis of acute gout. Th[e] acid deposition include the disease du[...]

Before-Class

一、Was there a clear question for the study to address?
A：Yes.這個研究基本上有涵括完整的PICO。P: Patients who had acute arthritic attack in the recent 15 days. I: Dual energy computed tomography. C: Observation of monosodium urate crystal in the synovial fluid or tophus. O: Diagnosis of acute gout. 因此算是問題明確。

二、Was there a comparison with an appropriate reference standard?
A：Yes.對照組如上述是傳統的檢查方法，於病人關節液中觀察到晶體或是有痛風石的顯現。

三、Did all patients get the diagnostic test and reference standard?
A：Yes.全部的病人都有接受DECT scan和ACR criteria 評估。

四、Could the results of the test have been influenced by the results of the reference st
A：No.全部患者都在其疼痛的關節處接受DECT scan，DECT positive is
color) in the joints and periarticular tissues.兩者為獨立進行，所以不太會受A

五、Is the disease status of the tested population clearly described?
A：Yes.收案的病人都是15天內有關節異常（e.g. pain）的病人。

六、Were the methods for performing the test described in sufficient detail?
A：Yes. Different DECT scan area was selected according to the location of the affec
with the second-generation DECT scanner (Somatom Definition DS; Siemens Healthca
potentials of 80 and 140 kV. The scan parameters were as follows: tube A 140kv and 5
DE-WRIST-TENDON series, thread interval: 0.7 mm, colli- mation 0.6 mm, slice thickn
thickness 0.75 mm, reconstruction algorithm B30f.

七、What are the results?
A：Excellent! The sensitivity, specificity, positive predictive value, and negative predictive value of DECT in the diagnosis of acute gouty arthritis were 97.9, 87.5, 95.9, and 93.3 %, respectively.

八、How sure are we about the results? (consequences and cost of alternatives performed?)
A：The reconstructed DECT images were analyzed by using the software (Volume @ Syngo MMWP VE 40A 2010; Siemens Medical) to calculate urate volumes. Two radiologists independently analyzed the DECT images. Hence, I perceived we could believe the results. Besides, the cost of DECT was not too expensive to be performed
. The only concern was radiation exposure.

九、Can the results be applied to your patients/the population of interest?

應該還合理，頂多做個三次應該就足夠了。

The more, the better! We love student speak aloud!

In-Class

After-Class

- One final written test and one oral presentations (with small groups).
- Homework

Propensity Score Matching (1:1)

- The ratio of students participating flipped classes and interns taking conventional classes is 1:1 (one flipped pairs one conventional)
- Participants without post scores or those who did not sign agreements were excluded

	Conventional Class	Flipped Class
All	47	35
Matched	35	35
Unmatched	12	0
Discarded	0	0

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Results of Matching

- Except for outgoing, other variables show no statistically difference between flipped class and conventional class, after we conducted propensity score matching

- Extraversion will be treated as a confounder in the following repeated measures ANOVA

	Independent t test		
	t statistic	d.f.	P value
Gender	-0.242	68	0.809
Extraversion	-2.335	68	0.022*
Openness	1.716	68	0.091
Neuroticism	-0.183	68	0.856
Conscientiousness	1.825	68	0.072
Agreeableness	-1.694	68	0.095

Repeated measures ANOVA

- The interaction of Exam X Type ($p < 0.001$) is statistically significant, indicating students taking flipped class performed better.

	Average	SD	Number
Flipped pretest	4.471	0.858	35
Flipped posttest	6.413	1.155	35
Conv. Pretest	3.538	1.023	35
Conv. posttest	3.698	1.179	35
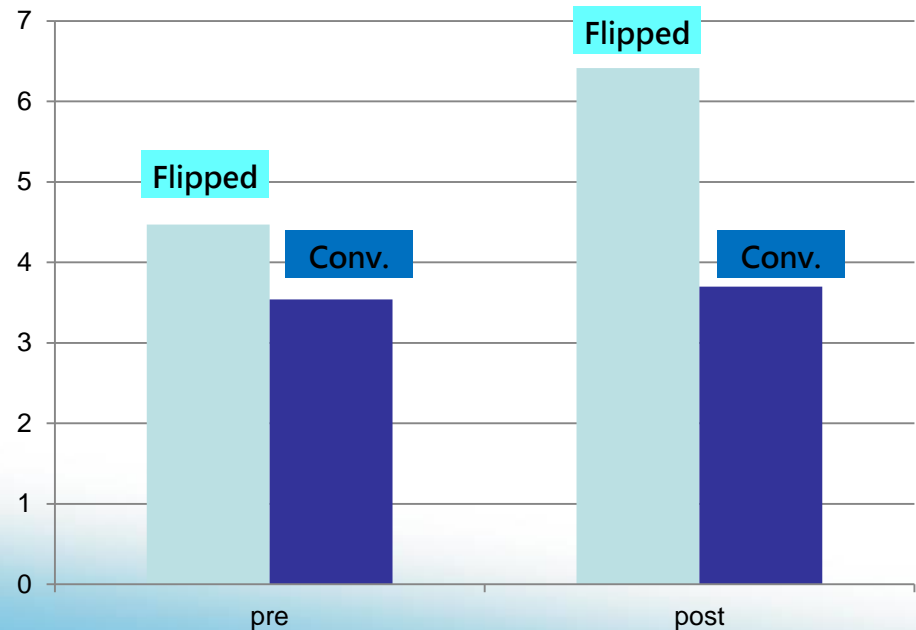
Compare Scores

Milestones	Type	N	Average	SD
Ask	flipped	35	6.136	1.317
	conventional	35	4.908	1.412
Acquire	flipped	35	6.711	1.466
	conventional	35	5.177	1.996
Appraise	flipped	35	**6.392**	2.264
	conventional	35	**1.008**	1.431

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Compare Scores

- Among written exam, the "appraise" part makes the biggest difference in the conventional class.

	Independent sample t test		
	t statistic	**df**	**P value**
Ask	3.765	67.671	<0.001
Acquire	3.665	62.410	<0.001
Appraise	11.893	57.425	<0.001

Written Test: Ability Analysis
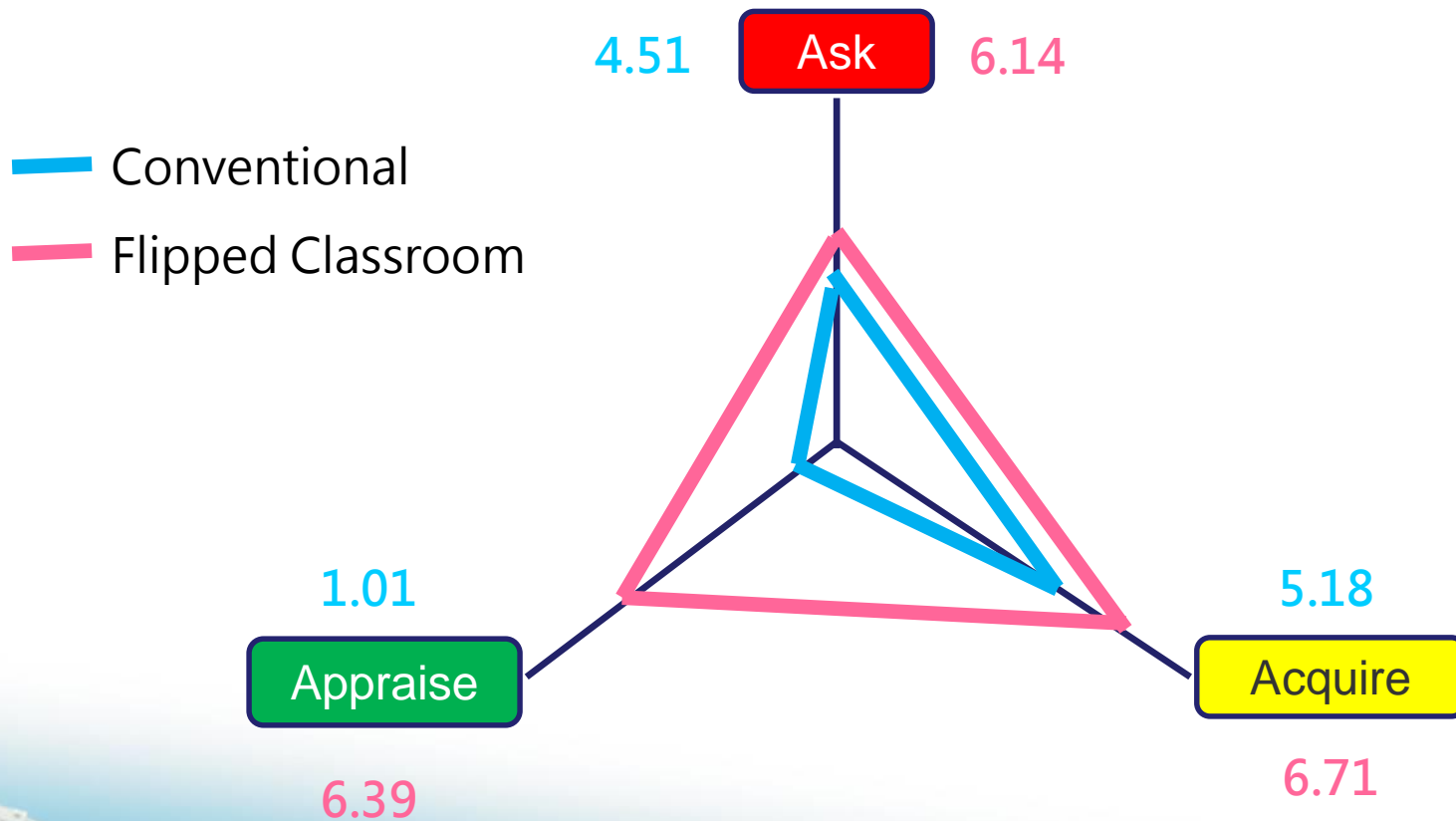
Linear Regression

- Use all participants (flipped and conventional)
- Controlling for class type, gender and big-5 personality traits are not significant predictors on scores. However, openness and Neuroticism are on the borderline

	Beta	SE	P value
Gender	0.162	0.281	0.567
Extraversion	0.020	0.012	0.101
Openness	-0.033	0.019	0.092
Neuroticism	-0.036	0.019	0.063
Conscientiousness	0.002	0.023	0.928
Agreeableness	0.024	0.022	0.287
Teaching method*	3.018	0.311	<0.001*

Oral Presentations

- Milestones: Ask, Acquire, Appraise, Apply
- The scenario was based on the students' interest.

Oral Presentations: Ability Analysis
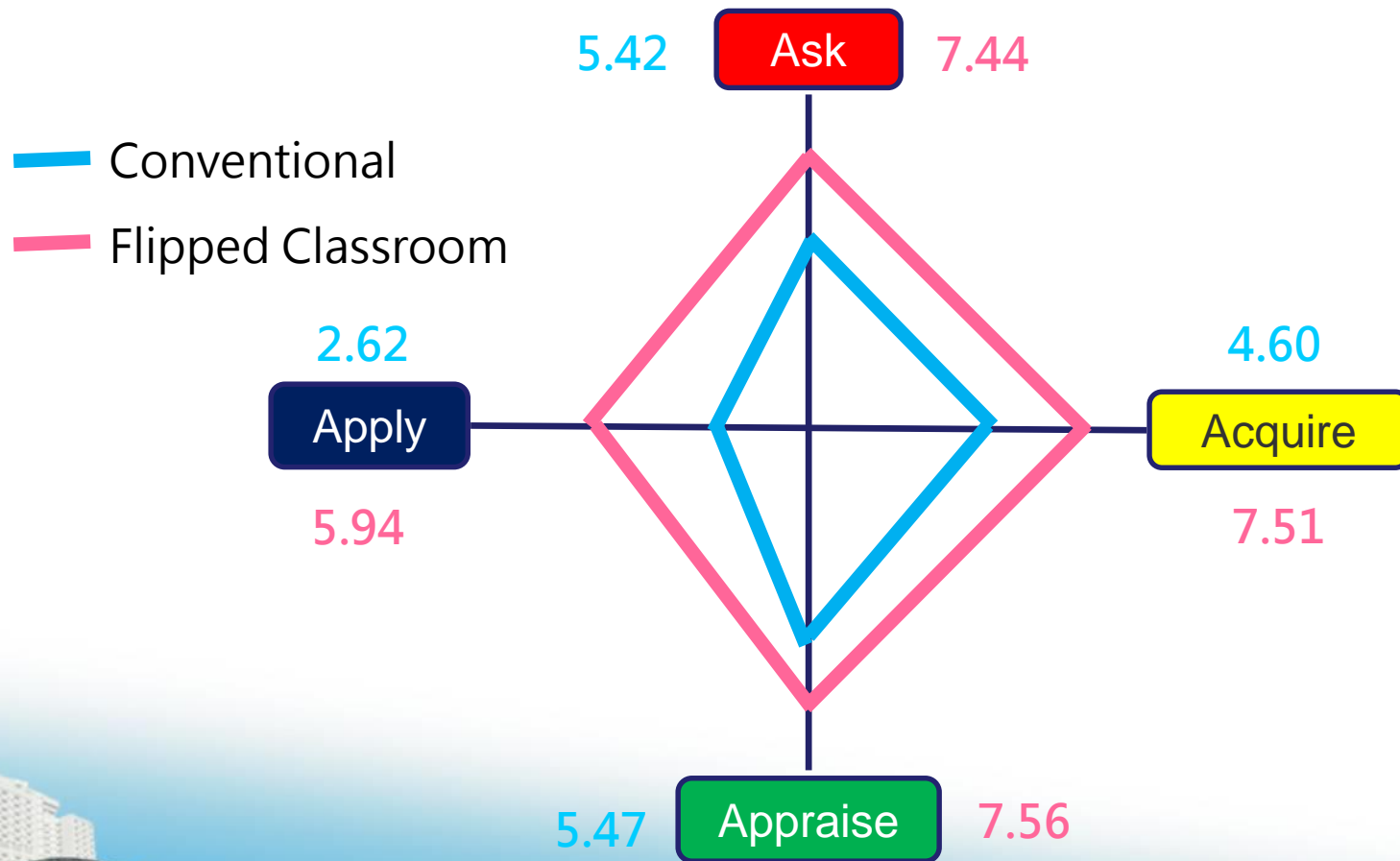
Benefits of Flipped Classroom

- Students have better learning effects, especially in the "appraise" and "apply" part.

- Greater satisfaction and confidence

- Students like in-time problem solving, which help them easier to understand the whole process of EBM.
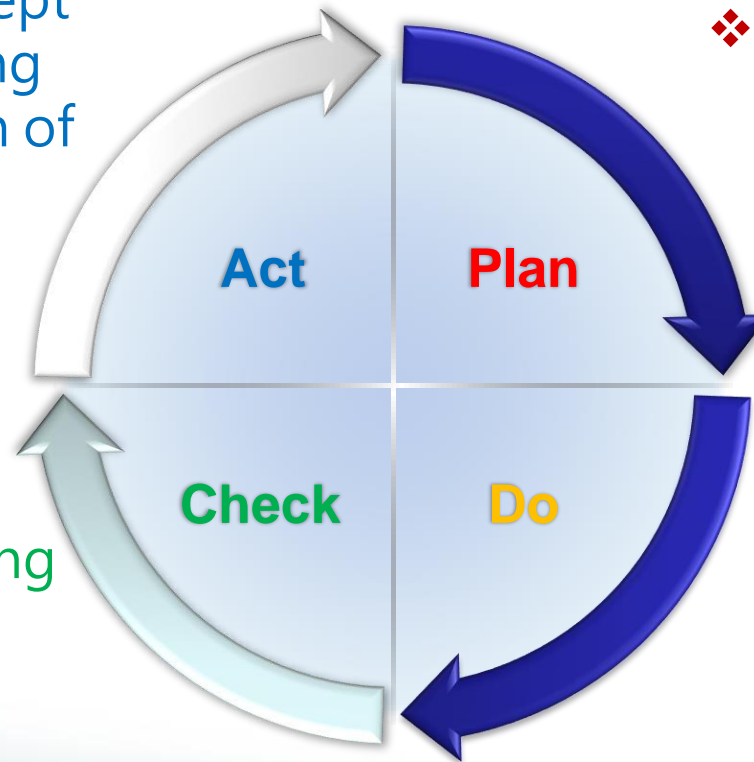
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Furthermore…

- We will apply the experience for the next year's EBM flipped classroom.

- Standardization of scoring system.

- Application of team based learning (TBL) in the conventional type.

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PDCA

❖Apply the concept for EBM teaching
❖Standardization of test in EBM

❖Improvement with flipped classroom and small class teaching

Act **Plan**

Check **Do**

❖Analysis the learning progress of each student

❖Flipped classroom
❖On line learning
❖EBM clinic
❖TBL teaching

Conclusions

- EBM has been implemented for over 10 years in TPE VGH. EBM center will integrate knowledge, medical care, and research for improvement of healthcare.

- The flipped classroom and small classroom enhance the motivation and learning efficacy of students, which should be applied in the EBM teaching.

Acknowledgement

- 鄭浩民主任、徐德福醫師
- Staff of EBM center

Question & Discussion