นิพนธ์ต้นฉบับ

The effect of evaluation methods on students' learning style.

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The purpose of this study was to examine whether the evaluation methods had any effect on the learning style of medical students in Community Medicine course. The authour aimed to analyse the objectives of the course, the evaluation methods and the students' approach to studying by comparing the conventional medical curriculum with the problem-based learning curriculum.

A questionnaire developed to find out the evaluation methods implemented in each curriculum was given to the instructors in both curricula. Also, another questionnaire translated and adapted from Reichman and Grasha's was used to determine how the evaluation methods affected the students' learning approach. Twenty-three and thirty-six responses were returned from the instructors and students in both tracts. Descriptive statistics were used to analyse the data, in addition, the statistically significant by differences were tested.

The results indicated that both Community Medicine courses referred to the same main objectives but different evaluation methods were implemented. The conventional curriculum emphasised on students' knowledge while the PBL emphasised on the information gathering ability. Students in both tracts accepted that there was a moderate effect of the evaluation methods on their learning. The results showed certain significant differences between the curricular groups; the PBL students preferred more Independent and Collaborating Approach of studying. Also, at the end of the Community Medicine course Collaborating Approach in both groups increases, including Participating Approach in the conventional group. This study showed that the evaluation methods had an effect on altering the students' learning style.

Key words : *Evaluation Method, Learning Style.*

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การวิจัยนี้มีวัตถุประสงค์ เพื่อศึกษาถึงผลกระทบของ วิธีประเมินผลต่อพฤติกรรมการเรียนของนิสิตในวิชาเวชศาสตร์ชุมชน โดยวิเคราะห์วัตถุประสงค์ของหลักสูตร วิธีการประเมินผล และวิธีการเรียนของนิสิตเปรียบเทียบระหว่างหลักสูตรปกติและหลักสูตรโครงการการศึกษาแพทย์แนวใหม่

ผู้วิจัยได้สร้างแบบสอบถาม เพื่อเก็บข้อมูลเกี่ยวกับวิธีประเมินผล จากอาจารย์ผู้สอนวิชาเวชศาสตร์ชุมชนทั้งสองหลักสูตร และได้ปรับปรุงแบบมาตราส่วนประมาณค่าจากของไรช์แมนและกราส์ซา เพื่อวัดแบบการเรียนของนิสิต ส่งให้นิสิตทั้งสองหลักสูตรที่ศึกษาวิชาเวชศาสตร์ชุมชนแล้ว ได้รับแบบสอบถามกลับคืนจากอาจารย์รวม 23 ฉบับ จากนิสิต 36 ฉบับ นำมาวิเคราะห์ผลโดยใช้ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และ การทดสอบนัยสำคัญทางสถิติของความแตกต่างระหว่างหลักสูตร

ผลการศึกษาพบว่า วัตถุประสงค์ของวิชาเวชศาสตร์ชุมชนทั้งสองหลักสูตรไม่แตกต่างกันแต่ผู้สอนให้ความสำคัญต่อวิธีประเมินผลต่างกัน โดยในหลักสูตรปกติเน้นการสอบข้อเขียนเพื่อประเมินความรู้มากที่สุด ขณะที่หลักสูตรแพทย์แนวใหม่ เน้นการประเมินความสามารถในการค้นคว้าและรายงานมากที่สุด นิสิตทั้งสองหลักสูตรคิดว่าวิธีประเมินผลมีผลต่อการเรียนของนิสิตพอควร นิสิตหลักสูตรแพทย์แนวใหม่ใช้รูปแบบการเรียนแบบอิสระ (independent) และแบบร่วมมือ (collaborating) มากกว่านิสิตหลักสูตรปกติ และเมื่อเรียนวิชาเวชศาสตร์ชุมชนแล้วนิสิตหลักสูตรแพทย์แนวใหม่มีการเรียนแบบร่วมมือเพิ่มมากขึ้นและนิสิตหลักสูตรปกติก็มีการเรียนแบบร่วมมือและแบบมีส่วนร่วมเพิ่มมากขึ้นด้วย การศึกษาครั้งนี้จึงเป็นการยืนยันว่าวิธีการประเมินผลมีผลต่อการปรับวิธีการเรียนของนิสิต

Chulalongkorn University launched the project of Community-Targeted Problem-Based medical curriculum (CTPB) which ran in parallel to the conventional curriculum since 1988. The problem-based curriculum proposed a different teaching-learning process aiming at producing medical graduates who have equivalent competency to the conventional graduates and who possess more self-learning skills and lifelong continuing education minds. Various learning experiences were provided to the students to help them practice their self-directed learning skills through the schedule both at the medical school and in the affiliated hospitals.

Studies have shown that the student's approach to studying are influenced by a variety of factors including the structure of the curriculum, the method of instruction, and the structure and frequency of examinations. The structure of the curriculum plays an important role of influencing the students' learning behaviors, if the curriculum is overloaded with content and teaching activities, the students adopt learning behaviors which help them cope with the curriculum requirements (Vu & Galofre,1983). The method of instruction influenced students' approach to learning as reported that students in problem-based schools were being higher on deep approach and lower on surface approach than students in traditional schools (Newble & Clarke,1986). The structure and frequency of examinations in medical curricula were observed as factors that may inhibit the self-confident and independent student from learning in his own way (Neame & Powis, 1981), while other studies indicated that if the students perceived the examination system as to require predominantly recall of factual information then they will tend to adopt a surface-level or rote-learning approach (Marton & Saljo,1976). Furthermore, a study on the effect of assessments and examinations on the learning of medical reported that an alteration in the final-year assessment scheme led to changes in the students' learning activities (Newble & Jaeger,1983).

As there were differences in the teaching-learning process of both curricula in Chulalongkorn University, a study on the type of evaluations used in each curriculum and whether these methods affected the learning styles of the students was commenced. This took place during the Community Medicine course, and revealed that both curricula were comparable to each other as the total credit hours of each were almost the same, the teaching methods were similar and the emphasis was on the same objectives in both courses.

Objectives

1. To analyse the course objectives of Community Medicine in the conventional curriculum compared with the problem-based curriculum.
2. To analyse the evaluation methods implemented in both medical curricula.
3. To study and compare the students' learning styles in the conventional and problem-based curricula.

Materials and Methods

Subjects.

1. Ten Community Medicine instructors from the conventional curriculum and thirteen instructors from the problem-based curriculum were recruited.
2. Twenty-two students from the fifth-year conventional curriculum and fourteen sixth-year students from the problem-based curriculum both groups had studied Community Medicine recently.

Procedure.

The course objectives of Community Medicine in the conventional curriculum and problem-based curriculum were compared to consider the equivalency of both tracts. To find out the evaluation methods implemented in each curriculum, two questionnaires were developed. One was constructed by the authors and given to the instructors in both curricula. The other was translated and adapted from Reichman and Grasha's and distributed to the students in both curricula to assess their learning styles. The students were asked to assess themselves according to the learning activities they usually performed or frequently did referring to the given list of learning activities comparing between pre-exposure and post-exposure to the Community Medicine course. They were also asked to determine the magnitude of the effect of evaluation methods on their approach of learning. Data analysis was done by using Descriptive Statistics and the differences of the students' learning styles between curricular groups were also tested.

Results

In the conventional curriculum,Community Medicine comprised of three courses, eleven credit hours, each course was arranged during the clinical years. The first course aims to introduce the students to the concepts of community medicine, health care system, community survey and community diagnosis. The second course emphasised the task and role of the health team and community treatment. The third course underlined the community treatment and monitoring. In problem-based curriculum, there were two Community Medicine courses of twelve credit hours provided to the sixth-year students. The course objectives covered the knowledge, practice and attitude of community survey, diagnosis, and management. The result of the comparison showed that the learning objectives in both curricula referred to the same main objectives of the Faculty.

To assess the achievement of the learning

objectives of the course, the instructors employed various methods of evaluation to judge the students' knowledge, performance and attitude. The conventional curriculum assigned more weight to the written test which aimed to assess the students' knowledge than to other tools which assessed other ability or attitude. The problem-based curriculum emphasised on the assessment of information searching, gathering and presenting ability through the practical field work in the community. Both curricula did not put much emphasis on the attitude assessment.

With regard to the learning styles, students in both tracts accepted that evaluation methods moderately affected their learning styles. Nine to fourteen percent of them admitted that they had to adjust their approach to learning, cooperate more in group working, prepared more for the field work, and paid more attention to community surroundings.

The comparison of the students' learning styles in each curriculum showed that the problem-based curricular students preferred more Independent and Collaborative Approach of learning than the conventional curricular students, and this difference was statis-

Table 1. Learning approach comparison between conventional and problem-based curricular students before attending the Community Medicine course.

Approach	conventional		problem-based		t-value
	$\bar{X}$	SD	$\bar{X}$	SD	
Independent	30.95	4.43	34.71	3.34	2.72**
Avoidant	24.54	4.42	24.93	4.65	0.25
Collaborative	35.50	4.17	38.79	4.49	2.24*
Dependent	33.54	3.80	32.14	4.52	1.00
Competitive	29.23	4.07	27.57	4.57	1.13
Participant	34.27	3.55	34.07	3.56	0.17

* $p < 0.05$
** $P < 0.01$

Table 2. Learning approach comparison between conventional and problem-based curricular students after attending the Community Medicine course.

Approach	conventional		problem-based		t-value
	$\bar{X}$	SD	$\bar{X}$	SD	
Independent	30.64	3.96	35.07	3.56	3.40**
Avoidant	24.54	5.14	24.14	5.07	0.23
Collaborative	36.54	4.49	40.36	4.03	2.58*
Dependent	33.59	4.01	32.79	4.08	0.58
Competitive	29.18	4.45	27.71	4.83	0.36
Participant	35.23	3.42	35.14	4.90	0.95

* $p < 0.05$
** $P < 0.01$

tically significant (as shown in table 1 and table 2).

Other significant findings following the Community Medicine course, indicated that students from both groups developed more Collaborative Approach; and students in the Conventional curriculum gained more Participating Approach (as shown in table 3 and 4).

Table 3. Learning approach of conventional curricular students before and after Community Medicine course.

Approach	before		after		t-value
	$\bar{X}$	SD	$\bar{X}$	SD	
Independent	30.95	4.43	30.64	3.96	2.24**
Avoidant	24.54	4.42	24.54	5.14	0.32
Collaborative	35.50	4.17	36.54	4.49	2.26*
Dependent	33.54	3.80	33.59	4.01	0.67
Competitive	29.23	4.07	29.18	4.45	0.30
Participant	34.27	3.55	35.23	3.42	3.35**

* $p < 0.05$
** $P < 0.01$

Table 4. Learning approach of problem-based curricular students before and after Community Medicine course.

Approach	before		after		t-value
	$\bar{X}$	SD	$\bar{X}$	SD	
Independent	34.71	3.43	35.07	3.56	0.84
Avoidant	24.93	4.65	24.14	5.07	1.71
Collaborative	38.79	4.49	40.36	4.03	3.14**
Dependent	32.14	4.52	32.79	4.08	1.80
Competitive	27.57	4.57	27.71	4.83	0.23
Participant	34.07	3.56	35.14	4.90	1.15

* $p < 0.05$
** $P < 0.01$

Discussion

In comparing the two curricula, the conventional and the community-targeted problem-based curriculum, the study revealed that the learning objectives of both curricula referred to the same main objectives of the Faculty, especially, in the Community Medicine course. The objectives were on community health problems survey, diagnosis, management, and community health care evaluation.

With regard to the student assessment, the conventional curriculum put more emphasis on written examinations for knowledge assessment than on other tools for performance or attitude. On the other hand, the PBL curriculum emphasised on report writing and practical field work for assessing the ability of information searching, leadership, attitude, and presentation.

The students also viewed the methods of evaluation as being a factor in affecting their learning styles. Prior to the Community Medicine course, the students in each curriculum preferred different learning styles. Those in PBL curriculum preferred more Independent and Collaborative Approach compared to those in the conventional curriculum. This may be due to the fact that the PBL curriculum students were used to small groups and self-directed learning while the others were not. So the PBL curriculum students would adopt the character of self-determination and team working which enhanced Independent and Collaborative learning style. To this point, it was congruent with the study of Marton and Saljo (1976) who found that the students in problem-based schools rated themselves higher on deep approach and lower on surface approach than students in the traditional schools.

In comparing between pre and post Community Medicine course, the findings showed that both PBL and conventional students increased their Collaborative approach when finishing the courses. It could be explained that the evaluation methods of both curricula looked at the ability to search, to write reports on teamworking, so the students adjusted themselves to the approaches that would fulfil the required assessment. The findings were consistant with the research done by Newble and Jaeger (1983) who found that the change of assessment method had a major influence on students' learning.

If possible, further study should be conducted on a large group of students, as the sample size in this study was small. Moreover, a review of literature showed several kinds of students' learning styles inventory, so further study could be carried out using different types of inventory or developing a particular type for specific group of students or curriculum.

According to this study, our data indicated that the assessment methods did influence the students' learning styles. It would be useful to the curriculum administrators to study the evaluation methods on other courses of the PBL curriculum. At this point the instructors and/or curriculum committee should carefully plan, implement, and monitor the evaluation methods so that it will benefit the students as well as the administrators.

References

1. Zona M P, Torgrude D S W. Personal styles, educational characteristic, and career experiences associated with adult learner styles in social work education. Ph.D. dissertation, The Catholic University of America, 1980.
2. Davidman L. Learning style: the myth, the panacea, the wisdom. **Phi Delta Kappan** May, 1981.
3. Rita D. Teaching in a purple fog: what we don't know about learning style. NASSP Bull March, 1981.
4. Guild P, O'Rourke B. Learning styles: knowledge, issues and applications for classroom teachers. Ph.D. dissertation, University of Massachusetts, 1980.
5. Coles C R. Differences between conventional and problem-based curricula in their students' approaches to studying. Med Educ 1985 Jul; 19(4) : 308-9
6. Baker J D. 3d, Cooke JE, Conroy JM, Bromley HR, Hollon MF, Alpert CC. Beyond career choice: the role of learning style analysis in residency training. Med Educ 1988 Nov; 22(6) : 527-32
7. Vu N V, Galofre A. How medical students learn. J Med Educ 1983 Aug; 58(8) : 601-10
8. Newble D I, Gordon M I. The learning style of medical students. Med Educ 1985 Jan; 19(1) : 3-8
9. Newble D I, Jaeger K. The effect of assessments and examinations on the learning of medical students. Med Educ 1983 May; 17(3) : 165-71
10. Newble D I, Clarke R M. The approaches to learning of students in a traditional and in an innovative problem-based medical school. Med Educ 1986 Jul; 20(4) : 267-73
11. De Volder M L, De Grave W S. Approaches to learning in a problem-based medical programme: a developing study. Med Educ 1989 May; 23(3) : 262-4
12. Reichman S, Grasha A. Workshop handout on learning styles. Ohio: Faculty Resource Center, University of Cincinnati, 1975.

Instructor Questionnaire

Part 1 Status

1. Unit/Department _____ Hospital _____

2. Experience in Community Medicine Teaching

   [ ] less than one year [ ] 1-3 years [ ] more than 3 years

Part 2

1. On the beginning of the course, did you inform students about the evaluation method of Community Medicine course ?

   [ ] Yes [ ] No (skip to item 3)

2. If you inform students about evaluation method, when did you inform ?

   [ ] the first day of the course [ ] prior to each evaluation method

   [ ] prior to final examination

3. In planning student evaluation in Community Medicine course, what do you object to ?

   (Please rate 1-6 to show the importance as follows : 1 = most important, 2 = less important....., 6 = least important)

   The evaluation is for.....

   _____ the student to be more inquiry

   _____ the student to learn more content

   _____ the student to work better in team

   _____ the student to have better attitude toward practicing in community

   _____ improving teaching and learning

   _____ grading students

4. In Community Medicine course, what method do you use for student evaluation, what do you evaluate, how do you weight each method ?

	Method	**To evaluate**	**Weight**
4.1	_____	_____	_____
4.2	_____	_____	_____
4.3	_____	_____	_____
4.4	_____	_____	_____
4.5	_____	_____	_____

5. In planning the lesson, what degree do you refer to the learning objectives ?

   [ ] always [ ] much [ ] moderate [ ] rarely [ ] not at all

6. In planning the lesson, what degree do you refer to evaluation methods ?

   [ ] always [ ] much [ ] moderate [ ] rarely [ ] not at all

7. How did you evaluate the students in your course ?
   [ ] test them as if they were going to practice in real life
   [ ] evaluate them while they were in class
   [ ] use written examination
   [ ] other (please specify).....

8. What degree do you think evaluation methods effect on student's learning approach ?
   [ ] most [ ] much [ ] moderate [ ] less [ ] least

9. What degree do you think evaluation methods effect on your teaching methods ?
   [ ] most [ ] much [ ] moderate [ ] less [ ] least

Student Questionnaire

Part 1 Status

1. Sex [ ] male [ ] female

2. GPAX _____

Part 2 Evaluation in Community Medicine course

1. When was the last time that you attend the course (Month)_____(Year)_____

2. In Community Medicine course, the last hospital that you practiced was _____

3. At Nongjok Hospital did you know about evaluation methods to be used in advance ?
   [ ] No
   [ ] Yes, from _____

4. What evaluation methods were used and how were they weighed ?

	Method	**Weight**
4.1	_____	_____
4.2	_____	_____
4.3	_____	_____
4.4	_____	_____
4.5	_____	_____

5. Please rate the importance of each statement as follows:
   1 = most important 2 = important 3 = least important
   _____ Students should know the evaluation methods and the weight to be used in advance.
   _____ Test should be implemented only for determining what to be improved (not for grading).
   _____ Test method must be related to learning experience.

6. Please rate the importance of evaluation method in Community Medicine course which you think it is advantaged to you.

   1 = most important 2 = important 3 = least important

   _____ practice test

   _____ written test

   _____ report writing

   _____ observation (long term)

7. Do you think that evaluation methods have any effect on learning style ?

   [ ] no effect at all

   [ ] little effect

   [ ] moderate effect

   [ ] much effect

   [ ] most effect

8. Do you think that the evaluation method in Community Medicine course make you alter your learning styles ?

   [ ] not at all

   [ ] yes, because_____

   _____

Part 3 Student's learning style

The following statements are related to feeling and attitude toward learning in general. There is no certain answer. Please write the number that best explains how you feel about the statement as follows:

Mark 1 if you strongly disagree with the statement.
Mark 2 if you moderately disagree with the statement.
Mark 3 if you are undecided.
Mark 4 if you moderately agree with the statement.
Mark 5 if you strongly agree with the statement.

	Before class	After class
1. Most of what I know about material relating to this course, I learned on my own.	☐	☐
2. I have a difficult time paying attention during class sessions.	☐	☐
3. I find the ideas of the other students relatively useful for helping me understand the course material.	☐	☐
4. I think that if the teacher lets the students in this class do whatever they want, he would not be doing his job well.	☐	☐
5. I like other students in this class to know when I have done a good job.	☐	☐
6. I try to participate as much as I can in all aspects of this course.	☐	☐
7. I study what is important to me and not necessarily what the instructor says is important.	☐	☐
8. If I do not understand the course material, I just forget about it.	☐	☐
9. I think an important part of this class is to learn to get along with other people.	☐	☐
10. I accept the structure the teacher sets for this course.	☐	☐
11. I think students have to be aggressive to do well in this course.	☐	☐
12. I get more out of going to this class than spending that time at home.	☐	☐
13. I think I can determine what the important content issues are in this course.	☐	☐
14. I try to spend as little time as possible on this course outside of class.	☐	☐
15. I like to hear what other students think about the issues raised in class.	☐	☐
16. I think the teacher should clearly state what he expects from students.	☐	☐
17. I feel that I must compete with the other students in class to get a grade.	☐	☐
18. I feel that the activities we have in class are generally interesting.	☐	☐
19. I feel that my ideas about the content are often as good as those in the textbook.	☐	☐
20. This course does not really interest me.	☐	☐
21. I think students in this class should be encouraged to work together.	☐	☐
22. I like the tests for this course to be taken right out of the book.	☐	☐
23. I try to do assignments better than the other students.	☐	☐
24. I read material before the class so that I can share idea in class.	☐	☐
25. I am confident in my abilities to learn the important material.	☐	☐
26. I do not feel that I miss anything if I cut this class.	☐	☐

	Before class	After class
27. I like to talk to other students outside of class about the ideas and issues raised in class.	☐	☐
28. I think the teacher is the best judge of what is important to know.	☐	☐
29. To do well in this course, I have to compete with the other students for the teacher's attention.	☐	☐
30. In this class I sit where I can be sure to hear the professor and see what he writes.	☐	☐
31. I like to think things through for myself before the teacher lectures on the course material.	☐	☐
32. I am in this course only to fulfill a requirement.	☐	☐
33. I try to get to know other students in this class on a personal level.	☐	☐
34. I try my best to do the assignments for this class the way the professor says they should be done.	☐	☐
35. I like to see if I can get the answers to problems or questions before anybody else in class does.	☐	☐
36. I do my assignments for this course whether I think they are interesting or not.	☐	☐
37. I do assignments for this course my own way without the ideas and issues raised in class.	☐	☐
38. For this course I sit where the teacher is unlikely to notice me.	☐	☐
39. I like this course when students are encouraged to discuss course material.	☐	☐
40. I tend not to think or work on problems or issues related to this course unless they were first covered in the text or lectures.	☐	☐
41. I like to know that I have done better than the other students in this class.	☐	☐
42. I feel that I can really learn something in this course.	☐	☐
43. During class discussions, I feel that I have to compete with the other students to get my ideas across.	☐	☐
44. I prefer that this teacher never calls on me.	☐	☐
45. I think learning in this course should be a cooperative effort between the teacher and students.	☐	☐
46. I think too much discussion in this class prevents the teacher from covering enough required material.	☐	☐
47. I like to know how well the other students in this course are doing on exams.	☐	☐
48. I do my assignments before reading other things that interest me.	☐	☐
49. I always have self study outside the class.	☐	☐
50. I think one of the most important things about this course is how easy it is for me to get a good grade.	☐	☐
51. I try to help the other students when they have a hard time understanding the course material.	☐	☐

	Before class	After class
52. I feel that I can learn what is important in this course by doing what the professor says.	☐	☐
53. I only help other students with material for this course when I feel it will not hurt me.	☐	☐
54. I think this class is very important.	☐	☐
55. I have my own ideas about how this course should be run.	☐	☐
56. I am pleased to know that the class is cancelled.	☐	☐
57. I feel a responsibility to help the other students in this class learn course material.	☐	☐
58. I think the teacher should emphasize the content that I must learn.	☐	☐
59. To get ahead in this class, I think sometimes you have to step on the toes of the other students.	☐	☐
60. I work on the reading assignments for this course until I feel I understand the material.	☐	☐