

9-1-1996

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Pholwan, Nutjaree and Tantayapom, Kitpramuk (1996) "The comparative study of sixth year medical students' achievement among conventional curriculum, MESRAP curriculum, and problem-base, Faculty of Medicine, Chulalongkorn University in academic year 1995," *Chulalongkorn Medical Journal*: Vol. 40: Iss. 9, Article 5.

DOI: 10.58837/CHULA.CMJ.40.9.4

Available at: <https://digital.car.chula.ac.th/clmjjournal/vol40/iss9/5>

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The comparative study of sixth year medical students' achievement among conventional curriculum, MESRAP curriculum, and problem-base, Faculty of Medicine, Chulalongkorn University in academic year 1995*

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Pholwan N, Tantayaporn K. The comparative study of sixth year medical students' achievement among conventional curriculum, MESRAP curriculum, and problem-base, Faculty of Medicine, Chulalongkorn University in academic year 1995. Chula Med J 1996 Sep;40(9): 713-24

Objective : - *This research determined to study the achievement of the sixth year medical students in the conventional program, MESRAP (Medical Education for Students in Rural Area Project) program and CTPB program (Community Targeted Problem Based Medical Education).*
- *This study compared the scores of the comprehensive course examination and the students GPAX, and determined the correlation coefficient between the comprehensive examination scores and the GPAX among these three programs.*

Design : *Descriptive study*

Setting : *Sixth year medical students from Faculty of Medicine, of Chulalongkorn University in the 1995 academic year.*

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Received for publication. June 12, 1996.

* In the name of the 1995 Comprehensive Examination Committee of the Faculty of Medicine, Chulalongkorn University.
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Subjects : *One hundred and thirty six medical students. There were 97 medical students in the conventional program, 28 from MESRAP, and 13 from the CTPB program.*

Main outcome measure : *The data was analysed by using percentages, the arithmetic means, standard deviations, F-test, T-test, and Pearson correlation coefficients.*

Results : *1. The highest possible score of the comprehensive examination was 300. The highest actual score was 231 (77.00%), and the lowest was 139 (43.33%). The arithmetic mean was 185.63 (61.88%), and the standard deviation was 16.95. The arithmetic mean of the conventional, MESRAP, and CTPB programs were 190.16, 180.15, 163, respectively. When the mean scores among the three programs were compared the mean score of the conventional program was higher than the MESRAP and CTPB programs and was significantly different at level 0.05 [$p < .05$]*

2. A GPAX tabulation of the three programs showed that the highest GPAX was 3.88 (97.00%), and the lowest GPAX was 2.02 (50.50 %). The arithmetic mean was 3.07 (76.75%) and the standard deviation was 0.496. The arithmetic mean of the conventional, MESRAP, and CTPB programs were 3.20, 2.16, and 3.12, respectively. When the mean of GPAX among the three programs were compared the mean of the Conventional program was higher than the MESRAP and CTPB programs, and was significantly different at level 0.05 [$p < .05$]

3. The achievement of the students on the comprehensive examination was significantly different with GPAX scores, at a level 0.01 [$p < .01$]

Conclusion : *The medical students in academic year 1995 who had a good GPAX would also have a high score in the comprehensive examination. Additionally, the results of our study indicates that the doctors graduated from the Faculty of Medicine of Chulalongkorn University have knowledge up to the standards of the Medical Council.*

Key words : *Achievement, Comprehensive examination, GPAX, Conventional, MESRAP, CTPB.*

ณัฐจรรย์ พลวัน, กิจประมุข ตันตยาภรณ์. การศึกษาเปรียบเทียบ: ผลสัมฤทธิ์ทางการเรียนระหว่างนิสิตแพทย์ ชั้นปีที่ 6 ปีการศึกษา 2538 คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย. จุฬาลงกรณ์เวชสาร 2539 ก.ย.; 40(9): 713-24

- วัตถุประสงค์** : เพื่อศึกษาเปรียบเทียบคะแนนสอบวิชาเวชศาสตร์ทั่วไป และคะแนนเฉลี่ยสะสมตลอดหลักสูตร ของนิสิตแพทย์ชั้นปีที่ 6 ปีการศึกษา 2538
- รูปแบบการวิจัย** : การวิจัยเชิงพรรณนา: การศึกษาเปรียบเทียบ
- สถานที่** : คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
- ผู้เข้าร่วมการศึกษา** : นิสิตแพทย์ชั้นปีที่ 6 ปีการศึกษา 2538 คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย (นิสิตแพทย์สามหลักสูตร โครงการปกติ 97 คน โครงการส่งเสริมแพทย์สำหรับชนบท 26 คน โครงการผลิตแพทย์แนวใหม่ 13 คน)
- การวัดผล** : ศึกษาในรูปของคะแนนสูงสุด ต่ำสุด มัชฌิมเลขคณิต ค่าเบี่ยงเบนมาตรฐานร้อยละ และศึกษาความสัมพันธ์ของคะแนนสอบวิชาเวชศาสตร์ทั่วไป กับคะแนนเฉลี่ยสะสมตลอดหลักสูตรของนิสิตแพทย์สามหลักสูตร
- ผลการศึกษา** : - จากผลการศึกษาพบว่าจากคะแนนวิชาเวชศาสตร์ทั่วไปคะแนนเต็ม 300 คะแนน คะแนนสูงสุดเท่ากับ 231 คะแนน หรือร้อยละ 77.00 คะแนนต่ำสุดเท่ากับ 139 คะแนน หรือร้อยละ 43.33 คะแนนเฉลี่ยเท่ากับ 185.63 คะแนน หรือร้อยละ 61.88 และค่าเบี่ยงเบนมาตรฐานเท่ากับ 16.95 คะแนนเฉลี่ยของนิสิตแพทย์โครงการปกติ โครงการส่งเสริมการศึกษาแพทย์สำหรับชนบท โครงการผลิตแนวใหม่เท่ากับ 190.16, 180.15, และ 163 คะแนน ตามลำดับ เมื่อเปรียบเทียบคะแนนเฉลี่ยพบว่า นิสิตแพทย์โครงการปกติได้คะแนนเฉลี่ยสูงกว่าอีก 2 โครงการอย่างมีนัยสำคัญที่ 0.05
- วิจารณ์และสรุป** : ผลที่ได้จากการศึกษาครั้งนี้ได้ข้อมูลที่สรุปได้ว่า นิสิตแพทย์ที่มีผลการเรียนเฉลี่ยสะสมตลอดหลักสูตรสูง มีผลต่อการทำคะแนนสอบวิชาเวชศาสตร์ทั่วไปสูงด้วย และอาจช่วยในการทำนายความสามารถของนิสิตแพทย์หลังสำเร็จการศึกษาแล้วว่ามีความรู้ ความสามารถตามมาตรฐานแพทยสภา

The curriculum of the Faculty of Medicine of Chulalongkorn University has been traditionally developed with a certain amount of influence from Western medical education. It is undeniable that the graduates have satisfactorily shown their competency as doctors, many of them have been nationally and internationally recognized in their profession. But this excellence appears to be in the specific fields needed for tertiary care in the large urban hospitals, not for solving the health problems in poor rural communities. With this concern, in 1976 Chulalongkorn University created a parallel program called "Medical Education for Students in Rural Areas Project" (MESRAP). Further investigation of problem-based medical education continued. In 1988 a third track problem-based course was launched in the Faculty of Medicine of Chulalongkorn University for the first time in Thailand. It is called the "Community Targeted Problem-Based Medical Education Program (CTPB)".⁽¹⁾

The six-year curriculum of the MESRAP students is designed considerably different from the traditional educational methods of medical students. Although the content is the same, MESRAP students are exposed to rural health problems from the first year of study. And in the last three clinical years, instead of being trained at Chulalongkorn Hospital they are assigned to various provincial and district hospitals in the MESRAP catchment area. At the end of their training, the students must pass the examination set by the University in order to graduate.⁽²⁾ The five-year CTPB curriculum design was based on a combination of primary health problems, Thai medical standards for medical practitioners, and the

Faculty's educational objectives. The curriculum structure emphasized the use of problem-based and self-directed learning as a means of medical study. The Doctor of Medicine degree is conferred by Chulalongkorn University after the students pass the comprehensive examination in their final year. This is the same requirement as in the other programs.⁽³⁾

Gay⁽⁴⁾ noted that evaluations basically represent one of two philosophical viewpoints, as illustrated by the following two definitions: 1) the systematic process of collecting and analyzing data in order to determine whether, and to what degree, objectives have been, or are being achieved, 2) the systematic process of collecting and analyzing data in order to make decisions. In education, the grade is one instrument for evaluation. Grades are recorded in cumulative folders and communicate level of achievement at various points in time.⁽⁵⁾

The Faculty of Medicine of Chulalongkorn University began using the comprehensive examination for medical students in 1975. The students could receive their bachelor degree if they had a grade point average of 2.00 or higher and passed the comprehensive examination. The comprehensive examination committee used the standard criteria adapted from the Medical Council's standard criteria in planning, organizing, assessing and reporting.⁽⁶⁾ They provided their judgements of success and failure, and strengths and weaknesses to the Faculty Committee for final judgement. The comprehensive examination is an essential process for maintaining the standards of the curriculum for each program and can improve the quality of medical education.⁽⁷⁾

Since 1992, the comprehensive examination

has been used for testing the medical students in their final year in the three programs. After three years no one has reported comparative results of achievement of the medical students in terms of comprehensive examination scores and GPAX scores.

Our study attempted to evaluate the GPAX and comprehensive examination scores of the three medical education programs to determine which program of learning best improves the education. It began with identification of the intended learning outcome. This is useful for future consideration of medical education programs.

Objectives of the Study

1. To study the 1995 comprehensive examination results and the student's GPAX for highest and lowest scores, arithmetic mean, standard deviation, and percentage for :
 - 1.1 all three programs combined
 - 1.2 the conventional program
 - 1.3 the MESRAP program
 - 1.4 the CTPB program.
2. To compare the scores of the comprehensive examination and GPAX among the three programs.
3. To determine the correlation coefficient between the comprehensive examination and the GPAX.

Definitions

1. **Student Achievement.** An ability test designed to appraise what the individual had learned as a result of previous experience or planned training.⁽⁸⁾

This study refers to measurement by grade point average in medical education of sixth-year medical students at Chulalongkorn University and use of the 1995 comprehensive examination.

2. Comprehensive examination. The Faculty of Medicine of Chulalongkorn University set standard criteria for the comprehensive examination based on the Medical Council's standard criteria. There are thirteen subjects which include: Emergency Room and Out Patient Department, Surgery, Medicine, Obstetric and Gynecology, Pediatrics, Preventive and Social Medicine, Orthopedic Surgery and Rehabilitation Medicine, Psychiatry, Radiology, Anesthesiology, Oto-laryngology, Ophthalmology, Forensic Medicine. In each subject, there are specific objectives and course outlines.

3. Sum of Grade Point Average (GPAX). A recording of student achievement using an alphabetical or percentage scale. The result is an ascending or descending order of students. A GPAX is the sum of the products of the value and the number of credits of all the courses assessed in letter grades from the first semester up to the current present semester.⁽⁹⁾

4. Medical Education for Students in Rural Area Project (MESRAP). This refers to the medical curriculum established by the Faculty of Medicine of Chulalongkorn University in 1976. It aims to increase the number of qualified doctors, correct the imbalance of doctors in urban and rural areas, and prepare the medical students to assume their roles in district hospitals. Students are recruited from 12 provinces, eight in the Eastern and four in northeastern provinces of Thailand.⁽¹⁰⁾

5. Community Targeted Problem-based

Medical Education (CTPB). This was established in 1988. Candidates must be graduates of any curriculum except health sciences and to be eligible must have 26 credits of basic science. They must also pass a rigid screening examination conducted by the two co-organising institutions (the Faculty of Medicine of Chulalongkorn University and the Directorate of Medical Services of The Royal Thai Air Force).⁽¹¹⁾

Population, Materials and Procedures

Population: There were 136 sixth-year medical student in the 1995 academic year from the three programs. The respective number of medical students in the conventional, MESRAP, and CTPB programs were 97, 26, and 13.

Materials:

1. One microcomputer
2. One printer
3. One optical scanner (OPSCAN Model 5)
4. Software for the optical scanner
5. Word Processing software
6. Spreadsheet software (LOTUS 123)
7. Statistics software (EPISTAT)
8. 136 computer answer sheets
9. 136 comprehensive examination answer sheets (300 items each)
10. The GPAX of the 136 medical students
11. Diskettes

Procedures:

1. Gather data (GPAX) from the Registra's Office of the Faculty of Medicine of Chulalongkorn University.

2. Collect the students' answer sheets after the examination.

3. Record the raw data from the answer sheets via use of the scanner.

4. Import the data into the spreadsheet program.

5. From the spreadsheet program obtain statistics indices such as percentage, maximum score, minimum score, arithmetic mean, and standard deviation.

6. Prepare four sub-worksheets: 1] scores for all students; 2] scores for conventional students; 3] scores for MESRAP students and 4] scores for CTPB students.

7. Use the EPISTAT program to compared the mean score among the programs by the one-way ANOVA and comparison between two programs by the independent sample t-test.

8. Use the EPISTAT program to determine the correlation coefficient between the comprehensive score and the GPAX.

Results

1. The profile of achievement of the students in terms of the 1995 comprehensive examination and their GPAX on highest and lowest scores were as follows:

The 1995 comprehensive examination highest score was 231 (77.00 %) and the lowest score was 139 (43.33%). The arithmetic mean was 185.63 (61.88%) and the standard deviation was 16.95. When classified by curriculum, in the conventional program the highest score was 231 (77.00%) and the

lowest score was 145 (48.33%). The arithmetic mean was 190.16 (63.37%) and the standard deviation was 15.11. In the MESRAP program the highest score was 207 (69.00%) and the lowest score was 139 (43.33%). The arithmetic mean was 180.17 (60.05%) and the standard deviation was 14.67. In the CTPB the highest score was 181 (60.33%) and the lowest score was 140 (46.67%). The arithmetic mean was 163 (54.64%) and the standard deviation was 13.15 [Table 1].

Table 1. Highest score, Lowest score, Mean and Standard deviation of the 1995 Comprehensive Examination.

Program	No.of Students	Highest score	Lowest score	Mean	S.D.
Conventional	97	231 [77.00 %]	145 [46.33 %]	190.16 [63.39 %]	15.11
MESRAP	26	207 [69.00 %]	139 [43.33 %]	180.15 [60.05 %]	14.60
CTPB	13	181 [60.33 %]	140 [46.67 %]	163 [54.64 %]	13.15
Total	136	231 [77.00 %]	139 [43.33 %]	185.63 [61.88 %]	16.95

The highest GPAX was 3.88 (97.00%) and the lowest GPAX was 2.02 (50.50%). The arithmetic mean was 3.07 or (76.77%) and the standard deviation was 0.496. The conventional program highest GPAX was 3.88 (97.00%) and the lowest was 2.51 (62.75%). The arithmetic mean was 3.20 (80.00%) and the standard deviation was 0.459. The MESRAP

program highest GPAX was 3.14 (78.50%) the lowest was 2.02 (50.50%). The arithmetic mean was 2.61 or (65.25%) and the standard deviation 0.348. The CTPB program highest GPAX was 3.44 or (86.00%) and the lowest was 2.40 (60.00%). The arithmetic mean was 3.12 or (78.00%) and the standard deviation was 0.318 [Table 2].

Table 2. Highest , Lowest , Mean and Standard deviation of GPAX.

Program	No.of Students	Highest GPAX	Lowest GPAX	Mean	S.D.
Conventional	97	3.88 [97.00 %]	2.51 [62.75 %]	3.20 [80.00 %]	0.459
MESRAP	26	3.14 [78.50 %]	2.02 [50.50 %]	2.61 [65.25 %]	0.348
CTPB	13	3.44 [86.00 %]	2.40 [60.00 %]	3.12 [78.22 %]	0.318
Total	136	3.88 [97.00 %]	3.07 [50.50 %]	3.07 [76.75 %]	0.496

2. In comparing the comprehensive examination among these programs, the results were found to be significantly different. The F-value of 21.378 was found to be significantly different at the .05 level [$p < .05$]. The arithmetic mean of the comprehensive examination in the conventional program was significantly higher than the mean of the MESRAP and CTPB programs at a level 0.01 [$p < .01$]. When the

MESRAP and CTPB results were compared a, t-value of 3.568 was found at the .05 level [$p < .05$] [Table 3]. When ranking the scores of the 136 sixth-year medical students, the top fourteen were conventional medical students. The MESRAP medical student with the highest score ranked number fifteen, and the CTPB medical student who had the highest score ranked number eighty-seven.

Table 3. Difference Among Scores of Comprehensive Examination 1995.

Programs	Student Achievement	
	F-value	T-value
Conventional vs MESRAP vs CTPB	21.378*	-
Conventional vs MESRAP	-	3.020*
MESRAP vs CTPB	-	3.568**
Conventional vs CTPB	-	6.168*

* $p < .05$

** $p < .01$

The comparative GPAX among three programs the means of these samples were significantly different at level 0.05 [$p < .05$]. When compared between conventional program and MESRAP, the mean GPAX of conventional program was higher than the mean GPAX of MESRAP, the mean of these two samples were significantly different at .01 level [$p < .01$]. When compared between conventional

program and CTPB program the mean GPAX of these two samples were not significantly different. [Table 4]. When ranked of 136 sixth year medical students, the top fourteen were the conventional medical students. The CTPB medical student with the highest GPAX ranked number fifteen and the MESRAP medical student who had the highest GPAX ranked number fifty-eight.

Table 4. Difference Among Scores GPAX of sixth year medical students.

Programs	Student Achievement	
	F-value	T-value
Conventional vs MESRAP vs CTPB	19.509*	-
Conventional vs MESRAP	-	6.103**
MESRAP vs CTPB	-	4.400
Conventional vs CTPB	-	.644

* $p < .05$

** $p < .01$

3. Among all of the sixth-year medical students, the correlation between the comprehensive examination scores and GPAX was significantly related with r was .41399, significant at .01 level. [$p < .01$] [Table 5].

Table 5. Correlation Between Comprehensive Examination Scores and GPAX.

Student No.	Comprehensive examination	GPAX	r
1.	193	3.21	.41339*
2.	193	3.17	
3.	189	3.32	
4.	179	3.20	
5.	164	2.69	
6.	186	2.94	
7.	186	3.35	
8.	170	2.80	
9.	205	3.88	
10.	202	3.48	
.	.	.	
.	.	.	
127.	150	2.40	
128.	176	3.36	
129.	159	3.02	
130.	171	3.26	
131.	175	3.27	
132.	165	3.14	
133.	174	3.37	
134.	140	3.17	
135.	181	3.44	
136.	174	2.59	

* $P < .01 = .232$ r Pearson's correlation coefficient.

Discussion

Boonsri⁽¹²⁾ found that the achievement of the medical students in MESRAP program was lower than in the conventional program. His study reported that achievements of the medical students were different with different recruitment styles. Conventional program students were recruited by the entrance examination of the Ministry of Affairs, and they had a higher ability to learn. These results were in broad agreement with Amnach⁽¹³⁾ who revealed that the medical students from the MESRAP program had lower achievement levels in some courses than the medical students from the conventional program. He suggested that the faculty must improve the educational systematic process of services, teaching, and research.

With regard to student achievement in terms of GPAX and comprehensive examination scores, The conventional medical students had higher GPAX and comprehensive examination scores than the MESRAP and CTPB students. Both the MESRAP and CTPB programs should maintain the upkeep and management of knowledge, the appreciation of the students for the things they learn in class, hence the conduct of seminars and improvement of training in facilities and equipment. After the examination, the results should be computed and checklists marked as previously planned. Feedback should be provided to the students as soon as possible, and can be arranged by discussing the examination with the students, Particularly in areas where the general performance was poor.

Further studies should focus on student evaluation. In all cases, the evaluation process is

basically the same and involves determination of the types of data which need to be collected, and determination of the individual or group/groups from whom the data will be obtained, etc.

Summary

This comparative study aimed to study the scholastic achievements of the sixth-year medical students of the Faculty of Medicine of Chulalongkorn University in the 1995 academic year. For the study, 136 medical students were chosen from three programs; 97 students were from the conventional program, 26 were from MESRAP, and 13 were from CTPB. The 1995 comprehensive examination results and GPAX were used to provide the data on 15 subjects. Percentages, arithmetic means, standard deviations, the T-test, the F-test, and Pearson' correlation coefficient were the statistical methods used. This study attempted to: ⁽¹⁾ study the 1995 comprehensive examination scores and GPAX in terms of highest score, lowest score, arithmetic means, standard deviation and percentage for all three programs, the conventional program, the MESRAP program, and the CTPB program; ⁽²⁾ to compare the scores of the comprehensive examination and GPAX among the three programs; and ⁽³⁾ to determine the correlation coefficient between the comprehensive examination results and GPAX.

The highest possible score of the comprehensive examination is 300. The highest in our series was 231 (77.00%) and the lowest was 139 (43.33%). The arithmetic mean was 185.63 (61.88%) and the standard deviation was 16.95. The arithmetic means of the conventional, MESRAP, and CTPB

programs were 190.16, 180.15, and 163, respectively.

The highest GPAX among the students was 3.88 (97.00%), and the lowest was 2.02 (50.50%). The arithmetic mean was 3.07 (76.75%) and the standard deviation was 0.496. The arithmetic means of the conventional, MESRAP and CTPB programs were 3.20, 2.61, and 3.12, respectively. When comparing the mean GPAX among three programs, the arithmetic mean GPAX of the conventional program was higher than in the MESRAP and CTPB programs and was significantly different at .05 level [$p < .05$].

The correlation of the comprehensive examination scores and GPAX were significantly related where r was .41339, significant at .01 level [$p < .01$].

References

1. Ruamsuke S, Kriengsiri S, Varavithya C, Hongladarom T, Rajatapiti B, Suwanwela C. Problem-Based Medical Education: New Challenge in Thailand. Bangkok: Faculty of Medicine, Chulalongkorn University, 1988.
2. Faculty of Medicine, Chulalongkorn University. Medical Education for Students in Rural Area Project (MESRAP). Bangkok: Division of Academic affairs, 1993:1.
3. Faculty of Medicine, Chulalongkorn University. Community targeted Problem Based Medical Education Program (CTPB). Bangkok: Division of Academic Affairs, 1993:1.
4. Gay LR. Educational Evaluation And Measurement. New York: Macmillan 1991:1.
5. Harden RM, Dunn WR. Medical Education-A Workshop. A Relook Into Medical Education in The '80s. Malaysia: Universiti Sains, Malaysia. 1981
6. Faculty of Medicine, Chulalongkorn University. Table of Specification for Comprehensive Examination. Bangkok: Division of Academic Affairs, 1993.
7. Laisnitsarekul B, Tantayaporn K, Sriratanaban J. The 1993 comprehensive examination in medicine: score of Multiple Choice Question test. Bangkok: Division of Academic Affairs, 1993.
8. Gay. Educational Evaluation And Measurement. New York: Macmillan, 1991:2.
9. Chulalongkorn University. Chulalongkorn University Bulletin 1986-1988, Bangkok: Chulalongkorn University, 1986.
10. Faculty of Medicine, Chulalongkorn University. Medical Education for Students in Rural Area Project (MESRAP). Bangkok: Division of Academic Affairs, 1993:2
11. Faculty of Medicine, Chulalongkorn University. Community targeted Problem Based Medical Education Program (CTPB). Bangkok: Division of Academic Affairs, 1993:2
12. Sangprasert B, Makinanukul S. The Assessment of Extracurriculum Field Courses and Community Medicine of MESRAP. J Prapokklao Hosp Clin Med Educ 1986 Jul-Sept;3(3):139-43
13. Amnach Sriratanaban. Medical education for students in rural area procect. An approach to the problem. Chula Med J 1983 Sep;27(9):1-5