# In-house Pre-medicine Trained Students: How Faculty Members Perceive Them?

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Abstract—A pre-med study is a 1-year program consists of Chemistry, Biology, Physics, and Mathematics as core subjects. This study aimed to evaluate the perception of teaching members in medicine and pharmacy faculties toward their students who come from an in-house pre-med program with regards to cognitive, affective domain, and soft skills. A set of questionnaires consisted of statements encompassing the 3 attributes was distributed to and collected from faculty members. Data of 30 from 53 possible teaching members were analyzed using t-test and Chisquare test to evaluate differences for each statement across the two faculties. Generally, there was no such difference found (for p < 0.05) for each attribute inter-faculty wise. Further analysis was carried out by combining all respondents from the two faculties. Responses based on the 3 attributes were analyzed. Teaching members perceived students positively on the cognitive and soft skills, and very positively on the affective domain.

*Index Terms*—Medical students, cognitive skill, soft skill, affective domain, teachers' perception

#### I. INTRODUCTION

It is fame that only brightest students can go to medical schools. Due to their future profession, medical students certainly require skills to sustain the rigorous long training. Top of the curve is the communication skills. Such skills learned early in medical courses, be it formal or informal proved to enhance students' ability to appropriately relate to peer-peer and doctor-patient communications. The skill helps students to be attentive and motivates them to learn clinical communication strategies [1]-[3]. In short, ability to communicate clearly, greatly improves medical students' team dynamics, selflearning, problem solving, personal development and professionalism.

Medical field involves high level of hypotheticodeductive reasoning and therefore, analytical thinking skill that refers to ability to think clearly according to a correct framework is a must. This thinking is reflected through argumentation or written medium. In either case the hypothetico-deductive reasoning or algorithm is represented. A study revealed that preclinical students predominantly made claims without proper justifications, hence, instructional interventions were necessary to keep them on the right track [4]. Similar evidence was found in internal medicine clerkship which resulted in a call for additional resources dedicated to developing clinical reasoning curricula to improve diagnostic accuracy [5].

Non-cognitive aspect is as significant as the cognitive ability to determine academic success in medical schools. The aspect includes efforts such as trying hard, paying attention, and showing persistence to challenging academic work; and soft skills such as leaning and speed reading. Learning skills as an example really helps students to perform in theoretical and practical classes. Studies proved that seasoned and new learning skill, as well as approaches to studies improved problem solving ability and academic performance greatly [6]-[9].

There are evidences that noncognitive aspect outperforms academic self-efficacy (such as capability to learn and perform) and prospects (such as career perspective and social compliance) as predictor of students' success [10], [11]. Clearly, non-cognitive measures predict broader outcomes than simply letter grades [12], [13].

However, teachers to assess students on non-cognitive aspects is a rare phenomenon. Earlier efforts were done through self-presentation on self-report instrument, and such tools were known to be approximately 20% inflated to scores obtained in a research context [14], [15]. This work produced findings to fill-in the above gap. It investigated the perception of Faculty of Medicine and Faculty of Pharmacy (hereinafter referred to as FOM and FOP respectively) members on their students who come from inhouse pre-medical studies on aspects other than academic performance. It is hoped that the finding helps pre-med programs to produce better prepared students, and faculties to welcome these students with appropriate expectation, curriculum, and delivery technique. After all, these students are going to be healthcare professionals in time to come.

In relation, the objective of this study was to evaluate the perception of teaching members toward in-house trained pre-med students with regards to the following skills: cognitive, soft-skill, and affective domain.

In Malaysia, eligible high school graduates who intend to do Bachelor of Medicine (MBBS) or Bachelor of Pharmacy (B. Pharm.) typically enroll in pre-med or Foundation in Science (FIS) studies. FIS curriculum consists of major courses of Mathematics, Chemistry, Biology, and Physics; and supplementary courses of English, Information Technology, and Affective Domain

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(AD) elements. Upon successful completion and fulfill the main entry requirement, students to proceed to respective faculties. Teaching members in FOM and FOP of Cyberjaya University College of Medical Sciences were chosen as the subject of interest. The two faculties have been taking in-house trained FIS students since 2006, and a survey was done in July to August 2016 during which time, all students had completed one year in the degree programs.

## II. METHODOLOGY

A set of 13 statements questionnaire consisted aspects of: knowledge, soft-skill, and affective domain was developed and tested. There are as displayed in Table I.

#	Statement
1	FIS graduates have adequate basic science knowledge to pursue MBBS/ B.Pharm.
2	They surpass other pre-u. graduates in academic performance.
3	They portray right learning attitude to pursue MBBS/ B.Pharm.
4	They surpass other pre-u graduates in term of soft skills.
5	They have adequate communication skills.
6	They display good ethic values.
7i	Rating on their critical/ analytical skill.
7ii	Rating on their ability to identify problems from a right perspective.
7iii	Rating on their independent learning skill.
7iv	Rating on their problem-solving skill.
8	They practice good discipline in the faculty.
9	They blend well with the social environment at the faculty.
10	Min. CGPA of 3.0 is a good entry requirement to the faculty.

Respondents were asked to rate their level of agreement or satisfaction for each of the statements in the scale of 1-5. 1 for "Strongly Disagree" or "Poor", 2 for "Disagree" or "Below Average", 3 for "Undecided" or "Average", 4 for "Agree" or "Good", and 5 for "Strongly Agree" or "Excellent". The questionnaire was distributed to Preclinical faculty members of FOM and the faculty members at large of FOP. Responses were collected on agreed dates, data were compiled, and analyzed.

A comparison study in responses of FOM and FOP faculty members for each of the 13 statements was done. T-test and Chi-square test were conducted to check for significant difference for each statement between the two faculties' feedback. The t-test indicated about significant differences between the faculties based on the mean score, while the Chi-square tests informed about significant difference over the crosstabulation.

After an analysis of the above (to be discussed in the next subtopic), it was found that generally there was no significant difference between responses of the FOM and FOP faculty members. A second stage analysis was carried out by combining all respondents from the two (2) faculties.

#### III. ANALYSIS AND RESULTS

#### A. Demographic Profile.

Respondents came from teaching staff of FOM and FOP of the university. 19 (of 23 FOM faculty members) and 11 (of 30 FOP faculty members) responded and returned the questionnaire. Demographic profile of respondents is given in Table II.

The distribution represents the teaching position in the university with an exception of the professorship (which was not represented). The respondents came from a wide area of teaching such as anatomy, psychiatry, biochemistry, family medicine, pharmacology, social pharmacy, clinical pharmacy, and pharmaceutical chemistry.

Position	Faculty of Medicine	Faculty of Pharmacy	Total	Percent %	
Professor	0	0	0	0.0	
Assoc. Prof.	5	2	7	23.3	
Assist. Prof.	9	3	12	40.0	
Lecturer	4	5	9	30.0	
Assist. Lect.	1	1	2	6.7	
Total	19	11	30	100.0	

TABLE II. DEMOGRAPHIC PROFILE OF RESPONDENTS

# B. Comparison between FOM and FOP Faculty Members' Perception.

Comparison of feedbacks between the two faculties was evaluated from 2 perspectives: mean difference and cross-tabulation.

1) Mean difference

T-test was done to measure differences based on mean of each statement of the two groups. Taking p < 0.05 for significant level, the t-test result in Table III shows no significant difference in between the two faculties except for two statements.

TABLE III. T-TEST MEASURES THE MEAN DIFFERENCE BETWEEN FOM AND FOP

Statement	Mean (SD) FOM	Mean (SD) FOP	T-Test Value	p-value	
1	3.63 (0.684)	3.27 (1.009)	1.048	0.311	
2	3.37 (0.684)	3.36 (0.809)	0.016	0.987	
3	3.95 (0.524)	4.00 (0.775)	-0.2	0.844	
4	3.53 (0.612)	3.55 (0.934)	-0.061	0.952	
5	3.47 (0.905)	3.36 (0.924)	0.317	0.755	
6	3.74 (0.653)	3.64 (0.924)	0.317	0.755	
7i	3.21 (0.535)	2.91 (0.831)	1.08	0.297	
7ii	3.05 (0.621)	3.27 (0.905)	-0.715	0.485	
7iii	3.11 (0.658)	3.27 (1.104)	-0.458	0.654	
7iv	3.05 (0.621)	3.00 (0.894)	0.173	0.865	
8	3.84 (0.602)	4.09 (0.302)	-1.505	0.144	
9	3.89 (0.459)	4.45 (0.688)	-2.408	0.029	
10	3.16 (0.958)	3.91 (0.944)	-2.089	0.049	

FOP faculty members have higher mean than their counterpart in FOM (4.45 vs. 3.89) for statement 9-'They blend well with the social environment at the faculty'. Similar situation (3.91 vs. 3.16) is for statement 10-'Min. CGPA of 3.0 is a good entry requirement to the faculty'.

2) Cross tabulation differences

Chi Square test measured the cross-tabulation differences between FOM and FOP faculty members' perception. Taking p<0.05 as the cut-off for significant difference, the test result in Table IV shows no significant difference between the faculties except for two statements: 7iii-'Rating on their independent learning skill', and 9-'They blend well with the social environment at the faculty'. Majority of FOM faculty members (57.9%) perceive students' independent learning skill as average, while majority of their counterpart in FOP (54.6%) perceive students' independent.

#### TABLE IV. CHI-SQUARE TEST MEASURES THE CROSS-TABULATION DIFFERENCE BETWEEN FOM AND FOP FACULTY MEMBERS' PERCEPTION.

Statement	Faculty	% Str. Disagree/ Poor (1)	% Disagree/ Below Ave. (2)	% Undecided/ Average (3)	% Agree/ Good (4)	% Str. Agree/ Excellent (5)	Chi-Square Test Value	<i>p</i> -value	
1	FOM	0	10.5	15.8	73.7	0	4.163	0.125	
	FOP	0	36.4	0	63.6	0			
2	FOM	0	5.3	57.9	31.6	5.3	4.060	0.255	
	FOP	0	18.2	27.3	54.5	0			
3	FOM	0	0	15.8	73.7	10.5	3.771	0.287	
	FOP	0	9.1	52.6	12.1	10.2 5.2			
4	FOM	0	10.0	10.0	42.1	0.1	5.906	0.116	
	FOP	0	18.2	18.2	54.5	9.1			
5	FOM	0	21.1	15.8	57.9	5.3	0.967	0.809	
	FOP	0	27.3	9.1	63.6	0			
6	FOM	0	0	36.8	52.6	10.5	5 630	0.131	
0	FOP	0	18.2	9.1	63.6	9.1	5.050		
7:	FOM	0	5.3	68.4	26.3	0	5 200	0.070	
/1	FOP	0	36.4	36.4	27.3	0	3.309	0.070	
7::	FOM	0	15.8	63.2	21.1	0	2 252	0.500	
/11	FOP	0	18.2	45.5	27.3	9.1	2.252	0.522	
<b>_</b>	FOM	0	15.8	57.9	26.3	0	= 005	0.040	
7111	FOP	0	36.4	9.1	45.5	9.1	7.905	0.048	
7.	FOM	0	15.8	63.2	21.1	0	2 (71	0.1.00	
/1V	FOP	0	36.4	27.3	36.4	0	3.6/1	0.160	
8	FOM	0	0	26.3	63.2	10.5	3 641	0.162	
0	FOP	0	0	0	90.9	9.1	5.041	0.102	
9	FOM	0	0	15.8	78.9	5.3		0 000	
y	FOP	0	0	9.1	36.4	54.5	7.401	0.009	
10	FOM	0	31.6	26.3	36.8	5.3	4 368	0.224	
10	FOP	0	9.1	18.2	45.5	27.3	4.500	5.224	

Even though the two faculties show significant difference in statement 9, but majority in both FOM (84.2%) and FOP (90.9%) agree or strongly agree that students blend well with the social environment in the faculty. The difference is simply in the percentage of agree or strongly agree.

Comparison in cross-tabulation and difference of means perspectives show little difference between the two faculties except for statement 9-'They blend well with the social environment at the faculty', in which both faculties show positive feedback but one has higher mean than the other.

# C. Combination of FOM and FOP Faculty Members' Perception.

Since feedbacks from both faculties were very similar, researchers combined all respondents as a group of 30 for further analysis of the data. The bigger size contributed to better representative and less error. Following are the analysis of the perceptions on cognitive ability, soft skills, and affective domain elements of the combined group.

# 1) Perception on cognitive ability

Faculty members' perception on students' cognitive ability had 3 statements. The statements and their frequency distributions of response are displayed in Table V.

 TABLE V. FACULTY MEMBERS' PERCEPTION ON STUDENTS' COGNITIVE DOMAIN.

Statement	% Str. Disagree/ Poor (1)	% Disagree/ Below Ave. (2)	% Undecided/ Average (3)	% Agree/ Good (4)	% Str. Agree/ Excellent (5)	Mean (SD)	Graphic Representation			
1	0	20	10	70	0	3.50 (0.82)	100 % 1-2 3 4-5			
2	0	10	46.7	40	3.3	3.37 (0.72)	50 % 0 1-2 3 4-5			
10	0	23.3	23.3	40	13.3	3.43 (1.01)	100 % 1-2 3 4-5			

Statement 1-'FIS graduates have adequate basic science knowledge to pursue MBBS/ B.Pharm' has highest positive feedback (70%), and statement 10-'Minimum CGPA of 3.0 is a good entry requirement to the faculty' has 53.3% positive feedback. While statement 2-'They surpass other pre-university graduates in terms of academic performance' has only 43% positive feedback.

On the other end, negative feedbacks carry very small percentage between 10-23.3% in all 3 statements.

#### 2) Perception on soft skill

Faculty members' perception on students' soft skill was divided into 6 statements. The statements and their frequency distributions of response are shown in Table VI.

Faculty members seem to agree that the students have better softs skills including communication in general. Statement 4-'They surpass other pre-university graduates in soft skills' and statement 5-'They have adequate communication skills' have 53% and 63% positive feedbacks respectively. However, in the more details soft skills, positive feedbacks carry much less percentage. Instead, average score dominates the distribution. Statements 7i-'Rating on critical and analytical skills', 7ii-'Rating on their ability to identify problem from a right perspective', 7iii-'Rating on their independent learning skill', and 7iv-'Rating on their problem solving skill' has 57%, 57%, 40%, 50% average score respectively.

TABLE VI. FACULTY MEMBERS' PERCEPTION ON STUDENTS' SOFT SKILL

Statement	% Str. Disagree/ Poor (1)	% Disagree/ Below Ave. (2)	% Undecided/ Average (3)	% Agree/ Good (4)	% Str. Agree/ Excellent (5)	Mean (SD)	Graphic Representation			
4	0	6.7	40	46.7	6.7	3.53 (0.73)	100 30 1-2 3 4-5			
5	0	23.3	13.3	60	3.3	3.43 (0.90)	100 % 1-2 3 4-5			
7i	0	16.7	56.7	26.7	0	3.10 (0.66)	100 3 1-2 3 4-5			
7ii	0	16.7	56.7	23.3	3.3	3.13 (0.73)	50 1-2 3 4-5			
7iii	0	23.3	40	33.3	3.3	3.17 (0.83)	50 0 1-2 3 4-5			
7iv	0	23.3	50	26.7	0	3.03 (0.72)	100 30 1-2 3 4-5			

Negative feedbacks consistently carry very small percentage between 6.7-23.3%.

3) Perception on affective domain elements

Faculty members' perception on students' affective domain ability was divided into 4 statements. The

statements and their frequency distributions of response are displayed in Table VII.

Table VII clearly shows that faculty members are satisfied with the affective domain elements of the students. All 4 statements have high percentage of positive feedbacks 87%, 67%, 83%, 87% for statement 3-'They portray right learning attitude to pursue medicine/ pharmacy education', statement 6-'They display good ethic values', statement 8-'They practice good discipline in the faculty', and statement 9-'they blend well with the social environment at the faculty' respectively.

The negative feedback is consistently minimal with lowest of 0% in statements 8 and 9. Indecisive and average responses are also small in percentage.

TABLE VII. FACULTY MEMBERS' PERCEPTION ON STUDENTS' AFFECTIVE DOMAIN.

Statement	% Str. Disagree/ Poor (1)	% Disagree/ Below Ave. (2)	% Undecided/ Average (3)	% Agree/ Good (4)	% Str. Agree/ Excellent (5)	Mean (SD)	Graphic Representation			
3	0	3.3	10.0	73.3	13.3	3.97 (0.62)	100 % 0	_		
6	0	6.7	26.7	56.7	10.0	3.70 (0.75)	100 %	1-2	3	4-5
8	0	0.0	16.7	73.3	10.0	3.93 (0.52)	100 %	1-2	3	4-5
9	0	0.0	13.3	63.3	23.3	4.10 (0.61)	100 %	1-2	3	4-5

## IV. DISCUSSION

While most faculty members in FOM viewed the inhouse pre-med trained students' ability as independent learner as average, a large portion of their counterparts in FOP viewed these students as highly able to learn independently. Pre-clinical years in medical schools consist of in-class basic sciences such as anatomy, biochemistry, pharmacology, and physiology that do not require much independent study. However, subjects in pharmacy require more hours in laboratory works and independent assignments. Hence, pharmacy students are given more chance to show their independent learning skill.

The finding reveals that faculty members satisfy with the basic science knowledge and skills of the students to pursue the degree programs, although they are not necessarily better than those from external pre-med programs. However, there are evidences that in-house pre-med students perform better in preclinical academic performance, although the rest of the students may catch up at later stage of the training [16], [17]. In relation, minimum grade point average of 3.0 is an acceptable admission requirement to the degree programs.

Soft skills including communication skills is a strong factor among in-house pre-med trained students. They are perceived as superior in these skills compared to external pre-med students. However, critical, analytical, problem solving, and independent learning skills need improvement. Finding regarding the above skills is consistent with findings in other setups. Students need time to get used to new scenario and challenges. However, students may expedite this crucial skills ability if an explicit critical-thinking curriculum is introduced to them [18], [19].

Affective domain involves a spiritual aspect that emphasizes the development of attitudes, emotions, and values [20], [21]. These values are extended to interpersonal relation such as peer-to-peer relationship, teamwork, and organizational skill. The finding really shows that faculty members view these values are the main strengths of in-house pre-med trained students. Students' positive attitudes to teamwork and collaboration may be due to prior experience and exposure gained during the pre-med stage. They inherit and extend the attitude into new environment.

# V. CONCLUSION

This limited study shows that faculty members in Pharmacy and Medicine do see the advantage of in-house pre-med trained students when these students join them in degree level of education. The advantage encompasses higher ability as independent learners, and quicker adaptability to cognitive aspects, as well superior supporting soft skills. In addition to the above qualities, these students are also richer in positive attitudes, teamwork, discipline, and adapt well with demanding nature of medicine and pharmacy academic life. While the finding shows rosy view from teachers' perspective, further information is needed to complement the work. For example, this study only took into consideration those students who had spent a year in the medicine and pharmacy faculties. How do they cope in later stage of the training is an interesting scenario to compare to.

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