Correlation between Peer Assessment Score and Final Examination Mark among IIUM First Year Medical Students

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ABSTRACT

Background: Peer assessment has been shown to complement both formative and summative evaluations in education and used in some medical programmes. The study was aimed to find correlation between group work peer assessment score and final examination mark among four batches of International Islamic University Malaysia (IIUM) first year MBBS students. **Method:** A set of four questions was constructed and tested to assess students' overall role in their group research project. The difference in distribution according to years was tested by using one-way ANOVA or Kruskal-Wallis, depending on the data distribution. Pearson correlation coefficient test was done to test the linear association between peer score and final examination mark. Partial correlation test was used to adjust the correlation for four academic years. **Results:** From the analysed data of 502 students, there was moderate, significant positive correlation (0.366) between peer assessment score and the final examination mark ($P < 0.001$). Adjustment to the academic years resulted in correlation coefficient of 0.371. **Conclusion:** The results provide an important insight on the influence of peers' perception in predicting the medical student academic performance.

Keywords: Peer assessment, medical students, undergraduate, team work, IIUM

INTRODUCTION

Peer assessment is used in medical education evaluation since early 70s.[1] Peer assessment is used to complement both formative and summative evaluations; besides assessing teachers' teaching performance.[2] In a meta-analysis of 56 studies, peer assessment was found to have a good correlation (r=0.69) with various outcomes of interest, including evaluation on patient clerking performance in Family Medicine.[3]

There are many approaches to conduct peer assessment in medical education. Arnold et al. in 1981 requested medical students at Missouri-Kansas City School of Medicine to evaluate 11 dimensions of their peers; which were attitude, peer relation, reliability, medical information, concepts, skills, maturity, patient rapport, ingenuity, conscientiousness and integrity.[1] Average peer assessments were then calculated and used together with the other measures of student's performance.

Peer assessment is also expected to prevent 'easy-rider' or 'easy-loafer' in any group project.[4] Medical education is unique because the theories or concepts are specifically tailored for the actual medical practice. Teamwork is important and therefore, interpersonal skills and peer trustworthiness should be evaluated properly.[5] This study was conducted to measure the correlation between peer assessment which includes questionnaire on trustworthiness and teamwork, and final examination mark among first year IIUM medical students.

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MATERIAL AND METHODS

Subjects

This study involved four batches of first year medical students from 2009 to 2012 in International Islamic University Malaysia (IIUM). IIUM Medical Faculty was established in 1995 and there were 12 batches of MBBS graduates produced by the university on 2012. Since 2009, all first year medical students in the faculty are required to evaluate their peers during the last block (Block 4, Introduction to Public Health course). In this block, students are taught with the basics of public health medicine which include epidemiology, biostatistics, family health, occupational health, environmental health and nutritional health. For the purpose of studying epidemiology and biostatistics, students are split into four groups and each group has to conduct a small survey in the campus. At the end of the survey, all groups are required to present their findings to the lecturers. This task requires team work and cooperation between group members. This becomes the main aspect of the peer evaluation.

Peer assessment questionnaire

The peer assessment is to be done online. All students need to answer four questions; *"Who contributed the most in your group?"*, *"Who contributed the least in your group?"*, *"Who do you like to work with the most?"* and *"Who you don't like to work with the most?"*. The questions requested responses for two positive attributes (Question 1 and 3) and two negative attributes (Question 2 and 4), by nominating a group member for each question. Each student can only be nominated once.

From the factor analysis (Kaiser-Meyer-Olkin (KMO) value of 0.507 and Bartlett's Test of P<0.001), inter-item correlation (TABLE 1) shows positive correlation between questions for positive attributes (Q1 and Q3) and negative attributes (Q2 and Q4). The correlation between positive and negative attributes was observed to be inversely proportional. Principal Component Analysis with Varimax rotation and Kaiser Normalization extracted two factors that correspond very well to the positive and negative attributes. Positive attributes (Q1 and Q3) were loaded well into one factor with the loading values of 0.857 and 0.842 respectively; while negative attributes (Q2 and Q4) had loading values of 0.881 and 0.888, forming into another factor.

Table 1 Inter-item correlation between questions

	Q1	Q2	Q3	Q4
Q1 - Who contributed the most in your group?	1	-0.057	0.447	-0.005
Q2 - Who contributed the least in your group?	-	1	-0.116	0.572
Q3 - Who do you like to work with the most?	-	-	1	-0.098
Q4 - Who don't you like to work with the most?	-	-	-	1

Initially, everyone is given 5 points. Every positive nomination will grant the student 1 point whereas each negative nomination will result in the reduction of 1 point. TABLE 2 illustrates the calculation example.

Table 2. Example of peer assessment scoring

	Number of nomination		
	Student 1	Student 2	Student 3
All students receive 5 points	5	5	5
Q1 - *Who contributed the most in your group?*	6	0	0
Q2 - *Who contributed the least in your group?*	1	7	0
Q3 - *Who do you like to work with the most?*	3	1	0
Q4 - *Who you don't like to work with the most?*	0	3	0
Total nomination (2+3+4+5)	10	11	0
Peer Score (1+2-3+4-5)	13	-4	5

Examination marks

The examination comprises multiple choice (true/ false) questions, problem solving, short notes and data visualisation tests. Forty percent of the final examination mark is to be carried forward from the continuous assessment. The total mark is described in percentage.

Statistical analysis

The analysis only considers the students who sat for the examination. For repeat students, only their first result and peer assessment score were included.

The online peer assessment was created by using PHP and MySQL. Data is downloaded in Microsoft Excel format and later merged into SPSS for Windows version 20 (IBM Corp., Armonk, NY) for analysis. The distribution of examination marks and peer score was presented in mean and standard deviation (SD), or median and IQR (Inter-quartile range).

The difference in distribution according to years was tested by using one-way ANOVA or Kruskal-Wallis, depending on the data distribution. Pearson correlation coefficient was used to test the linear correlation between peer score and final examination mark. Partial correlation test was used to adjust correlation for four academic years. Statistical significance is set at $P < 0.05$.

RESULTS

Five hundred and four first year IIUM medical students from 2009 to 2012 were selected for this analysis. We further exclude two students who were barred from the examination by the administration due to poor discipline from the analysis, thus the final number of students being analysed was 502. These two students obtained 49 and 44 total nominations for poor attributes (Q2 and Q4).

As depicted in TABLE 3, the overall mean of the examination mark was 60.9% (SD 6.6). Examination mark in 2011 was significantly higher than the other years ($P < 0.001$). Mean Peer Score was 5.3 (SD 2.4). The peer score was not different between batches. Pearson correlation coefficient between peer score and examination mark was 0.366 (r^2= 0.138) (P<0.001). After being adjusted to the academic years, the value was still significant (r=0.371, P<0.001). This shows that the peer assessment explains 13.8% variation in the final examination mark.

TABLE 3. Descriptive Statistics for Final Examination Mark and Peer Assessment Score

		All	2009	2010	2011	2012	P
Examination Mark	N	502	104	133	128	137	< 0.001*
	Mean	60.9	59.4	59.3	65.9	58.9	
	SD[a]	6.6	5.1	4.7	6.8	6.7	
Peer Score	N	502	104	133	128	137	0.585*
	Mean	5.3	5.5	5.4	5.1	5.2	
	SD[a]	2.4	2.6	2.6	1.6	2.7	

[a]SD = Standard deviation, * One-way ANOVA

DISCUSSION

Peer assessment was done to assess teamwork for a project done by the first year medical students. It measures how much a student contributes in a group project, as perceived by his or her peers.

The result shows a positive correlation between the students' ability to work in team and their academic performance. If they are perceived as good by their peers, the examination mark is likely to be good. The result concurs with the average correlation value observed from a meta-analysis study done by Falchikov and Goldfinch in 2000.[3]

Two students who were barred from examination due to poor discipline were nominated with negative attributes by 30% of their classmates nominated. In fact, for a class of 100 students, the probability of a student to be nominated once, in one of the four questions, is 0.04. So when 30% of the classmates marked down these two students for not contributing in the group project, it shows that the questionnaire can be used to identify problematic students.

The results provide an important insight on the influence of peers' perception in predicting the medical student academic performance. This also indicates that the students' ability to score in the final examination is associated with social skill. This is a good quality to have in future doctors.[5] Both formative and summative evaluations are important in medical education[6] and this outcome to a certain extend is proven in the IIUM first year student final examination mark.

It is believed that the four questions used in the questionnaire are able to measure teamwork. The same constructs for the questions managed to be extracted. However, the validation of the questions based on processes such as transition, action and interpersonal dimensions could not be performed.[7] This is considered as the limitation of the study.

In conclusion, peer assessment is associated with academic performance of the medical students and it should be used regularly in medical curriculum.

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