



Attitude of medical students toward a mandatory pre-medical year in the University for Development Studies, Ghana

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ABSTRACT

Objectives: The length of medical training at the undergraduate level varies across the world ranging from 4.5 to 7 years. In most medical schools including the three others in Ghana, the period of training a doctor is 6-year. Medical students in the University for Development Studies (UDS) however graduate after 7 years, because they spend a year in a mandatory 1st year class called problem-based learning zero (PBL 0). This study assessed the medical students' attitude toward this mandatory 1st year and the relevance of the courses taught during that period. **Methods:** A total of 304 non-graduate 1st year to the 7th year medical students completed a questionnaire in a cross-sectional study. Data were analyzed using SPSS 18 and GraphPad 5.01. Association between different variables was tested. **Results:** The age of entry into UDS medical school is 19.14 years. With a maximum attitude score of 5, students had a negative attitude toward Mathematics (2.31 ± 1.14), Physics (2.46 ± 1.27) and African studies (2.34 ± 1.22) courses. Cell structure (4.29 ± 0.84) and Biomolecules (4.20 ± 0.97) were courses students found most relevant to their training. Attitude toward the mandatory first (PBL 0) year was negative across all the levels, but there was a significant worsening of attitude as students advance to higher years of study ($P < 0.0001$). Though some students were socially and psychologically affected as a result of spending a year at PBL 0, the greatest negative effect was the economic constraints it brought to themselves and their guardians (62.3%, $n = 134$). **Conclusion:** Medical students at the UDS Studies have a neutral or negative attitudes toward courses at PBL 0 except Genetics, Cell structure, Organic Chemistry and Biomolecules. Furthermore, the students had a negative attitude toward this preparatory year and suggested it is scrapped since it has a social, psychological and especially economic impact on them.

KEY WORDS: Attitude, Ghana, medical students, pre-medical, problem-based learning

INTRODUCTION

Medical training institutions would best serve the needs of humanity if their products are competent in terms of patient care and able to demonstrate sound knowledge, skill, appropriate attitude, critical thinking, and problem-solving abilities [1]. Although the World Federation of Medical Education had made an effort toward the harmonization of medical training by launching the global standards program, there still exist differences in medical training across the world [2]. The admission procedures, courses, degrees awarded and duration of training required for the trainee medical doctors to attain independent medical practice varies in different parts of the world [3,4]. In most countries, including Ghana, students enter medical school directly after completing secondary education [2]. India offers one of the shortest undergraduate medical program of 4.5 years while in Pakistan, China and Singapore; it takes 5 years to obtain a Bachelor of Medicine, Bachelor of Surgery (MBBS)

degree [3]. Medical training in Europe and Australia spans between 4 and 6 years while most schools in sub-Saharan African countries graduate their students after 6 years [3,5,6]. If all these doctors trained in 5 years or less are considered competent, then duration of medical students may not be the most critical factor for the graduation of a competent Physician. According to Professor David Celermajer, Professor of Cardiology at the University of Sydney, the length of medical training in Australia and some other parts of the world is excessive and does a disservice to the community and doctors [7].

According to the Ghana Medical and Dental Council (MDC), the government agency responsible for the regulation of the practice of medicine and approval of courses of instruction for the training of doctors, the minimum period of undergraduate training is 5 years followed by 2 years pre-registration internship [8]. Currently, all three other medical schools in Ghana graduate their students after a 6 years undergraduate

program. The School of Medicine and Health Sciences (SMHS) of the University for Development (UDS) which runs a problem-based learning and Community-Based Education and Service (PBL/COBES) curriculum graduates its students after 7 years with the 1st year preparatory class referred to as PBL 0. The PBL 0 was to prepare the students adequately to pursue the medical program hence students are taught courses including physics, chemistry, mathematics, behavioral sciences, statistics, African studies, genetics as well as communication skills. According to the MDC, these basic courses should be taken in the first semester of the year of entry into the medical school. Non-graduate medical students of the UDS, however, spend a year studying these basic courses which invariably increases their years of training. Several medical schools in Southern Africa and even the University of Cape Coast in Ghana which runs the PBL system graduate their medical students between 5 and 6 years.

This study, therefore, assessed the students' attitude toward the PBL 0 year as well as their opinion on the relevance of the courses to their further vocation as doctors.

METHODS

Study Design and Setting

This was a cross-sectional study involving all non-graduate medical students of the UDS in Tamale, Ghana. A *de-novo* semi-structured questionnaire was designed. The questionnaire gathered information on respondents' demographic data and attitude toward the individual courses and the PBL 0 program. A pilot study involving 10 students from the 2nd, 3rd, and 4th year (PBL 1 to PBL 3) medical classes was undertaken to determine the reliability of the questionnaire and also correct ambiguities. In addition to the students who took part in the pilot study, 6th year students who are all graduate students and graduate students in other levels who did not go through PBL 0 were excluded. In UDS-SMHS, all graduates applicants are admitted to begin the medical program in PBL 1, the 2nd year class. The final study was conducted between May and June 2014. Whereas students in PBL 1 and 2 completed the questionnaire before a lecture, PBL 0 students completed their questionnaire after an end of trimester examination. For the other levels, the questionnaires were given to their leaders who returned the completed ones after persistent reminders. Before the administration of the questionnaire, free and informed consents were obtained from all respondents.

Prior approval for this study was obtained from the Ethics Committee of the SMHS of the UDS.

Study Variable Determination and Measurements

The attitude of the students towards the PBL 0 courses and the mandatory first year (PBL 0) was assessed using seven questions in a 5 point Likert scale, ranging from strongly disagree to strongly agree. Numeric values of 1, 2, 3, 4, and 5 were assigned to the Likert scale points; strongly disagree,

disagree, neutral, agree, and strongly agree, respectively. Mean attitude scores were obtained for various courses studied in PBL 0. Scores for statements which assessed the overall attitude of the students were also categorized based on gender and year of study. Classifications of the mean attitude scores in this study are as follows; 0-2.5, negative; 2.6-3.5, neutral or uncertain; and 3.6-5.0, positive.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using GraphPad Prism, Version 5.01 (GraphPad Software Inc., San Diego CA) and Statistical Package for the Social Sciences (SPSS), version 18 (SPSS Inc, IBM, Chicago, IL, USA). Internal consistency of the questionnaire was assessed by Cronbach's alpha value. Independent t-test and one-way Analysis of Variance were used where appropriate to measure possible associations between the variables. Statistical significance was assumed at $P < 0.05$ and a confidence interval of 95%.

RESULTS

Demographic Profile

A total of 450 questionnaires were administered, out of which 304 were completed and returned giving a response rate of 67.6%; (1st year, 89.0%; 2nd year, 55.3%; 3rd year, 93.6%; 4th year, 62.9%; 5th year, 34.6%; and 7th year, 41.2%) The Cronbach's alpha value of the questionnaire was 0.91. The mean age of the respondents was 21.84 ± 1.984 years. The average UDS medical school entry age was 19.14 years. As shown in Table 1,

Table 1: Socio-demographic characteristics of respondents (n=304)

Variable	Subgroups	Number of respondents	Percentages
Gender	Male	194	63.8
	Female	110	36.2
Year of study	1 st (PBL 0)	89	29.3
	2 nd (PBL 1)	63	20.7
	3 rd (PBL 2)	73	24.0
	4 th (PBL 3)	44	14.5
	5 th (PBL 4)	18	5.9
	7 th (PBL 6)	17	5.6
Occupational sector of guardian	Finance and administration	66	23.6
	Health	20	7.1
	Education	74	26.4
	Construction and Engineering	30	10.7
	Agriculture	29	10.4
	Artisanship and private businesses	48	17.1
	Pensioners	13	4.6
	Urban	209	75.5
Place of residence, n=277	Suburban	47	17.0
	Rural	18	6.5
	Overseas	3	1.1

PBL: Problem-based learning

greatest proportions of respondents were males 194 (63.8%) and 1st year medical students, 89 (29.3%). Most respondents have their parents or guardians working in the education related sector as teachers, lecturers or researchers, 74 (26.4%). The majority of respondents, 209 (75.5%) also live in urban areas of Ghana.

Students' Attitude toward Courses in PBL 0

Table 2 showed the attitude of the students toward the courses offered in PBL 0 and their opinions on the relevance of these courses to their future practice as doctors. Students were uncertain whether the study skills course improved on their method of studying and academic results (2.75 ± 1.13). Again, they were unsure of the communication skills course improving their written and oral communication in English Language (3.01 ± 1.33). In the opinion of the students, mathematics (2.31 ± 1.14) and physics (2.46 ± 1.27) courses provided no additional knowledge. Although they considered mathematics course irrelevant to their medical practice (2.36 ± 1.27), they were uncertain about the role of physics (2.57 ± 1.28) in their future vocation. In case of statistics and Physical chemistry courses, students were unsure of their relevance to medical

practice (3.43 ± 1.18 ; 3.27 ± 1.20) and as to whether these courses provided them extra knowledge than they previously possessed (3.07 ± 1.28 ; 2.70 ± 1.26). The courses students found most relevant to their future practice were Cell structure (4.29 ± 0.84), Biomolecules (4.20 ± 0.97) and Organic chemistry (3.75 ± 1.16). African studies was the course students most students disliked (2.34 ± 1.22).

Students' Attitude toward the PBL 0 Program

Table 3 showed the results of the statements that assessed the overall attitude of the students toward the PBL 0 program categorized according to gender and years of study. During the PBL 0 year, medical students were placed in a same class with non-medical students and were taught all the basic courses together. Both the males (3.29 ± 1.34) and females (3.33 ± 1.31) were uncertain about the effect that studying together with non-medical students had on their social life on campus. Male students had a worse attitude toward the PBL 0 program than the females, but the difference was not significant (2.48 ± 0.69 vs. 2.54 ± 0.68). Again both male (1.99 ± 1.09) and female students (2.11 ± 1.08) disagreed with any assertion that the caliber of students admitted to read medicine in UDS were of

Table 2: Students' attitude toward courses at PBL 0 and their relevance to their future practice of medicine

Course	Students agreeing to have acquired additional knowledge from PBL 0 courses			Students suggesting course is relevant to the future practice of medicine		
	Mean (maximum=5)	Standard deviation	Attitude	Mean (maximum=5)	Standard deviation	Attitude
Study skills	2.75	1.13	Neutral			
Communication skills	3.01	1.33	Neutral			
Genetics	4.29	0.91	Positive			
Mathematics	2.36	1.27	Negative	2.31	1.14	Negative
Statistics	3.07	1.28	Neutral	3.43	1.18	Neutral
Physical chemistry	2.70	1.26	Neutral	3.27	1.20	Neutral
Organic chemistry	3.49	1.18	Neutral	3.75	1.16	Positive
Physics	2.46	1.27	Negative	2.57	1.28	Neutral
Cell structure*				4.29	0.84	Positive
Computer skills*				3.40	1.19	Neutral
African studies*				2.34	1.22	Negative
Biomolecules*				4.20	0.97	Positive
Behavioral science*				3.31	1.24	Neutral

*These are courses students had not studied at senior high school

Table 3: Students' attitude toward the PBL 0 year

Statement	Attitude score and P value									
	Male	Female	P value	PBL 0	PBL 1	PBL 2	PBL 3	PBL 4	PBL 6	P value
Studying together with 1 st year students of other course will/had improved upon my socialization on campus	3.294	3.327	0.833	3.719	3.635	3.247	2.841	2.722	2.0	<0.0001*
Overall, PBL 0 had/would enable (d) me to understand the courses in higher years	2.639	2.718	0.587	3.135	2.984	2.562	1.932	2.667	1.412	<0.0001*
Being taught together with other 1 st year students in PBL 0 retards the rate of the learning of such courses	3.0	2.836	0.268	3.213	2.635	2.945	2.909	3.056	2.588	0.081
Class size in PBL 0 was satisfactory	1.918	2.145	0.094	2.270	1.810	1.932	1.977	1.722	1.941	0.148
Caliber of students admitted to read medicine in UDS is lower hence the PBL 0 is appropriate to bring them up to scratch	1.995	2.109	0.380	2.303	2.190	1.890	1.818	2.111	1.176	0.008*
PBL 0 is relevant and should not be scrapped	2.108	2.164	0.711	2.382	2.444	2.027	1.432	2.556	1.412	<0.0001*
I enjoyed the learning experience in PBL 0	2.381	2.5	0.431	2.730	2.794	2.288	1.795	2.722	1.353	<0.0001*
Overall attitude toward PBL 0	2.476	2.543	0.417	2.822	2.642	2.413	2.101	2.508	1.697	<0.0001*

*Statistically significant, PBL: Problem-based learning

lower quality, which resulted in the introduction of the PBL 0 year. Students in all the years of study significantly disagreed with the relevance of PBL 0 year and its continuation in UDS, with the final year students (1.41 ± 1.06) exhibiting the worse attitude. Positive and desirable effect that PBL 0 may have on the social life, learning experience and expectation of an improved understanding of courses in the higher years based on PBL 0 knowledge, generally and significantly decreased as students advance to higher years in the medical school ($P < 0.0001$).

Social, Economic and Psychological Effect of PBL 0 on Students

The socio-economic and physiological effects that PBL 0 had on the students are shown in Table 4. About a third of the students suggested they were socially, 81 (37.7%) and psychologically, 85 (39.5%) affected as a result of spending a year in PBL 0. For the majority of these students, the social effect was a positive, 48 (59.7%); however, the psychological effect was negative for a greater majority, 73 (85.9%). The majority of the students, 134 (62.3%) said PBL 0 exerted an economic effect on their lives with the effect being overwhelmingly negative, 133 (99.3%).

DISCUSSION

After the introduction in Ghana of a new educational program in 1987, the 13-17 years pre-tertiary education period had reduced to 12-year hence students finish senior high school by the age of 18 years. This accounted for the average age of entry into UDS medical school being 19.14 years. This age is comparatively lower than other countries such as Germany where the average medical school entry age was 21.4 years [5].

Several factors have been found to affect student's attitude toward a course and they include; teacher attitudes and beliefs, teaching style and behavior, classroom characteristics, assessment, and achievement, as well as students' perceptions and characteristics [9]. In the case of the respondents in this study, over a 7-year period, different teachers taught these courses so teacher and teaching characteristics cannot and change be the reason for their negative attitude toward mathematics, African studies and physics or the positive attitude toward Biomolecules, Genetics and Cell Structure courses. Furthermore, though students were generally not satisfied with the class size, they were of the opinion that the classroom environment did not affect their learning process. The entry requirement for the medical schools in Ghana requires the student to have obtained the best of the grades in mathematics and physics hence achievement and assessment should not be the factor for their attitude toward these courses. Since the respondents were all medical students with similar characteristics, the possible factor that could influence the respondents' attitude toward the courses in the PBL 0 would be their perceptions about the courses and the program. Therefore, courses that attracted negative attitudes were those the students believed do not provide any

Table 4: Social, economic and psychological effect of PBL 0 on students

Variable (n=215)	N (%)			
	Responses		Types of effect	
	Yes	No	Negative	Positive
A year in PBL 0 affected me socially	81 (37.7)	134 (62.3)	33 (40.3)	48 (59.7)
A year in PBL 0 affected me economically	134 (62.3)	81 (37.7)	133 (99.3)	1 (0.7)
A year in PBL 0 affected me psychologically	85 (39.5)	130 (60.5)	73 (85.9)	12 (14.1)

PBL: Problem-based learning

new knowledge or they did not find relevant to their future profession.

Medical schools in Ghana admit students based on a total aggregate of results in six subjects in the secondary school certificate examination with Grade A1 being the best for any subject. The cut-off points for entry into medical schools located in the cities of Kumasi, Accra, and Cape Coast (runs a 6 years PBL curriculum) were aggregates 6, 7, and 8, respectively, for the 2013/2014 academic year [10-12]. In an interview with I.A. Nurudeen (Senior Assistant Registrar, in charge of admissions, UDS) in October 2014, he said the cut-off point for UDS medical school for the same academic year was aggregate 6. The students in this study were, therefore, justified to say the caliber of students admitted into UDS is not of lower standard hence if PBL 0 was to bring them to a satisfactory level, then it cannot be justified.

The 7th year students who were at the end of their medical training were best placed to measure the relevance of the PBL 0 year and how the courses at PBL 0 had been helpful during their training. This final year group did not find the courses in PBL 0 providing them with added knowledge which enabled them to understand any of the courses taught in the higher years. The final year students also had the worst attitude toward the relevance of the PBL 0 year. These results need to inform authorities in UDS to reconsider the admission of students to do a year long pre-medical program since the students who are the consumers of the knowledge being imparted in PBL 0 did not find them relevant. Although the PBL 0 year improved upon the social interaction among the medical and non-medical students, its psychological and economic effects were undesirable. For some UDS medical students, because their former high school mates who are reading medicine in other Ghanaian universities would qualify as doctors ahead of them, they psychologically feel inferior.

The detrimental effect of the longer period of training a doctor in the UDS is not being borne by the students alone, but by the Ghanaian society as a whole. To ensure that persons in a country receive the best basic healthcare services, the World Health Organization's minimum standard of 20 physicians per 100,000 people must be met [13]. Whereas Western countries can boast of an average of 222 per 100,000 persons, 38 sub-Saharan African countries have fallen short of the

minimum standard with thirteen of these countries having 5 or fewer per 100,000 persons [13]. As at 2010, Ghana had a ratio of 11 physicians per 100, 000 people, which is about half the WHO recommended ratio [14]. An additional year that a student stays in UDS medical school, makes achieving the recommended physician to people ratio more challenging since UDS medical school which could have added an annual average of 100 medical doctors to Ghana's stock of doctors would still be keeping this number in the classroom. Guardians in this study who are mostly workers in the educational sector are also burdened to provide the needs of their wards for an extra year.

The PBL methodology which involves both vertical and horizontal integration between basic sciences and clinical knowledge stimulates, profound lifelong learning, self-directed learning and an early encounter with clinical problems [15,16]. This teaching and learning method promotes deep approaches to students learning rather than surface approach thereby providing students better appreciation of important biomedical principles which are needed in the practice of medicine [17]. A study conducted at UDS/SMHS to investigate the learning approaches (deep vs. surface) of medical students following a PBL based medical curriculum showed that the PBL students at SMHS using the PBL methodology predominantly employed deep approach to learning [18]. This means, the PBL students rather require even a shorter period to grasp the skills and knowledge required before the mandatory internship programs. According to Meel (2003), the academic foundation that needed to be laid to produce a competent Physician is acquired by the 5th year of medical school with the on the job internship period providing them with the necessary skills for independent practice [19]. Reduction of years of medical training does not reduce the knowledge and competence of Physician as shown in a study in which students in the 5 years PBL group in the final psychiatry examination performed significantly better in the problem-solving case vignette examination than their 6 years traditional lecture based colleagues but there were no statistically significant differences in the mean marks for the long case and the oral examination [20].

Although medical students in UDS spend an average of 45 weeks for academic work more than the 32 weeks for other medical schools in Ghana, they also spend the most number of years in school.

This study comes with some limitations. This study involved the use of self-administered questionnaire rather than interviews hence the reliability of answers could not be verified.

CONCLUSION

Medical students in UDS generally had neutral or negative attitude toward all courses offered in PBL 0 except Genetics. They found organic chemistry, cell structure and Biomolecules courses relevant to the medical training. Though their PBL 0 provided an avenue for socialization with non-medical

students for future professional teamwork, medical students in UDS had negative attitude toward the PBL 0 year and questioned its relevance to their overall training and hence their support for its discontinuation. A year off the current 7 years medical school curriculum would free more infrastructural space for more students to be admitted, reduce the burden on facilities and staff and increase the physician population in the country for better healthcare. The social, psychological and economic burden on the students and guardian would also be lessened.

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