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Factors influencing academic achievement of medical students in the basic medical sciences

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Summary

A structured questionnaire was administered to 236 medical and dental students who had just finished the Part I M.B.B.S./B.D.S. degree examination. Apart from personal data of each student, the questionnaire sought information on issues that may affect the student's learning of Anatomy, Biochemistry and Physiology. The scores of all the students in their continuous assessment tests and the finals of the Part I M.B.B.S./B.D.S. examinations in the three subjects were recorded.

The results showed that age, repeating the year, performance in continous assessment tests, having one, seven or eight 'A' grades in the Ordinary Level (O/L) examination significantly affected the overall performance of the students. On the other hand, likeness for a particular subject, mode of entry of the student whether direct or concessional, types of books read, time spent on each subject, having between two and six 'A' grades in O/L, access to hostel accommodation, adequacy or otherwise of financial support and the student's rating of his/her state of health did not significantly influence the performance of the students. The students gained most from lectures while tutorials were rated as being more helpful than practical classes. Multiple choice questions (MCQs) is the preferred mode of assessment.

The possible explanation for these findings and their implications for medical education are discussed.

Résumé

Un questionnaire bien structuré fut administre aux 236 etudants de la medecine et de la dentistàrie qui venaient de completer la premiere annee des études Universitaires. A part les information demandées sur la vie privee et publique des etudants le questionnaire cherchait des renseignements sur des evenements qui pourraient affecter la performance des etudiants dans leurs tentatives d'apprendre l' anatomie la bis-chemie et la physiologie. Les points obtenus par les etudiants dens l' evaluation continue et dans les examers de la fin de la premiêre annee furant notés.

Les resultats montrèrant que l' êge, doublex un classe, la performance dan l' évaluation continue ajent den grades de une seph au hut "A" (mention Trên Bien) dans l' afamen de brévet affectèrant la performance totale des étudiants significativement. De l' autre côté la préférence pons une matiere quelleconque, la méthode directe ou la méthode indirecte), les genres de livren lus, le temps passé pour études chaque matiere, ayent entre deux et six mention tries Bien dons l' examen de brévêt, ajent accessibilité au local universitaire, la souffiscence on insouffisance de soutien financier et l'êvaluation chov l' étudiant de son propre etat de sante n' avaient pas influencé significativement la performance des étudiants. Les etudiants profifaient le plus des cours donnes per les professeurs, qua la tatella fur consideree comme l plus rentable que len class des travaux pratiques. Les questions a options furent preferables aux etudiants en ce qui concerne la mode de verrifier la performance des etudiants.

Une explanation possile pour ces resultats et leurs implications furent largement discutees.

Introduction

The medical school at the University of Ibadan, the first in Nigeria, was established in 1948. Available records in the University show that between 1948 and 1962, student admission for Medicine per session was below 50. Between 1963 and 1965, admission rose above 100 and by 1975, admission had risen to 250 per intake. The rapid increase in students' intake was unfortunately not matched by corresponding expansion in teaching facilities and staffing. As a result of this, and due to the pegging of admission quota to 150 by the Joint Admission and Matriculation Board, admission per session has been reduced to 150 in the last five years.

On admission into the pre-clinical departments, medical students study the basic medical science sub-

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jects of Anatomy, Biochemistry and Physiology for three semesters. At the end of this period, the students sit for the Part I M.B.B.S./B.D.S. examination. The methods of assessment in the three subjects are similar, consisting of continuous assessment tests during the course and two written papers in the Part I examination. A student must pass the three subjects to proceed to the clinical stage of the course. Failure in one subject leads to a reference in that subject while failure in two or three subjects requires the student to repeat a year and the entire examination. A student who repeats the year and fails two or three subjects again is required to withdraw from the course.

Over the last decade, it has been observed that the failure rate (references, fail/repeat the year and withdrawals) in the Part I M.B.B.S./B.D.S. examination has been very high (Table 1). The large number of students and the rather young age of the students are some of the reasons speculated for this high failure-rate. There has been no study in any medical school in Nigeria of the factors affecting students' academic achievement in the Part I M.B.B.S./B.D.S. examination. In addition, no study has been done to seek the views of the students on some of the factors that are believed may influence their performance. The present study was therefore carried out to assess the effects of some variables on the academic performance of medical/dental students at Ibadan Medical School in their Part I M.B.B.S./B.D.S. examination.

Materials and methods

Two hundred and thirty-six medical and dental students (201 medical and 35 dental) in their third year of the medical programme who had just completed their Part I M.B.B.S/B.D.S. were studied using a structured questionnaire. The students were those admitted into the medical school in the 1985/86 session via concessional entry and the 1986/87 session via direct entry. They all gave informed consent after the purpose of the study had been explained to them.

The questionnaire which was completed anonymously sought information on matriculation number, age, sex, mode of entry of the students (whether by direct or concessional entry), ranking of their interest, class performance and time spent studying Physiology, Anatomy and Biochemistry. Students were also required to state how many "A" gradings they had in their General Certificate of Education (GCE/West African School Certificate, WASC) Ordinary Level subjects and to rate the common textbooks of Physiology in descending order of preference and ability to understand the texts. The questionnaire also sought information on whether

Table 1: M.B.B.S. Part I main examination results, 1978-1987 College of Medicine, University of Ibadan

Year	No of Candidates	References	Fail (repeat the year)	withdrawals	% Passing 3 Subjects
1978	276	78	33	4	58.3
1979	225	125	44	9	20.8
1980	242	85	53	11	38.4
1981	212	57	38	6	52.3
1982	265	102	52	2	41.1
1983	330	140	65	21	31.5
1984	319	157	55	8	31.0
1985	239	72	48	9	46.0
1986	243	61	72	17	38.2
1987	237	62	66	24	35.8

Table 2: Students' age and number of subjects passed

Age (Years)	Subjects Passed				Row Total
	0	1	2	3	
17	0	0	1	0	1
18	3 (11.3)	2 (7.4)	3 (11.3)	19 (70.4)	27 (11.4)
19	5 (10.0)	1 (2.1)	8 (17.0)	33 (70.2)	47 (19.9)
20	10 (21.7)	7 (15.2)	11 (23.9)	18 (39.1)	46 (19.5)
21	7 (14.9)	4 (8.5)	10 (21.3)	26 (55.3)	47 (19.9)
22	19 (28.4)	12 (17.9)	10 (14.9)	26 (38.8)	67 (28.4)
23	0	0	0	1	1 (0.4)
Column Total	44 (18.6)	26 (11.0)	43 (18.2)	123 (52.1)	236 (100.0)

or not the students had accommodation on campus, the adequacy or otherwise of students' financial support and the rating of their state of health. The students were also required to rank the different methods of instruction in the Department of Physiology (these consist of lectures, practicals, tutorials and private consultation with lecturers) in descending order of preference. The scores of the students in Anatomy, Biochemistry and Physiology in all their continuous assessment tests and in the finals of the February 1988 Part I M.B.B.S./B.D.S. examination were recorded. The response to the questionnaire was analysed. Some of the variables were cross-tabulated and a Chi-square test and the z-test were carried out as appropriate, to assess what variables significantly influenced the students' performance. P values of 0.05 or less were taken as statistically significant.

Results

The results showed that the 236 students studied were made up of 174 males, 61 females and 1 person did not indicate his or her sex. Seventy-eight of this number were repeat students. There was no sex difference in the percentage of candidates that passed the three subjects – Anatomy, Biochemistry and Physiology. Most of the students (99.2%) were aged 18 to 22 years (Table 2). Students aged 18 and 19 years did significantly better than those who were 20 years and above (Table 2). There was no statistically significant difference between the performance of the students admitted with concessional entry and those students admitted with direct entry who passed the three subjects. Students who repeated the second year of the course and the Part I examination did significantly better than the non-repeaters, with 61.5% and 47.1% respectively passing the three subjects. Although most of the students (55.9%) claimed to like Physiology best, compared with 26.3% and 17.8% who rated Anatomy and Biochemistry respectively as their best subject, based on their class tests results, 64.8% of the students actually performed best in Anatomy as against 18.6% and 15.3% in Physiology and Biochemistry respectively. The students spent almost equal proportion of their time on Anatomy and Physiology (36.7% and 35.1% respectively) and the least time (27.7%) on Biochemistry. The time spent on Biochemistry is however not significantly different from the time spent on each of the other two subjects. There was a high correlation between the time spent on Anatomy and anatomy performance (r = 0.94), but there was a low correlation between per-

formance and time spent on Physiology and Biochemistry ($r = 0.3$ and 0.4 respectively). There was a significant positive correlation between continuous assessment performance in the three subjects and performance in the final of the Part I examination (Table 3). Also, the final score in each of the three subjects showed a high degree of correlation (Table 4).

In Physiology, the students rated Review of Medical Physiology by W. Ganong (GA), Textbook of Medical Physiology by A.C. Guyton (GU) and Introduction to Human Physiology by J.H. Green (GR) as 1st, 2nd and 3rd respectively in descending order of their use by the students (Table 5). However, the books were rated GR – 1st, GU – 2nd and GA – 3rd in descending order of their ease to understand by the students (Table 6). There was however no significant association between pass or fail in the Part I examination and the type of books used. It should be noted that Samson Wright (a popular Physiology textbook at Ibadan in the fifties and sixties) is used mainly as a reference text (4th choice) by the students (Table 5) and most of them do not find it easy to understand (Table 6).

Table 3: Correlation between continuous assessment and final score in the 3 subjects ($n = 236$)

	PHYFSCO	*AFSCO*	*BFSCO*
Cont. Assess.	0.77	0.88	0.26
z	18.72	28.0	4.17
P	0.005	0.005	0.005

PHYFSCO = Physiology Final Score
AFSCO = Anatomy Final Score
BFSCO = Biochemistry Final Score

Table 4: Correlation between final scores in Physiology (PHYFSCO), Anatomy (AFSCO) and Biochemistry (BFSCO)

	PHYFSCO	*AFSCO*	*BFSCO*
PHYFSCO	1.00	0.71	0.74
AFSCO	0.71	1.00	0.74
BFSCO	0.74	0.74	1.00

n = 236

Table 5: Students' ranking of their "use" of the common textbooks of medical physiology

	GA	GU	GR	BEP	BT	SW	Row Total
1ST	203	22	10	—	—	—	235
2ND	23	95	101	—	—	13	232
3RD	5	65	102	1	6	30	209
4TH	2	12	11	1	17	98	141
5TH	1	—	1	8	17	2	29
6TH	—	—	—	7	2	2	11
Column Total	231	194	225	17	42	145	—

GA = Review of Medical Physiology by W.F. Ganong
GU = Medical Physiology by A.C. Guyton
GR = Introduction to Human Physiology by J.H. Green
BEP = Textbook of Physiology and Biochemistry by G.H. Bell, D. Emsile Smith and C.R. Paterson.
B.T. = Physiological Basis of Medical Practice by Best and Taylor
SW Samson Wright's Applied Physiology by Samson Wright.

Table 6: Students' ranking of 'ease' of understanding of all textbooks

	GA	GU	GR	BEP	BT	SW
1ST	30	94	106	1	—	2
2ND	68	76	75	1	6	7
3RD	100	25	31	4	8	41
4TH	28	2	5	3	18	74
5TH	—	—	—	2	12	—
6TH	—	—	—	6	1	—

Note: Abbreviations are as in Table 5.

Table 7: Number of 'O' Level 'A' grades and number passing three subjects

No of 'A' Grades	No of Students	% With 3 Passes
1	10	70.0
2	19	26.3
3	37	40.5
4	31	45.2
5	37	45.9
6	38	50.0
7	35	77.1
8	21	66.7
9	6	66.7

Students who had one 'A' and those with 7 or 8 'A' grades in their GCE/WASC Ordinary Level (O/L) entry qualification did significantly better than those with 2, 3, 4, 5 or 6 'A's in their O/L examinations (Table 7). There was no difference between the pass rate of students with 2, 3, 4, 5 or 6 'A's. An interesting point that emerged from the study is the highly significant association between the passing of Physiology and passing of the entire examination ($P = 0.001$).

Whether a student had hostel accommodation or not, and the level of financial support, whether excellent, good, fair or poor, and the rating of his or her health whether good, fair or poor did not significantly affect students' achievement. Lectures, tutorials and practical classes in Physiology were rated as 1st, 2nd and 3rd respectively by students (with 58.9, 25.0 and 5.1% rating respectively) as their preferred and most helpful method of instruction while MCQ's, long essays and short notes ranked 1st, 2nd and 3rd respectively as the preferred method of assessment.

Discussion

It is interesting that students below 20 years old did significantly better than those aged 20 years and above. This disproves the notion that many students do not do so well because they are too young and rather immature for their present class. The finding of no difference in the performance of the concessional entry and direct entry students in this study concurs with the results of Ayeni[1]. The repeat students performed better than the non-repeaters probably because the extra year had given them more time to understand the subjects better. Also, the realization that if they fail again, they will be asked to withdraw from the course could be a great motivating factor into making them study extra-hard. Those doing the examination for the first time are not under this type of pressure. This study showed that 'likeness' for a subject and actual performance in the subject are not related. The stated 'likeness' for Physiology was more than double that for Anatomy while performance in Anatomy was in fact more than three times better than in Physiology. This suggests that although the students like Physiology, it is probable that their understanding and their ability to answer questions in Physiology is low.

The other possibility is that the level of difficulty of Physiology tests may be much higher than those of Anatomy. The fact that this study was conducted in Physiology Department might have biased the response of the students to the 'likeness' question in favour of Physiology. While it may be noteworthy that the students have the least likeness for Biochemistry and their performance is lowest in that subject, likeness does not necessarily determine performance as shown by Physiology and Anatomy above.

The finding of a positive correlation between performance in their continuous assessment tests and passing three subjects in the Part I examination is not unexpected. This confirms that students who are good and hard-working as indicated by their class work results are the ones most likely to pass the Part I M.B.B.S./B.D.S. examination. The results showed a bias in favour of Review of Medical Physiology by Ganong, even though most of the students did not consider Ganong a book that is 'easy' to understand. The much easier textbooks by Green and by Guyton are also used by many students. The results suggest that most of the students read two textbooks – Ganong and Guyton or Ganong and Green. It is possible a few students use three or more textbooks. It is therefore not surprising that the type of books used do not seem to determine whether a student passes or fails. It is important to note that the factors of availability, accessibility, cost, peer suggestions and teachers' influence are some of the variables that may influence the type of books used by students. For instance, many good textbooks of Physiology written in English that are popular in Europe and North America are not included in this study because the authors know that such books are not available in bookshops (and even libraries) in Nigeria and the students are largely unaware of their existence.

The probable explanation for the finding that students with 7 or 8 'A' grades and those with one 'A' grade did better than those with 2 to 6 'A' grades is this: those with 7 or 8 'A's can be regarded as those

endowed with a superior academic ability, hence the better performance, while those with one 'A' probably see themselves as weaker than other students, as a result of which they worked harder than those with more 'A's. Except for these extreme values, the results suggest that the number of 'A's at O/L does not, to a large extent, determine success in the Part I M.B.B.S./B.D.S. examination. The latter result is similar to that of a recent study in Australia where only 12 – 14% of the variance in medical schools achievement could be explained by the variance in secondary school scores [2]. Persistent hard work is most probably a more important factor in determining achievement rather than how good the O/L result is.

Although far more time is spent on practicals than on lectures and tutorials, the latter two seem to be more helpful to the students in their learning process. The low rating of practicals suggests that there may be need to modify the nature of the practicals as conducted at present and to reduce the amount of time spent on such practicals. In Anatomy for instance, demonstrations on prosected specimens may well be more helpful than the actual dissection, while in Physiology, demonstrations, especially in the animal experiments, may be more helpful to learning than the students actually carrying out the experiments. More of the Biochemistry practicals can also be in form of demonstrations, while more time should be created for tutorials and group discussion. There is obvious preference for MCQ mode of assessment among the students, while short notes seem not so popular.

There is need for more studies on this subject in other medical schools so that the implications of the above findings for medical education can be fully assessed.

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