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Medical students' evaluation of physiology learning environments in two Nigerian medical schools

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Anyaehie US, Nwobodo E, Oze G, Nwagha UI, Orizu I, Okeke T, Anyanwu GE. Medical students' evaluation of physiology learning environments in two Nigerian medical schools. *Adv Physiol Educ* 35: 146–148, 2011; doi:10.1152/advan.00106.2010.—The expansion of biomedical knowledge and the pursuit of more meaningful learning have led to world-wide evidence-based innovative changes in medical education and curricula. The recent emphasis on problem-based learning (PBL) and student-centred learning environments are, however, not being implemented in Nigerian medical schools. Traditional didactic lectures thus predominate, and learning is further constrained by funding gaps, poor infrastructure, and increasing class sizes. We reviewed medical students' perceptions of their exposed learning environment to determine preferences, shortcomings, and prescriptions for improvements. The results confirm declining interest in didactic lectures and practical sessions with preferences for peer-tutored discussion classes, which were considered more interactive and interesting. This study recommends more emphasis on student-centered learning with alternatives to passive lecture formats and repetitive cookbook practical sessions. The institutionalization of student feedback processes in Nigerian medical schools is also highly recommended.

education; feedback; teaching

MEDICAL EDUCATION leading to the award of Bachelor of Medicine and Bachelor of Surgery (MBBS) degree in Nigeria is a 6-yr program consisting of 12 mo of basic sciences, 18 mo of preclinical study, and the rest spent in clinical departments. The preclinical period is for the basic medical sciences courses (Anatomy, Biochemistry, and Physiology), which run concurrently. In the Physiology Department, during these 18 mo, preclinical students are exposed to 6–7 h/wk of a supervised learning experience made up of didactic lectures (3 h), a tutorial (1 h), and laboratory practical sessions (2–3 h). The students then have time in the evening for private studies. Over time, an increasing population of students and funding gaps are limiting practical classes and making tutorials inpracticable. Didactic lectures are thus the predominant supervised learning environments for the students. Financial constraints of both students and departments limits the ability to procure textbooks and recent literature, poor internet penetration limits access to other learning resource, and, therefore, dictated lecture notes are thus the major source of resource for the students. Additionally, a poor and erratic electricity supply limits the time for student's personal independent study. In the two medical schools used for this research, transfers of students into the medical program at the second year of study increased class sizes above the approved limits, thereby making the classroom environments uncondusive for didactic lectures and copying of dictated notes, and the students organize peer-tutored discussion classes to augment the lectures.

Medical education is currently undergoing innovative evidence-based changes in teaching and learning environments around many parts of the world, and these include an increasing emphasis on student-centered learning as opposed to traditional didactic lectures and repetitive "cookbook" practical sessions (1, 18, 20). Implementation in Nigeria, however, appears limited; for instance, despite reported gains of active learning, especially PBL, it remains unimplemented in many Nigerian medical schools, and reports of teaching/learning review projects remain unapproved and unimplemented in some institutions (18). Student feedback processes are absent, and, presently, learning achievements are assessed largely by examinations of some sort. These have inherent limitations since the examinations are set and graded by the same teachers. Also, many medical curricula emphasize memory recall rather than understanding and, thus, mostly assess students' abilities to remember (1). The student's own goal is obviously to pass and progress, and medical students in Nigeria are not involved in the evaluation of either their teachers or their academic program.

This research aims to evaluate aspects of the learning environments available to students in two medical institutions in Nigeria. The goal of the study was to determine appropriate student-centered interventions that can improve the learning of physiology in Nigerian medical schools. It is expected that this report can feed into innovative changes in the medical curriculum in Nigerian medical schools as increasingly more medical educators take an interest in the alignment of the medical curriculum to the learning goals of medical education.

METHODS

Study Areas

College of Medicine, University of Nigeria, Enugu Campus (Enugu, Nigeria) This medical school was established in 1970 and is funded and run by the Federal Government of Nigeria. Admission is mainly through a national University Matriculation Examination (UME), but both interuniversity and intrauniversity transfers from related academic programs are approved by the institution. Also, students with a previous first degree can be admitted through a direct entry mode into the second year of the 6-yr medical program. The average yearly admission into this medical school varies between 200 and 250 students.

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College of Medicine, Imo State University (Owerri, Nigeria). This is a state-owned university. It is funded and governed by Imo State Government of Nigeria. The 10-yr-old medical school has similar admission procedures as that of the University of Nigeria. The average yearly admission into the medical school is ~100 students.

Subjects

Randomly selected consenting preclinical medical students (n = 126) of Imo State University (n = 46) and the University of Nigeria (n = 80) were the subjects of this research. An interviewer-administered questionnaire (approved by Departmental Ethical Unit) was used to determine exposed learning environments, those of greatest and least value in student-perceived acquired knowledge, and perceived shortcomings. Students' prescriptions for perceived shortcomings were also sought.

The results, as analyzed, represent the views of a total of 126 students who met our inclusion criteria.

Inclusion Criteria

Inclusion criteria were as follows:

1. Preclinical medical students admitted only via the UME
2. Exposure to at least 12 mo of physiology courses
3. Studying medicine as a first degree and no previous exposure to a second Bachelor of Medicine professional exam

RESULTS

Recruited students were aged between 18 and 24 yr (mean: 20.5 yr) with a male-to-female ratio of 1:1.2.

As shown in Table 1, the predominant learning environments were lectures, practical classes, peer-tutored discussions, and private study. Table 1 also shows that peer-tutored discussions were perceived to be of greatest value. The reasons advanced include the following:

1. Allows for interactions
2. Not usually time constrained
3. Atmosphere is friendly

Also, practical session were perceived to be of the least value, and the reasons given include the following:

1. Large groups
2. Strict protocol to be followed
3. Uninteresting and not interactive
4. Occasionally unsupervised

Students prescriptions for better learning were as follows:

1. More interactive environment
2. More lively classroom environment
3. Improved electricity supply
4. Smaller groups in practicals and improved supervision by tutors
5. Involvement of students in program evaluations

DISCUSSION

Basic science teaching is fraught with special difficulties ranging from sustaining interest and clinical correlation (2, 4, 8, 17). Physiology principles taught worldwide are the same, but the methods by which they are taught are as varied as the people teaching them (14). This study shows that the predominant learning environments were lectures, practical classes, peer-tutored discussions, and independent study, and these will form the thrust of the discussions. On a general note, however, there appears to be a declining interest in didactic lectures and practical sessions based on a lack of opportunities for interactions and feedback.

Didactic Lectures

Traditionally, the learning of physiology has relied heavily on systems-based didactic lectures (22), and a current trend in physiology education literature is to highlight ways in which teaching can be converted from a staff-centered passive learning environment to one that encourages student-centered active learning (19). The reducing interest in didactic lectures by the students agrees with a previous report (18) of a lack of interest in traditional methods of teaching. Globally, other teaching innovations, such as PBL in various forms (7), case-based lectures (11), a PBL-didactic lecture hybrid (1), and a combination of many processes (12), have been tried with remarkable success. Indeed, increased student attendance and interest in active learning environments has been reported in Nigeria (1). There has been a sustained explosion of physiology knowledge in the last century (16); however, many of us still continue to teach the way we always have (6). Thus, there is too much teaching, not enough learning (10), not enough thinking, and too little fun (6). The preference of students for peer tutoring demonstrates their willingness to learn and confirms the assertion that "how we teach is more important than what we teach" (5). Thus, the challenge for the tutor is to make learning fun, as this will greatly motivate and inspire students, and unless students are inspired and motivated, our efforts are pointless (6). However, promoting active learning in our large classes is challenging; thus, there is a need to limit class sizes to approved limits in both medical schools.

Peer-Tutored Discussion Sessions

Peer-tutored discussions appear to be the most preferred learning environment for the students, although not all have been exposed to it. It obviously presents an active learning environment and has been reported to increase students' attendance, interest, and course grades (1). Indeed, students acquire facts from lectures

Table 1. *Student exposure and value perceptions of the learning environments in both medical schools*

Learning Environments	Percentage of Students Exposed	Percentage of Students Perceiving the Environment to Be of the Greatest Value	Percentage of Students Perceiving the Environment to Be of the Least Value
Lectures	100	8.9	1.8
Practical sessions	100	0.0	93.2
Peer-tutored discussion classes	86.51	85.0	0.0
Private study	100	16.1	1.3
Internet	42.86	0.0	0.0
Supervised tutorials	17.46	0.0	0.0
Departmental seminars	1.59	0.0	0.0
Others (e.g., faculty seminars/workshops)	14.29	0.0	3.7

and textbooks; however, achieving understanding requires a more active engagement than is commonly achieved in either the lecture halls or during personal study. The active engagement may account for the students' preference for peer-tutored discussion sessions, which has opportunities for interactions, and brings together many different understanding of a subject matter for scrutiny. However, the actual value in knowledge acquisition and authenticity of facts learned from such environments could not be ascertained by the present study.

Independent Study

The use of private study is universal and supported, but the limitations of our study population centered on the lack of reference materials and basic infrastructure like electricity. The most used resource materials in our study population appear to be dictated lecture notes, which are often copied in very uncomfortable conditions due to inadequate space and lack of electricity, among other resource constraints.

Practical Sessions

Animal-based laboratory exercises in physiology provide active learning experiences, but over time, their use in the laboratory has been reduced (8), and there are funding difficulties in Nigerian universities (1). Interest in laboratory exercises by students appears poor from our results, and the reasons were mainly poor equipment/manpower support. Also, a previous report (20) has shown that traditional laboratory exercises presents students with a tightly scripted protocol that they are expected to follow, making them physically engaged but not mentally. Student understanding of the overall concepts in practical sessions is thus poor, and their primary concern is obtaining the expected results and writing prescribed reports. Worldwide, animal experiments in physiology are declining (1, 8); however, attempts to completely replace them with computer models has met opposition despite concerns regarding animal rights (20). However, innovations like inquiry-based learning models are being promoted to better stimulate the cognitive development of physiology laboratory concepts (13) and should be encouraged. We agree with the assertion that "if the objective or program can be met with experimental work, it must be included" (20) Students should be encouraged to work together, but in small groups that allow for better interactions and efficient supervision (3).

Conclusions

This work supports the call for improvement of learning environments that encourage lifelong learning and integrative reasoning (23). Emphasis should be on student-centered learning with alternatives to traditional didactic lectures and repetitive cookbook practicals together with the institutionalization of student feedback processes (18). Such new approaches need more support and funding from government and university authorities and may pose significant threats to the authority of the teacher, but the challenge to teachers is to develop ways for students to collaborate in different teaching settings. In this way, their communication skills are enhanced, use of professional language developed, and understanding of concepts is subjected to the critical questioning of fellow students and staff (20). Computers can provide additional learning resources (15), and expansion of their use is supported. It may appear difficult to innovate changes in a strictly traditional setting (17, 18), but student perceptions show that the effective management of educational change is crucial, with a willingness to explore possibilities despite cultural and traditional barriers. Passive lecture formats are boring for students, monotonous for teachers (6), and negatively affect performance (9), and we must find ways to reduce their usage.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).

REFERENCES

1. **Anyaehie UB, Nwobodo Ed, Njoku CJ.** Comparative evaluation of active learning and the traditional lectures on physiology: a case study of 200 level medical laboratory students of Imo State University, Owerri. *Niger J Physiol Sci* 22: 117–121, 2007.
2. **Barrows HS, Williams RG, Mary RH.** A comparative performance based assessment of 4th year students' clinical skills. *J Med Educ* 62: 805–807, 2001.
3. **Carvalho H.** Active teaching and learning for a deeper understanding of Physiology. *Adv Physiol Educ* 33: 132–133, 2009.
4. **Cross PK.** Teaching for learning. *Am Assoc Higher Educ Bull* 39: 3–7, 1987.
5. **DiCarlo SE.** Teaching alveolar ventilation with simple models. *Adv Physiol Educ* 32: 185–191, 2008.
6. **DiCarlo SE.** Too much content, not enough thinking, and too little fun! *Adv Physiol Educ* 33: 257–264, 2009.
7. **Gauci SA, Dantas AM, Williams DA, Kemm RE.** Promoting student-centered active learning in lectures with a personal response. *Adv Physiol Educ* 33: 60–71, 2009.
8. **Genneth S, Caston D, Kindly B, Smith J.** Review of three decades of laboratory exercises in the pre-clinical curriculum at the case Western Reserve University of Medicine. *Acad Med* 67: 203–206, 1992.
9. **Hammen CS, Kelland JL.** Attendance and grades in a human physiology course. *Adv Physiol Educ* 12: 105–108, 1994.
10. **Haramati A.** Teaching physiology: filling a bucket or lighting a fire? *Physiologist* 43:117–121, 2000.
11. **Hudson JN, Buckley P.** An evaluation of case-based teaching, an evaluation of continuing benefit and realization of aims. *Adv Physiol Educ* 28: 15–22, 2004.
12. **Kaufman D, Mann K.** Basic sciences in PBL and conventional curricular: students attitudes. *Med Educ* 31: 171–180, 1997.
13. **Kolkhorst FW, Mason CL, Dipasquale DM, Patterson Patricia, Bouno MJ.** An inquiry-based learning model for an exercise physiology laboratory course. *Adv Physiol Educ* 25: 117–122, 2001.
14. **McMillam B.** Powerlab in physiology teaching. *International Workshop: Modern Approaches to Teaching and Learning Physiology*. San Jose, Costa Rica: Nov. 16–18th, 2000.
15. **Micheal JA.** Computers in the physiology class room:using technology to foster learning with understanding. *International Workshop: Modern Approaches to Teaching and Learning Physiology*. San Jose, Costa Rica: Nov. 16–18th, 2000.
16. **Nshaho J.** Innovative strategies in teaching biomedical sciences to health sciences. *Niger J Physiol Sci* 20: 8–10, 2005.
17. **Nwobodo ED.** Problem-based learning (PBL) in Nigerian medical Shools. *Workshop on Curriculum Development at the College of Medicine*. Enugu, Nigeria: University of Nigeria Enugu Campus, 2005.
18. **Nwobodo ED, Anyaehie UB, Nwobodo N, Awiwa C, Ofoegbu E, Okonkwo C, Aligekwe C, Burdick B.** Students performance and perception of neurophysiology: feedback for innovative curricular reform in a Nigerian Medical school. *Niger J Physiol Sci* 24: 63–66, 2009.
19. **Sefton AJ.** Charting a global feature for education in physiology. *Adv Physiol Educ* 29: 189–193, 2005.
20. **Silverthorne DU.** Incorporating active learning in practical experiments for students. *International Workshop: Modern Approaches to Teaching and Learning Physiology*. San Jose, Costa Rica: Nov. 16–18th, 2000.
21. **Stewat BY.** The surprise element of a student-designed laboratory experiment. *J Coll Sci Teach* 17: 269–279, 1988.
22. **Tufts MA, Higgins-Opitz SB.** What makes the learning of physiology in a PBL medical curriculum challenging? Student perceptions. *Adv Physiol Educ* 33: 187–195, 2009.
23. **Vari RC, Lechner AJ.** Endocrine refresher course 2001: modern medical curricula. *Adv Physiol Educ* 25: 211–212, 2001.