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STUDENTS' PERCEPTION OF THE IMPACT OF CLASS NUMERIC STRENGTH ON THE QUALITY OF RADIOGRAPHY EDUCATION AND TRAINING IN SOME NIGERIAN UNIVERSITIES

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Abstract

Background. In recent times there has been an increased rate of admission into radiography courses in Nigerian universities, attributable to increased awareness for the course and brighter prospects of job opportunities both in Nigeria and abroad. This has put a strain on the learning environment for students.

Objective. To determine students' perception of the impact of class population on radiography education and training in Nigeria.

Methodology. A survey research design was adopted; an online semi-structured, self-administered questionnaire was developed and used by the researchers. Pilot test was conducted, and the questionnaire had a Cronbach's alpha of 0.8 in the reliability test. The questionnaire was administered to radiography students from 300 to 500 levels for a period of one month (June 2023). The data were analysed using SPSS version 20 IBM.

Results. A total of 326 responses were recorded from nine universities, with 48.2% (n=157), 20.9% (n=68), and 31% (n=101) from 300-level, 400-level and 500-level, respectively. The average number of students per class for universities with 100 - 500 levels was 131.6 range (107.7-323.7). The majority of the respondents (42%, n=137) perceived that larger class size influences understanding of lectures (P=0.004); 27.3% (n=87) and 42.4% (n=137) perceived that the number of students in class was the reason they did not have access to the equipment in the skills laboratory (P=0.001), and during clinical posting (P=0.001), respectively.

Conclusion. Large number students in class affects the students both in the theoretical and practical aspect of their training, adhering to RRBN recommendation might improve the learning outcome.

Keywords. students, perception, class size, radiography education

INTRODUCTION

Education is the systematic training of individuals to bring about positive change in their behaviour; it is a conscious and planned effort allowing students to actively develop their potential and skills.[1, 2] Universities are established to conduct the tripartite roles of teaching, research, and community service, thereby contributing meaningfully to the social and economic development of the nation.[1, 3] For universities to function effectively as citadels of learning and knowledge-producing institutions, they require adequate human resources, most especially academic staff.[4]

Across the globe there is a significant increase in student enrolment.[5] In Nigeria, university education had a good beginning in colonial times and was effective in the 1970s until the 1980s, when it changed due to mass admission, which impacted negatively on the quality of the system. The reduction in quality is due to the growing number of students in the face of diminishing resources.[3, 5]

Lectures delivered in a comfortable environment produce an effective result.[6] Class size, which implies the number of students, is seen as the challenge lecturers (teachers) must face in maintaining effective classroom management and

engagement.[5] Too many students per lecturer, in terms of lecturer-to-student ratio, tend to undermine the effectiveness of the lecturer in the supervision of students.[5, 7] The mean lecturer/student ratio continues to increase beyond the National Universities Commission's (NUC) approved standards.[8, 9] Student overpopulation leads to an imbalance in the number of lecturers/students, overstretching facilities and poor academic performance.[3] The importance of adequate academic staff in a university system and quality education cannot be overemphasised.[8, 9] These may be the reasons why some regulatory bodies place limits on the number of students per class.[10]

Though increasing enrolment in schools is laudable,[5, 14] the increase in the proportion of applicants that secure admission to undergraduate programmes in Nigerian universities puts the quality of the system in doubtful circumstances.[8] All of this may be due to the lack of corresponding improvement on adequate classrooms, number of lecturers, dilapidated structures, and the provision of practical equipment.[5] Radiography education is a skill-based discipline;[6, 15, 17] it is multifaceted, and it incorporates both classroom teaching and clinical components.[10, 11] Students learn more about their professional responsibilities through clinical practice and placements.[12] This provides them with an opportunity through which theoretical concepts can be better understood. It gives them a deeper understanding of theoretical concepts presented through lectures, which is required for clinical radiography practice.[11] A study showed that students face challenges in applying all the theoretical knowledge in practice and reported that they were only observers during clinical posting due to their number in the diagnostic room during clinical placement.[10] It is important to note that clinical placement is usually a challenging experience for undergraduate students.[13] In recent times, there has been an increased rate of admission into radiography courses in Nigerian universities, attributable to increased awareness of the course and brighter prospects for job opportunities both in Nigeria and abroad. From observation, during clinical posting in the hospitals, the diagnostic rooms are overcrowded, which is one of the challenges students face in the hospitals, and most of the skills laboratories in the department are used during accreditation of the programme and sometimes during examinations, with some not having functional equipment. The effect is sometimes reflected in the students' performance during clinical examinations, where an average student performs below the expected result. To the best of our knowledge, no research was done to determine the perception of students about the impact of class numerical strength on radiography education and training in Nigeria.

AIM, OBJECTIVE AND HYPOTHESIS

The aim of this work is to determine the impact of class numeric strength on radiography education and training. The objective is to determine the perception of radiography students on the effect of the number of students in class on understanding lectures, during practical, and on the student's clinical posting. It is hypothesised that there is significant effect of class numeric strength on the quality of training.

METHODOLOGY

A survey research design was adopted; an online semi-structured, self-administered questionnaire with 17 items was developed and used by the researchers and validated by experts to determine the perception of students on the influence of class size on lectures, practicals, and clinical postings. A pilot test was conducted by administering the questionnaire to a cross-section of respondents, and a reliability test was conducted. The questionnaire had a Cronbach's alpha of 0.8. Data from the reliability test was not used in the study. Minor modifications were made, and the questionnaire was typed into a Google Form and administered to radiography students from 300 to 500 levels (as these components of students attend clinical postings in hospitals and have started radiography courses). The questionnaire was administered using email and social media: for the month of June 2023 a WhatsApp group was created for all class representatives in universities that offer radiography in Nigeria and had reached at least 300 level. The questionnaire comprised two parts: demographics, and questions relating to lectures, practical, and clinical postings. Data were transferred to Microsoft Excel 2016 and SPSS Version 20.0 (IBM) for analysis. A chi-square test was conducted to statistically analyse the correlation between two schools, one with higher (323.7) and other with lower (43.3) average number of students in class to the effect of number of students in class in relation to some variables such as understanding lectures, use of equipment in skills laboratory (x-ray and ultrasound), participating during clinical posting in the hospital and overall radiography training. P values of <0.05 were considered statistically significant, and the results were presented in tables and charts. The data for the study were uploaded to Mendeley data, and a DOI was obtained.[16]

RESULTS

A total of 326 completed questionnaires were received from nine coded universities (UNI A to UNI I). Codes were used in keeping with research principle of anonymity. The results were 48.2% (n=157), 20.9% (n=68), and 31% (n=101) from 300-level, 400-level, and 500-level, respectively as shown in Figure 1. The average number of students per class for the universities that had graduating students was 131.6; the older departments had a higher number of students in class (107.7 - 323.7) compared with the new ones, viz., 43.3 - 51.7. For upcoming departments the average number of students was 19-49 as shown in Table 1.

The majority of the students strongly believed that radiography training can be affected by the following: number of students in class (42% n=137), well equipped library (52.5% n=166), availability of skills acquisition laboratory (73.5 n=236), and regular clinical posting in the hospital (73.6% n=237). The mean score of 3.58, 3.97, 4.41 and 4.38 respec-

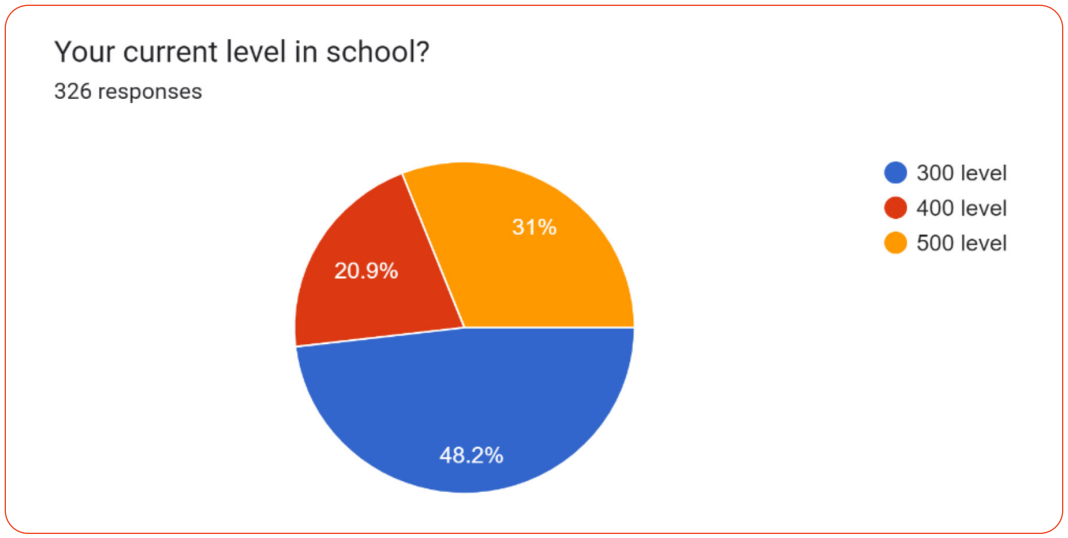

Figure 1. The respondents' current level.

Table 1. The average number of students per class in some radiography departments in Nigeria

S/No	University Code	300 Level	400 Level	500 Level	Total	Average
1.	UNI A	445	280	246	971	323.7
2.	UNI B	19	-	-		
3.	UNI C	49	-	-		
4.	UNI D	36	-	-		
5.	UNI E	37	-	-		
6.	UNI F	83	11	-		
7.	UNI G	95	85	143	323	107.7
8.	UNI H	39	54	37	130	43.3
9.	UNI I	62	38	55	155	51.7
	Average					**131.6**

Table 2. Factors that may affect the radiography training in Nigeria

Factors	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation
Number of students in class	51	27	62	44	134	3.58	1.492
	16.0%	8.5%	19.5%	13.8%	42.1%		
Well-equipped library	34	13	49	54	166	3.97	1.348
	10.8%	4.1%	15.5%	17.1%	52.5%		
Availability of practical skills laboratory	23	11	14	37	236	4.41	1.183
	7.2%	3.4%	4.4%	11.5%	73.5%		
Clinical posting in the hospital	30	5	14	36	237	4.38	1.240
	9.3%	1.6%	4.3%	11.2%	73.6%		

Table 3. Impact of class numeric strength on lectures

		N	%
Large class size can have effect on students' understanding lecture	Strongly disagree	52	16.0
	Disagree	28	8.6
	Neutral	51	15.6
	Agree	55	16.9
	Strongly agree	137	42.0
	7.2%	3.4%	4.4%
Chance of asking question	No	16	5.0
	Yes	307	95.0
Lecturers have time to answer your question	No	49	15.1
	Yes	276	84.9
Class size can prevent students from asking questions	Strongly disagree	127	39.0
	Disagree	50	15.3
	Neutral	68	20.9
	Agree	25	7.7
	Strongly agree	53	16.3

tively is shown in Table 2. The majority (52% n=166) strongly believed that the large class size influences student understanding of lectures; 16.9% (n=55) agreed, 15.6% (n=51) were neutral, and only 8.8% (n=28) and 16.0% (n=52) disagreed, and strongly disagreed, respectively. However, 95% (n=307) and 84.9% (n=276) admitted that they did have an opportunity to ask questions in class during lectures and the lecturers did have time to answer their questions, respectively. Table 3 shows that 39% (n=127) believed that the number of students in class does not prevent them from asking questions in class.

Most of the student respondents (81.1% n=262) reported that their schools do have a skills acquisition laboratory; 12.1% (n=39) said they do not have, and 6.8% (n=22) did not have any idea whether there was a skills acquisition laboratory. In terms of status of the equipment 39.9% (n=123) said the equipment was not functional, 38.4% (n=79) said they had never used the equipment: 9.6% (n=26) said they only used it for exams, 1% (n=3) used it once a year, 11.6% (n=35) used it once in a semester, 5.3% (n=160) once a month, and 47.5% (n=144) admitted to using the laboratory once a week. Close to a third (26.7% n=83) said they did not use the equipment, 41.8% (n=130) sometimes used the equipment. Only 31.5% (n=98) admitted to using the equipment in the skills laboratory. Table 4 shows that 27.3% (n=87) strongly agreed that the number of students in class was the reason they did not have access to the equipment.

Concerning clinical posting, 74.1% (n=238) of the respondents confirmed that they attended clinical posting in the hospital. Only 38.4% (n=118) said they had a chance to perform some procedures, 35.8% (n=110) said sometimes, and 25.7% (n=76) never had a chance to perform any procedure.

Table 4. Impact of class numeric strength on skill laboratory

		N	%
Do you have a skills laboratory?	No Idea	22	6.8
	No	39	12.1
	Yes	262	81.1
Functional equipment?	Yes	123	39.9
	No	185	60.1
How often do you use the lab?	Once a week	144	47.5
	Once a month	16	5.3
	Once a semester	35	11.6
	Once a year	3	1.0
	Only for exams	26	8.6
	Not at all	79	38.4
Do you have chance to use the equipment during practical in your laboratory?	No	83	26.7
	Sometimes	130	41.8
	Yes	98	31.5
Does the number of students in class prevent you from having access to the equipment?	Strongly disagree	68	21.3
	Disagree	62	19.4
	Neutral	62	19.4
	Agree	40	12.5
	Strongly agree	87	27.3

Table 5. Impact of class numeric strength on clinical posting

		N	%
Do you attend clinical posting?	No	27	8.4
	Sometimes	56	17.4
	Yes	238	74.1
Chance to perform procedures?	No	76	25.7
	Sometimes	110	35.8
	Yes	118	38.4
Large class size has effect on clinical posting	Strongly disagree	67	20.7
	Disagree	32	9.9
	Neutral	42	13.0
	Agree	45	13.9
	Strongly agree	137	42.4

Table 6. Chi-square test showing effect of class numeric strength on student training

Variable	P-value
Effect of class size on lecture	.004
Effect of class size on practicals	.001
Effect of class size on clinical posting	.001
Overall effect on radiography training	.000

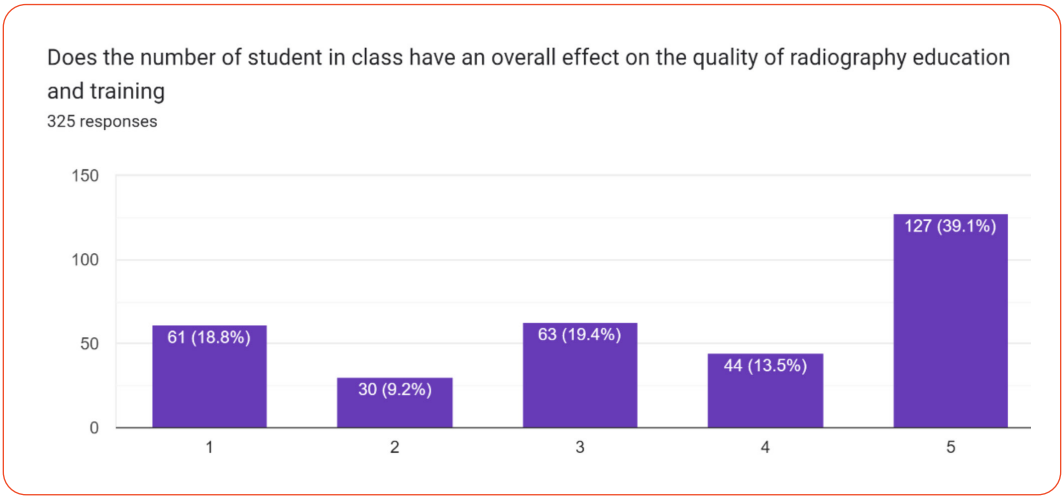

Figure 2. Impact of class numeric strength on radiography education and training in Nigeria.

Most of them (42.4% n=137) strongly agreed that the number of students in class affects them during clinical posting, as shown in Table 5.

Table 6 presents the following. In terms of the opinions of two schools, one with higher (323.7) and other with lower (43.3) average number of students in class to understanding lectures, the result shows p=0.004, which is statistically significant There is a positive correlation (p=0.001) between the number of students in class and lack of accessibility to equipment during practical in their skills acquisitions laboratory. A positive correlation (p=0.001) was shown between the number of students in class and an inability to perform procedures in the hospital during clinical posting. As shown in Figure 2, 39.1% (n=127) strongly agreed that the number of students in class had an overall effect on radiography training in Nigeria; as supported by the chi-square test result (p=0.000).

DISCUSSION

It is believed that smaller classes provide better teaching and learning;[18] lectures delivered in a comfortable environment produce an effective result.[6] The average number of students recommended by the Radiographers Registration Board of Nigeria (RRBN) per level is 50, considering the total number of academic staff available in a department and other factors such as the library and teaching facilities available. The number of students is within the normal limit in upcoming departments that are just starting, and the majority not having four and five hundred. At the universities that have 100-500 levels, the average number of students per class is 131.6; older radiography department have a higher number of students in class (107.7 - 323.7) compared to the new departments (43.3 - 51.7). These might be universities with older radiography department that have higher and more balanced (junior and senior) academic staff in the department, unlike the universities with new radiography department, which usually have fewer and more junior academic staff. Moreover, the universities with older radiography departments have a higher number of applicants than upcoming departments.

Students need support and guidance from academic advisors. In a very large class it is very difficult for lecturers to have good class control, and this may have an effect on the understanding of lectures. More than half of the respondents (52% n=166) agreed that a large number of students in class has an effect on the student understanding of lectures, this is because a well-ventilated and conducive environment aids in learning,[24] and also gives the lecturers more grip and control over the class. This finding is in keeping with Ajayi and his team,[5] who found that the majority of their respondents agreed that class size has a significant influence on students' classroom engagement. However, in our study 95% (n=307) admitted that they have the chance to ask questions in class during lectures, and 84.9% (n=276) stated lecturers have time to answer their questions. Our finding was that 39% (n=127) believed that the number of students is not a factor that prevents them from asking questions in class. This is in keeping with Guseman,[19] who reported that students perceive no difference in learning for large and small class sizes. However, most of the respondents suggested that the management should increase the number of qualified academic staff to improve the quality of teaching and the student-lecturer ratio. From the result of this study, the majority of the respondents strongly agreed that a well-equipped class room (52.5% n=166), availability of practical skills laboratories (73.5% n=236), and clinical posting in the hospital (73.6% n=237) may affect radiography training in Nigeria. This is in agreement with the NUC evaluation criteria such as adequate equipped class room, and availability of laboratories for accreditation of degree programmes in Nigerian universities. The weighting assigned to each of them: academic content 23%, staffing 32% (with teaching staff 22%, administration 5%, non-teaching staff 3%, and staff development 2% as components), physical facilities (such as laboratories and classes) 25%, library 12%, and funding 5%.[8]

One of the recommendations for accreditation in any radiography department, by both NUC and RRBN, is the availability of functional skills acquisition laboratory (x-ray, ultrasound and others) to aid in students training pre-clinical skills development included the use of a university laboratory.[20] Undertaking practicals in a skills acquisition laboratory is part of the requirements for radiography training; Students are required to integrate their knowledge of radiography into practical skills.[13] However, it appears that the student respondents in our study face numerous challenges during the practicals due to the high number of students in class: 27.3% (n=87) strongly agreed and 12.5% (n=40) agreed that the number of students in class was the reason why they do not have access to the equipment in their skills laboratory; 81.1% (n=262) of the respondents reported that their schools have skills acquisition laboratories. Only 31.5% (n=98) admitted to using the equipment in the skills laboratory. Some departments have non-functional equipment in the laboratory, as indicated by 69.1% (n=185) of the respondents. This implies that students rely on lectures and demonstrations they receive during lectures. This then increases the workload on the already overstretched lecturers in the department. Some departments only use the equipment in the laboratory during exams, as indicated by some of the respondents (n=26); others use it once a semester (n=35) or once a month (n=16). Over a third (38.4% n=79) of the respondents said they had never used the equipment; 41.8% (n=130) admitted to sometimes using the equipment in the laboratory. These challenges may go a long way toward hampering the quality of training as most of the students are only exposed to theories in lectures. It is imperative that departmental management should promote and encourage weekly use of their skills laboratory by the students to improve on their practical skills.

Clinical posting is also one of the requirements for training in universities offering radiography.[20] It plays an essential role in developing students' skills, and provides students with an opportunity through which theoretical concepts can be better understood.[21, 22] However, due to limited resources in our hospitals, and the increasing number of students admitted in radiography departments, many of the students (42.4% n=137) strongly agreed, and 13.9% (n=45) agreed that the number of students in class affects them during clinical posting. Majority of the students only observe during clinical posting and don't have the chance to participate in or perform procedures in the hospital, with only 38.4% (n=118) of the respondents saying they have the chance to perform some procedure, while 35.8% (n=110) said they sometimes perform or participate in some procedures, and 25.7% (n=76) never have the chance to perform any procedure. Even though 74.1% (n=238) of the students claim to attend clinical postings in the hospital, this can be due to increase number of students enrolled in the programme, the result agrees with the study conducted by Kyei, et. al.,[23] where they reported that most of the respondents are of the opinion that they are too crowded in a room, hence students are not too willing to attend training in duty rooms. Adopting 3D virtual radiography simulation by radiography departments is a improves diagnostic radiography education.[25, 26, 27, 28]

Majority of the students (39.1% n=127) strongly agreed that the number of students in class do have an overall effect on radiography training in Nigeria; there is strong correlation (p=0.000) between class numeric strength and the impact on radiography training, some respondents provides some few suggestions on how the quality of training can be improved such as; more practical aspect, increase the number of qualified academic staffs, conducive classroom, lecturers attitude toward students, e-learning programme, availability of students accommodation within the hospital to ease clinical posting, increase clinical posting time, mentorship from lecturers, improve relationship with clinical radiographers in the hospital and suggesting that final year radiographers attends call duty to improve on their skills.

LIMITATIONS OF THE STUDY

There was a low response rate to the questionnaire. The study focused on students' perceptions only and did not cover the perceptions of radiography lecturers on the impact of class numeric strength on the quality of radiography education and training in Nigeria.

RECOMMENDATIONS

1. Time should be allocated on the timetable for practical skills laboratories during the week.
2. Virtual radiography should be made compulsory and part of the accreditation requirements in the radiography department by the Radiographers Registration Board of Nigeria (RRBN) to aid coping with the growing number of students.
3. University management should employ more academic staff to improve the student - lecturer ratio and reduce stress on the few lecturers in the department, which may affect their performance.

CONCLUSION

Radiography education consists of both theoretical and clinical skills. The findings were that the number of students in class affects the students both in the clinical (in the hospital) and practical (in the skill acquisition laboratory) aspects of their training. It was also found that large class sizes influence understanding lectures in class, but this had no effect on their chance to ask questions in class. Adhering to the RRBN recommendation, based on the number of students in class, and the adoption of modern teaching methods such as virtual radiography by training institutions might help students acquire more practical and clinical skills during their training that are essential in radiography training.

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None

CONFLICT OF INTEREST

None

CONTRIBUTION OF AUTHORS

AU, AB, SWIO and DZJ conceptualised the idea. AU, AB and MYM developed the methodology. AU collected the data; MYM and MSU analysed the data. AU, AB and IM wrote the original draft. AS, TI and DZJ reviewed and edited the manuscript. All authors read and agreed to the final draft for publication.

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