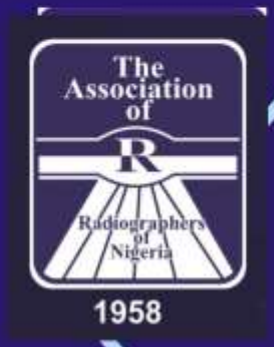

JRRS

JOURNAL OF RADIOGRAPHY & RADIATION SCIENCES

OFFICIAL JOURNAL OF THE ASSOCIATION OF RADIOGRAPHERS OF NIGERIA (ARN)

ISSUE 1, VOL 33, MAY 2019/ ISSN:1115-7976

Journal Homepage: www.jarnigeria.com

Factors that affect Teaching and Learning among Undergraduate Radiography Students in two Nigerian Universities

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Received: 22 August, 2017. Received final revision: 15 March, 2019. Accepted: 20 May, 2019

ABSTRACT

Objectives: To understand undergraduate radiography students' perception on effective teaching and learning.

Methods: Two hundred (200) radiography students from different academic levels of Nnamdi Azikiwe University, Nnewi Campus and University of Nigeria, Enugu Campus, were enlisted. Self-completion semi- structured questionnaires were used to obtain information from students on their perception of the teaching methods employed by lecturers.

Results: Results revealed that factors such as teaching methods, lecturers' knowledge of the subject, their disposition at lectures, use of clear concepts and their practical applications, learning environment, use of visual teaching aids, and use of non-judgmental feedback on students' work can influence effective learning. Other influencing factors included workload and lecture scheduling, student academic level, age, gender and availability of facilities.

Conclusion: The academic performance of students is not only influenced by the lecturer's knowledge of the subject but also the method used, available facilities, the age and academic level of the students.

Keywords: Radiography, Teaching, Learning, effective, academic performance

Introduction

Radiography is a skill-based discipline and an understanding of how students take in information provides clues on how specific teaching methods impart necessary skills for their adaptation after graduation [1, 2]. Academic performance is characterized by the ability to recall what was taught after a period of time and applying the principles of the knowledge gained in their daily life experience [3, 4]. Various factors influence academic performance. These include student's age, school, parent/guardian's socio-economic status, learning preferences, teaching faculty, gender, residential area of students, medium of instructions in schools, tuition trend, daily study hour, amongst others [5]. Learning and academic performance correlate strongly with education standard and educational institutions from which students get knowledge [6].

Teaching methods refer to the general principles and strategies used for classroom instruction. Commonly used methods include; class participation, demonstration, recitation, memorization or combination of these. The choice of teaching methods to be used depends largely on the information being passed or skill being taught. It can also be influenced by the aptitude and enthusiasm of the students [1]. Variety of teaching and learning methods and styles exist and better results are obtained when there is a good match between student's learning preferences and teacher's teaching styles [7]. The use of several teaching methods especially for key concepts is the best method for grooming future radiographers who are often faced with the challenges of making multiple strategic decisions in the workplace [8].

One core objective of radiological services is to give timely therapy in order to reduce patients' waiting time. To imbue prospective radiographers with this attitude, their training should be holistic, and should involve practical demonstration using patients**,** humour, use of real life experience, explanation of concepts from more than one viewpoints and the use of open-ended questions provide a better method of evaluation. Also, lectures delivered in a comfortable environment and for a short time produce an effective result. Interactive teaching methods correlate positively with higher level of learning and academic and practical performance [8 - 16].

This study was aimed at identifying methods of teaching as a factor affecting radiography student's performance in South-East of Nigeria using Nnamdi Azikiwe University and University of Nigeria, as case studies.

People and methods

A prospective cross sectional survey research design was adopted in this study. The study was carried out between May and June, 2015. Using formula [17], two hundred students, sampled from a population of 401 radiography students in 300 and 500 levels at Nnamdi Azikiwe University (NAU), Nnewi Campus, Nigeria and University of Nigeria, Enugu Campus (UNEC) Nigeria, were enlisted.

A 17-item, self-completion and semi-structured questionnaire was used for data collection. Section A of the questionnaire was on Socio-demographic characteristics, section B was on researcher identified teachers' attitude, and section C was on ways of improving academic performance. The questionnaires were administered by direct issuance while students were in classroom after lectures. Respondents were asked to score according to the strength of their perception on a four–point Likert scale representing strongly agree (1), agree (2), disagree (3) and strongly disagree (4) as appropriate. One hundred and ninety four (194) questionnaires were completed and returned to the researchers by respondents. Statistical Packages for Social Sciences (SPSS) version 16.0 was used to analyze data. Statistical significance was set at $p < 0.05$. Descriptive statistics like mean, median, mode, standard deviation, minimum, maximum frequency and percentages were used in the presentation of results. One way analysis of variance (ANOVA) and independent T-test were statistical tests used as appropriate. Effectiveness of teaching was judged by the preference of the students on items scored. Any lecture delivered in line with students' preference was deemed effective.

Table 1. Distribution of respondents according to institution, level of study and gender

Institution	**Frequency (%)**
UNEC	96 (49.5)
NAU	98 (50.5)
Total	194 (100)
Gender	**Frequency (%)**
Male	113 (58.3)
Female	73 (37.6)
Not indicated	8 (4.1)
Total	194 (100)
Level	**Frequency (%)**
300	89 (45.9)
500	104 (53.6)
Not indicated	1 (0.5)
Total	194 (100)

Results

Table 1 is the distribution of the respondents according to school, level of study and gender. Table 2 shows the age range distribution of respondents. Table 3 shows the respondents' perception on teaching methods, while Table 4 shows the response to teaches' style of teaching. Tables 5 and 6 show the independent-sample T-tests for difference in mean response between male and female respondents on teaching methods/conditions and teaching style, respectively. In table 5, significant difference existed only in the use of diagrams, charts and graphs for teaching ($p = 0.02$).

No statistically significant difference existed between males and females. Tables 7 shows ANOVA tests for difference in performance due to age on teaching methods/condition. No difference existed. Tables 8 and 9 are independent T-tests for difference in mean response between UNEC and NAU students on teaching methods/condition and for difference in performance between UNEC and NAU based on teaching style. Table 10 shows the distribution of the suggestions by the students (respondents) on how to improve teaching and learning in radiography departments.

Table 2. Age distribution of respondents

Age range (years)	Frequency (%)
17 - 20	9 (4.6)
21 - 23	78 (40.2)
24 - 26	76 (39.2)
27 - 30	14 (7.2)
Not indicated	17 (8.8)
Total	194 (100)

Discussion

Teaching in a meaningful context provides a way to apply academic learning to important real-world problems [14]. Just as effective communication is achieved when the receiver of information is able to receive, decode, understand and apply the conveyed message in a positive and expected way, effective teaching and learning is inferred when the student receives the teaching and gives out the expected performance [18].

Findings from this study like those from other researches [16, 19] showed that having dedicated lecturers, teaching effectively, allowing time for note taking, use of projections, animations and demonstrations during teaching, and explaining concepts/principles with more than one viewpoints have positive effects on students performance. This leaves us with many things to ponder about, starting from the availability of teaching resources like classrooms, libraries, enough knowledgeable and dedicated lecturers, teaching aids-videos, demonstration phantoms and such others.

Table 3. Responses on teaching methods

Teaching methods/ conditions	Min	Max	Mean ± St. deviation
Congested and unconducive classrooms	0	4	2.09 ± 1.059
Lectures tightly scheduled	1	4	2.04 ± 0.881
Discussion in between teaching	0	4	1.94 ± 0.806
Note-taking time allowed	0	4	2.01 ± 0.006
Multiple viewpoints in explaining concepts	1	4	2.30 ± 0.81
Actual work explained incorporated in teaching	0	4	2.11 ± 0.73
Open-ended questions used for evaluation	0	4	2.25 ± 0.785
Diagrams, charts and graphs used in teaching	0	4	2.02 ± 0.765
Secure future	0	4	1.83 ± 0.688

From our results there is need to pay attention to giving time for note taking which had a score of 3.14 ± 0.98 and 3.25 ± 0.80 from students of UNN and NAU, respectively. This range of score showed that the students were not given enough time for note taking and this imparts negatively on learning. Use of projections, animations and demonstrations for lectures can also make for effective teaching and learning.

Table 4. Responses on teaching style/teachers' characteristics

Lecturers' teaching characteristics	Minimum	Maximum	Mean ± St. deviation
Lectures flexible and diversified	0	4	2.13 ± 0.736
Well knowledgeable lecturers	0	4	1.72 ± 0.650
Teachers possesses sense of humor	0	4	2.09 ± 0.787
Teachers teaches with enthusiasm	1	4	2.10 ± 0.644
Teachers know and mentors students	1	4	2.35 ± 0.814
Non-judgmental feedback on students work	0	4	2.30 ± 0.817

Table 5. Independent-sample T-test for difference between male and female on teaching methods

Teaching methods/ conditions	Male (Mean ± SD)	Female (Mean ± SD)	p-value
Unconducive and congested classroom	2.14 ± 1.076	2.04 ± 1.047	0.37
High academic workload and tightly scheduled lectures	2.02 ± 0.896	2.04 ± 0.873	0.91
Discussion in between teaching are allowed	2.05 ± 0.800	1.80 ± 0.763	0.25
Note taking time allowed	2.07 ± 0.704	1.89 ± 0.658	0.92
Projections, animation and demonstrations are used in lectures	3.27 ± 0.916	3.06 ± 0.956	0.89
Concepts/principles are explained in more than one view point	2.28 ± 0.818	2.33 ± 0.800	0.76
Incorporated actual work experience in teaching	2.14 ± 0.680	2.04 ± 0.807	0.46
Open-ended questions used for evaluation	2.32 ± 0.723	2.06 ± 0.880	0.70
Diagrams, charts and graphs used in teaching	2.02 ± 0.654	2.01 ± 0.935	0.02*
Secure future	1.82 ± 0.722	1.84 ± 0.667	0.77

*Significant

Table 6. Independent T-test for difference between males and females on teaching style/characteristics

Teachers' teaching characteristics	Male (Mean ± SD)	Female (Mean ± SD)	p-value
Lectures are flexible and diversified	2.17 ± 0.680	2.07 ± 0.822	0.43
Well knowledgeable lecturers	1.72 ± 0.661	1.17 ± 0.656	0.67
Teachers possesses sense of humor	2.12 ± 0.758	1.99 ± 0.808	0.10
Teachers teaches with enthusiasm	2.16 ± 0.621	2.00 ± 0.687	0.57
Teachers knows and mentors their student	2.37 ± 0.793	2.26 ± 0.834	0.74
Non-judgmental feedback on student's work	2.33 ± 0.787	2.25 ± 0.894	0.90

This scored 3.24 ± 0.916 and 3.06 ± 0.956 from UNN and UNN students, respectively and 3.05 ± 0.964 and 3.31 ± 0.893 from 300level and 500level students, respectively. This agrees with findings from literature **[9].** Another issue of importance is that increase in practical teaching will enhance problem-based learning that will produce the desired psychological disposition to accept challenges [2]. To achieve effective teaching and learning processes for radiography programmes, attention therefore, has to be paid to those areas where the respondents showed uniform response to either teaching style or condition.

For example efforts have to be made to use teachers who are not judgmental, use animations and practical demonstrations. It was also shown that the students' level of study and method of teaching can affect their understanding and performance.

Table 7. ANOVA for test of difference on performance due to age and teaching method/conditions

Teaching method/conditions	F	Significant
Unconducive and congested classrooms	0.409	0.802
High academic workload and tight lecture schedule	2.175	0.730
Discussion in between teaching allowed	1.643	0.165
Note taking time allowed	1.289	0.276
Use of projections, animations and demonstrations in lectures	1.798	0.131
Concepts/principles are explained in more than one view point	1.595	0.177
Actual work experience incorporated in teaching	1.232	0.299
Open-ended questions are used for evaluation	1.544	0.191
Diagrams, charts and graphs are used for teaching	0.624	0.646
Secure future	0.762	0.551

Table 8. Independent-sample T-test for difference in performance between UNEC and NAU due to teaching methods/conditions

Teaching methods/conditions	UNN (Mean± SD)	NAU (Mean± SD)	p-values
Unconducive and congested classrooms	2.81 ± 0.94	1.39 ± 0.59	0.00
High academic workload	2.23 ± 0.97	1.86 ± 0.75	0.003
Discussion in between teaching	2.09 ±0.85	1.84 ± 0.74	0.86
Allowing note taking time	3.14 ± 0.98	3.25 ± 0.80	0.73
Projections, animations and demonstrations are used in lectures	2.12 ± 0.71	1.91 ± 0.64	0.25
Concepts/principles are explained in more than one view points	2.28 ± 0.89	2.33 ± 0.73	0.05
Actual work experience incorporated in teaching	2.12 ± 0.74	2.11 ± 0.73	0.55
Open-ended questions used for evaluation	2.24 ± 0.84	2.19 ± 0.73	0.04
Use of diagrams, charts and graphs in teaching	1.94 ± 0.75	2.09 ± 0.77	0.61
Secure future	1.81 ± 0.79	1.84 ± 0.58	0.03

Table 9. Independent-sample T-test test for difference between UNEC and NAU academic performance due to teachers' teaching style/characteristics

Teachers' teaching characteristics	UNN (Mean± SD)	UNIZIK (Mean± SD)	p-values
Diversity and flexibility of lectures	2.13± 0.78	2.14 ± 0.69	0.73
Well knowledgeable lecturers	1.66 ± 0.65	1.78± 0.65	0.34
Teachers possesses sense of humor	2.14± 0.83	2.04 ± 0.75	0.19
Teachers teaches with enthusiasm	2.10 ± 0.64	2.10± 0.65	0.88
Teachers knows their students and mentors them	2.32± 0.85	2.34 ± 0.78	0.22
Non-judgmental feedback on students	2.25 ± 0.81	2.34 ± 0.83	0.96

These factors have to be put into account by the lecturer to make their teaching effective [15].

Conclusion

The academic performance of students is not only influenced by the lecturer's knowledge of the subject but also the method used, available facilities, the age and academic level of the students. Also evident from the study is that there is statistically significant difference between teaching methods and condition of learning in the studied institutions but not in the teachers' teaching style//characteristics. The areas of weakness observed in this study have to be addressed.

Table 10: Distribution of suggested solutions to improve academic performance

Solution	Frequency (%)
Allowing more time to study	16 (8.3)
Improving standard curriculum	5 (2.6)
Employment of more qualified lecturers	21 (10.8)
Giving assignment & seminar presentation	1 (0.5)
Good teacher-student relationship	24 (12.4)
Increase in practical teaching	28 (14.4)
Having dedicated lecturers	10 (5.15)
Providing conducive environment and provision of basic facilities	54 (27.8)
Reducing workload	9 (4.6)
Students being studious	3 (1.5)
Teaching effectively	19 (9.7)
Use of visual teaching aids	36 (18.6)
Varying teaching methods	2 (1.0)
Applying indexing quota	1 (0.5)
Paying attention during lectures	1 (0.5)
Supervising lecturers	1 (0.5)
Adequate lecture time	4 (2.01)

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How to cite: Chiegwu H. Uche, Ugwuanyi D. Chimuanya, Ofokansi F. Chigozie. Factors that affect Teaching and Learning among Undergraduate Radiography Students in two Nigerian Universities. J Rad & Radiat Sci, 2019; 33 (1): 6 – 12