FACTORS AFFECTING THE DEVELOPMENT OF PRACTICAL SKILLS AMONG CLINICAL RADIOGRAPHY STUDENTS IN NIGERIA: A TALE OF TWO UNIVERSITIES.

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ABSTRACT

Objective: To identify the factors that affect the development of practical skills among clinical radiography students and to obtain information on how the practical skills development can be improved.

Methodology: The study was a prospective cross-sectional survey. It covered the clinical (400 and 500 Level) radiography students of University of Nigeria, Enugu Campus (UNEC) and Nnamdi Azikiwe University, Nnewi Campus, (NAU). A semi-structured questionnaire was the instrument used for the data collection and a total of one hundred and twenty two (122) students participated in the study. Statistical package for social sciences SPSS (Version 16.0) was used to analyze the data and $p < 0.05$ was accepted as statistically significant.

Results: The results of the study showed that there were more respondents from UNEC than from NAU, and also that the number of male respondents were more than the number of female respondents from the two institutions. The result however identified structures/ facilities, amongst others, as factors which affect the development of practical skills. It was also found that allowing the students perform certain investigation under supervision, with no direct intervention of the instructor may be a major way through which practical skills development can be improved.

Conclusion: Inadequate physical structures and facilities are factor which affect the development of practical skills of clinical radiography students in South-East Nigeria.

Keywords: Practical Skills, Radiography Students, Development.

INTRODUCTION

In most professions, the body of knowledge is constantly evolving and a practitioner is expected to have up to date information about such changes. Accordingly, graduates of Radiography programmes (radiographers) must have the skills required to meet new challenges in the field[1]. In many instances, a conflict arises between the roles and responsibilities associated with meeting workload demands and providing support for learning in the clinical department, particularly where staffing is inadequate[2]. This is a factor which affects both capacity and quality of learning in the clinical environment. Sometimes, emotional stress occurs due to inadequate exposure to practical procedures, insufficient training and poor communication skills[3]. In Nigeria, radiographers are expected to undergo a compulsory post-qualification one-year internship programme, aimed at exposing them to practical training in a work setting. Many authors feel that this pre-registration year is not primarily the place to learn practical skills and that teaching at undergraduate level using a more structured approach is more effective [4,5,6].

The use of lists or log books drawn up from consensus amongst clinical staff and detailing basic skills have been used to gauge students' mastery of relevant skills[7].

Naturally, students find it easier to remember what they had been taught in the practical skills sessions than the lectures. This study aimed at investigating the factors that affect the development of practical skills among clinical radiography students in two Nigerian Universities.

MATERIALS AND METHODS

This study involved the clinical (4th and 5th year) radiography students of the two institutions namely University of Nigeria, Enugu Campus and Nnamdi Azikiwe University Nnewi Campus, Anambra State.

The data instrument was anonymized semi-structured self-administered questionnaire with a 4 point Likert scale. This instrument was adapted from a study by Nikurawu and Saburi[8] on the barriers to clinical teaching in midwifery. The final instrument was validated by review experts in the field of radiography. The questionnaire has three sections:

1. Section A was on the demographic data of the respondents.
2. Section B dealt with the respondents' knowledge on the factors affecting the development of practical skills among the clinical radiography students. This 20-itemed section, on a 4-point Likert scale assessed the following:

a) Attitudes of clinical personnel
b) Physical structures/ facilities
c) Staffing level
d) Environmental/Atmospheric conditions.

Section C was on the respondents' suggestions on how the development of practical skills among clinical radiography students can be improved.

Statistical package for social science SPSS (version 16.0) was the software used for the data analysis.

Descriptive statistics of frequency counts, percentages, mean, median, standard deviation, skewness and kurtosis were obtained. Inferential statistics (ANOVA and Post-hoc ANOVA using Bonferoni Adjustment) was done and $P< 0.05$ was accepted as statistically significant. Qualitative data was content-analyzed.

RESULTS AND DISCUSSION

A total of 122 questionnaires were completed by the respondents from the two institutions involved in the study. Eighty-five (69.67%) of them were from University of Nigeria (UNEC) while thirty-seven (30.33%) were from Nnamdi Azikiwe University (NAU). In UNEC, fifty-one (60%) were males while thirty-four (40%) were females whereas twenty four (64.86%) were males and thirteen (35.14%) females in NAU.

The mean values for the measured variables were:
Attitudes of clinical personnel = 2. 4263
Physical structures/ facilities = 2.0357
Staffing level = 2. 7115
Environmental/Atmospheric conditions = 2. 4811

ANOVA result for factors affecting development of practical skills shows that a significant difference exists ($P<0.05$).

Table 1 shows the results of the descriptive statistics. It shows that staffing level (as one of the variables studied) had the highest mean value whereas structures had the lowest mean value. Values of Kurtosis and skewness (< 2) also indicate that the data were normally distributed.

Table 1: Contingency Table showing descriptive statistics of measured variables

v	Minimum	Maximum	Median	Mean	Standard Deviation. (Statistics)	Skewness (statistics)	Kurtosis (statistics)
A	1.50	3. 50	2.5000	2. 4263	0.39029	0.372	0-012
S	1.00	4.00	1.9150	2.0357	0.58240	0.466	- 0.088
SV	1. 40	4.00	2. 8000	2. 7115	0. 53336	0.182	-0.257
E	1.00	4.00	2.6700	2. 4811	0.60616	- 0.258	-0.142

Key: (V = variables; S = Structures, SV = Staffing Levels, E= Environmental, A = Attitude)

Table 2: Result of Post-hoc ANOVA using Bonforoni Adjustment

Variables I	Variables II	P- value
Attitudes of clinical personnel	Physical structures/Facilities	0.000
	Staffing level	0.000
	Environmental/Atmospheric conditions	1.000
Physical structures/Facilities	Staff level	0.00
	Environmental/Atmospheric conditions	0.00
Staffing level	Environmental/Atmospheric conditions	0.005

Table 3: Theme Categorization of Comments made by Students

S/N	Factor	Number of respondents	Percentage (%)
1	Un-aiding students	28	22. 95
2.	Good equipments and facilities	26	21.31
3.	Sufficient posting time	21	17.21
4.	Sufficient clinical instructors	8	6.56
5.	Long vacation posting	6	4.92
	Provision of other imaging modalities	5	4.10
7.	Interval Assessments	4	3. 28
8.	Batch/ Group posting	3	2. 46
9.	Prioritizing posting attendance	3	2. 46
10.	Good structures	3	2. 46
11.	Academic friendly environment	2	1.64
12.	Classroom demonstration	2	1.64
13.	Early commencement of posting	2	1.64
14.	Sound background in anatomy	1	0.82
15.	No comments	8	6.56
		122	100.00

Results from the post-hoc ANOVA using Bonferoni Adjustment that a significant difference exists between attitudes of clinical personnel and physical structures/facilities, attitudes and staffing level, but no such difference was found between attitudes of clinical personnel and environmental/atmospheric conditions . Also a significant difference was found between physical structures/facilities and staffing level and between physical structures/facilities and environmental/atmospheric conditions. A significant difference was also observed between staffing level and environmental/atmospheric conditions.

Content analysis of students' opinions on the factors that could improve the development of practical skills, were merged into themes (Table 3). A total of fourteen themes were identified namely

- Adequate equipments and facilities
- Good structures
- sufficient posting time
- Batch/Group postings
- Long-vacation posting
- Interval assessments
- Good background in anatomy,
- Prioritizing of posting attendance,
- Classroom demonstration
- Academic-friendly environment
- Sufficient Clinical Instructors
- Early commencement of posting
- Allowing adequate hands-on by students and provision of other imaging modalities.

Some of the students however stated they had no idea on how the practical skills development can be improved.

Table 3 shows the factors that could improve practical skills, the frequency of the respondents for each of the factors as well as their percentages. From the table it can be seen that hands-on training of the students, (22.95%) and provision of good equipments and facilities (21. 31%) were the two highest occurring factors. Classroom demonstration (1. 64%) and a sound background in anatomy (0.82%) can also be seen as the least two occurring factors.

DISCUSSION

Performance of health professionals in the field is one basic way of assessing professionalism and the standard of training. Clinical teaching methods vary and include problem-solving, experimental, clinical conference, observation and multimedia approach[9]. Clinical teaching and learning takes place in the clinical setting where learners are supported, learning is valued, a structure of exploration is provided, the freedom to ask questions is enhanced, different opinions are encouraged and accepted and the development of the student is fostered[10]. Individual clinical teachers can adopt any of the methods described above including Role modeling which requires a teacher to demonstrate a skill and discuss the criteria by which the outcome was achieved [8,11].

Experimental teaching methods which include clinical assignment, written assignment and simulation are also frequently used[10,8].

The case study is usually based on a patient the learner has actually looked after and requires the student to make in-depth analysis of health care problems and needs, based on relevant theories and principles [9].

A clinical log represents a record of the student's personal experience related to clinical practice in the form of learning diary. The student records in sequence feelings, reactions, attitudes and activities regarding experiences in the clinical area based specific clinical objectives[8].

Other acceptable methods include Observation teaching methods including field trips, ward rounds and demonstrations[8]. In observation learning occurs through modeling. Learners observe an actual clinical experience or demonstration and modeling promotes learning by informing the learners about the behavior to be developed[13]. Sometimes a multimedia can be used to provide information through remote and inaccessible processes and these include slides, films, audiotapes, computers, programmed instructions and photographs. These are effective in promoting cognitive learning, retention of knowledge and performance[10].

A practitioner on graduation is faced with the task of transforming the theoretical knowledge gained during training into the practical/ procedural skills of a competent professional[14]. These procedural skills will ultimately benefit the patients and leave the practitioner with a sense of worth and accomplishment. Factors influencing the development of practical skills of interns (house officers) has been carried out in South Africa[15], but none has been done among radiography students in Nigeria. A lot of studies have been carried out to determine the factors that affect ones (especially students') development or success of practical skills.

Christina[2] in her study on clinical education and training identified minimum staffing levels, the number of treatment/examination rooms and the number of staff available to undertake the defined roles as a variety of criteria to determine the capacity of placements to support pre-registration learners (students). She further opined that there is often conflict between the roles and responsibilities associated with meeting workload demands and providing support for learning in the clinical environment, particularly where staffing levels are reduced. The authors consider this as a major factor affecting both capacity and the quality of learning in the clinical environment. Furthermore, staff attitude to students/ learners is an important factor in enhancing the quality of learning experiences, such that the negative attitude of an individual member of staff towards a student/learner can have a profound effect on learning.

The emotional atmosphere in a class environment has equally been identified as a factor affecting what students learn[16,17]. Other factors such as high school grade point average, motivation, method of learning and father's level of education, place of abode and gender were effective in a student's academic success [17,18,19,20,21,22,23].

Some studies [19,20] have observed that a student's success is dependent upon the three variables of cognitive entry behaviour, motivation and quality of education[18,24,25,33].

It has also been noted that a positive significant relationship exist between a student's academic success and his/her family members' attitude towards education and learning[20,26,27].

Evidence from the literature [14,3] show that inadequate exposure to practical procedures and common clinical conditions and insufficient training in different communication skills lead to a high incidence of emotional distress. Even problem-based learning (PBL) methods have also shown an increased percentage of long term recall[27]. In India, similar opinions that emphasize practical over theoretical learning methods have been canvassed[28,29,30].

Our study showed the mean values for the variables as: Attitudes of clinical personnel(2.4) Physical structures/facilities(2.0), staffing level(2.7) and Environmental/atmospheric conditions (2.5). From the above mean values, it can be deduced that physical structures/facilities is the dominant factor that affecting the development of practical skills, whereas staffing level is the least factor.

The result from content analysis also identified hands on training of the students under observation and provision of good equipment and facilities as the two highest factors, and a sound background in anatomy and classroom demonstration as the two least factors that can improve the development of practical skills among clinical radiography students.

The result of the study identified staffing as the most prominent factor which favours the development of practical skills. The ANOVA P-value was found to be significant (P = 0.000) when all the skill acquisition parameters were compared. This is agreement with a previous study done by Hedjazi and Omidi[17] on factors affecting the academic success of Agricultural students in University of Tehran, Iran, which showed that educational factors such as the instructor as the fundamental basis of education can have a profound effect on students' learning. The authors canvassed the need for lecturers to be quite familiar with practical skills and follow especially a pragmatic policy of presentation of theory mixed with the actual field of practice. This is also in agreement with the result of this study as the students suggested deeper knowledge of anatomy and other imaging modalities. There is need for lecturers who have advanced knowledge compared to basic clinical instructors to be part of the clinical environment/teaching. This appears not to be the case in Nigeria, where Radiography teachers are not included in the clinical rotations in the Teaching hospitals.

The variable that had the least score in this study was structures. This observation agrees with those of Jaschinski and De Villiers[15], who stated that an obstacle to skills training was the structure of the tertiary hospitals.

This study has also showed that sufficiency of clinical instructors is a factor that can improve the development of practical skills. This is in agreement with a work by Christina[2] which noted that there is often conflict between the roles and responsibilities associated with meeting workload demands and providing support for learning in the clinical environment particularly where staffing levels are reduced. This study further identified sufficient posting time as a factor that can improve practical skills. It has been said that inadequate exposure to practical procedures and common clinical conditions and insufficient training lead to a high incidence of emotional distress[3].

The result of this study also showed that allowing the students perform certain investigations themselves with no direct intervention of their instructors (Un-aiding students) can also help improve the development of practical skills. A report[27] has it that problem-based learning (PBL) methods have shown an increased percentage of long-term recall[27]. Problem-based learning is a relatively new loosely defined educational process in which students gain basic knowledge by focusing on solving carefully prepared problems[31]. Each Problem or 'trigger' is posed by the instructor [32]. In this student centered process, the instructor participates as an adviser rather than as a leader [33]. Unlike traditional forms of instruction, such as lecture, PBL is student-led and student-directed[1]. Problem-Based Learning promotes self-directed skills and stimulates clinical reasoning[34]. In PBL the focus is on the client/patients problems or needs. In radiography practice, PBL is based on the problems/needs of the patient, his/her family or the community. PBL provides the opportunity for students to participate actively in the health care team, seek solutions to real problems and learn by doing [10].

Our study suggests an academic friendly environment, notably an improvement in the attitude of clinical staff to students, as a means of improving practical skills. This is in agreement with Anderson[16] who described a classroom's emotional atmosphere as a social group that affects what students learn. A student also opined that a sound knowledge in Anatomy can help improve development of practical skills, in line with the fact that students generally enjoyed learning clinical skills, they were very concerned when they found themselves unable to understand them, the student attributed this to lack of a strong foundation in basic sciences[35].

The factor that had the least score in the study was physical structures/facilities, and this agrees with the results from the content analysis which suggested good structures and provision of sufficient facilities as one of the factors through which development of practical skills can be improved.

CONCLUSION

Many factors affect, in variable degrees, the development of practical skills among clinical radiography students. These include attitude of clinical personnel, physical structures/facilities, staffing level and environmental/atmospheric conditions.

It can however be concluded that inadequate physical structures/facilities was the most prominent factors which affects development of practical skills, allowing hands on training as well as provision of state-of-the-art equipments and facilities are major ways through which the development of practical skills could be improved.

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