

Evaluation of BSc Radiologic Sciences and Medical Imaging Technology Programmes in Sudanese Universities from Students' Perspective

Awad Mohamed Elkhadir

Diagnostic Radiology Department, Faculty of Applied Medical Sciences (FAMS), King Abdulaziz University, Jeddah, Saudi Arabia

Email: alprof2007@hotmail.com

Received 8 August 2015; accepted 7 December 2015; published 10 December 2015

Copyright © 2015 by author and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY). http://creativecommons.org/licenses/by/4.0/



Open Access

Abstract

This study sets the objective to involve undergraduate students in the evaluation of radiologic sciences and medical imaging technology programmes in Sudanese universities. Based on the analysis of survey results in which the participants (BSc students undertaking radiologic sciences and medical imaging technology programmes at university level) are asked to answer both closed and open-ended questions, the study seeks to reveal the participants' perceptions and introspections about the radiologic sciences and medical imaging technology programmes in Sudan. It also attempts to explore the participants' suggestions and recommendations as to enhance the quality of these programmes with an eye to helping syllabus designers to improve these programmes, thereby bettering healthcare services for the larger good to the community. A brief cross-sectional survey is completed by a total of 105 radiologic sciences and medical imaging technology students, i.e. 39 (37.1%) third-year students and 66 (62.9%) fourth-year students. The majority of participants is satisfied with the programmes, indicating that they are up-to-date and ran abreast with the latest developments in the field. Very few suggest that the programmes should be reviewed for revision, implying that there is room for improvement. Some participants recommend that more training hours in modern imaging modalities (e.g. MRI, CT and U/S) should be introduced. Only one participant recommends the introduction of advanced training centres.

Keywords

Programmes Evaluation, Radiologic, Medical Imaging Technology, Sudan

1. Introduction

Medical Radiology Science is one of the most important spheres in medical care providing students to wide range of knowledge such as physics, human anatomy and physiology to become qualified (radiologic technologists) in two tracks Radiographic Technology or Radiation Therapy Technology. Radiologic Technology programmes include several subtypes including: x-rays, mammograms, CT or CAT scans, and MRI.

Radiologic sciences and medical imaging technology education in Sudan dated back to 1932 [1]. In 1995, there was a curriculum change towards bachelor's degree (BSc) [1]. Sudan is the first country in the region to commence BSc, Master's and PhD programmes in imaging technology and this has availed a critical mass of trainers helping other countries as well [2].

The present study is designed to obtain Radiologic Technology students' opinions about the BSc programmes to detect if it keeps pace with rapid development or not and to get their suggestions for the development of the programmes.

Radiologic Technology Programmes Overview

Radiologic Technology schools in the Sudan, whether public or private, adopt a modern systematic educational strategies and methods. The National University (NUSU), for example, embraces the semester system and follows different methods in the daily program of activities; 1) problem-based learning (PBL); 2) seminars and small group discussions; 3) field practice in rural and primary health care settings and societies; 4) practical sessions (hospitals, health centers, laboratory, technical); 5) laboratorial skills; 6) lectures; and 7) educational assignments, reports and research activities. The duration of study for BSc (Honors) is four years, divided into eight semesters covering a total of 160 credit hours (hrs) [2]. Generally speaking, radiography and imaging programmes at BSc level include different general and specialised courses. During the first and second year of study, programmes focus on general subjects and basic sciences of medical imaging. The final two levels of programmes are concentrated mostly towards the clinical practice, in which students are trained on the principles of radiographic techniques using the available equipment in their colleges. After graduation, the students are distributed to hospitals to put theory to practice under the supervision of supervisors from the colleges and hospitals.

2. Methodology

The Knowledge, Attitude, Practices (KAP) methodology was implemented to address the research questions. KAP surveys are focused evaluations that measure changes in human knowledge, attitudes and practices in response to a specific intervention. The KAP survey was first used in the fields of family planning and population studies in the 1950s. KAP studies use fewer resources and tend to be more cost effective than other social research methods because they are highly focused and limited in scope. KAP studies tell us what people know about certain things, how they feel, and how they behave. Each study is designed for a specific setting and issue [3]. "The attractiveness of KAP surveys is attributable to characteristics such as an easy design, quantifiable data... concise presentation of results, generalisability of small sample results to a wider population, cross-cultural comparability, speed of implementation, and the ease with which one can train numerators" [4]. In addition, KAP studies bring to light the social, cultural and economic factors that may influence health and the implementation of public health initiatives, "There is increasing recognition within the international aid community that improving the health of poor people across the world depends upon adequate understanding of the socio-cultural and economic aspects of the context in which public health programmes are implemented. Such information has typically been gathered through various types of cross-sectional surveys, the most popular and widely used being the knowledge, attitude, and practice (KAP) survey" [4]. Study carried out on 14th August 2014, design was implemented in two phases. The first phase involved the collection of the data, followed by the second phase, involving the analysis and interpretation of the statistics obtained using Pearson Chi-Square test. One advantage of a KAP survey is that it allows, in a single survey, the collecting of a large amount of data that will be subject to statistical analysis (which qualitative methods of data collection do not allow). A brief cross-sectional survey requiring answering four questions was distributed randomly to 105 students of two universities was limited to some students because the survey conducted during the examination period, so most of them were busy on their examinations; namely, Sudan University of Science & Technology (SUST) and the NUSU. Prior permissions for access were obtained from the two universities. To help overcome any reluctance to participate, participants were assured that the survey was only for research purposes and that confidentiality and anonymity would strictly be observed. This work was conducted in compliance with Institutional Review Board/Human Subjects Research Committee requirements.

The main purpose of this study was to disclose the views of finalist undergraduate radiologic sciences and medical imaging technology students in two Sudanese universities regarding the quality of BSc radiology and imaging technology programmes. The study also aimed to extract suggestions and recommendations from the participants regarding ways to improve these programmes. It was believed that the students, along with syllabus designers, held the key to providing a better understanding of the research problem.

The study sought to explore the following:

- The participants' views about the radiologic sciences and medical imaging technology programmes in their faculties *i.e.* whether they keep pace with the latest developments;
- > The participants' views about the clinical practice in their faculties;
- > The participants' suggestions regarding ways of improving the radiology and medical imaging technology programmes in the Sudanese universities;
- > The participants' suggestions about ways of improving the clinical practice in the Sudanese universities.

 To address the above issues, a brief survey requiring answering four questions (two closed questions and two open-ended questions). The questions were as follows:
- > Do you think that the radiologic sciences and medical imaging programme in your faculty keeps pace with the latest developments in the field?
- > Do you think that the clinical practice you have received is quite enough to achieve its set objectives?
- ➤ How do you think the radiologic sciences and medical imaging programmes can be improved?
- ➤ How do you think the clinical practice can be improved?

3. Results

3.1. Demographic Characteristics of the Participants

Table 1 presents the frequency distributions (counts and percentages) of the demographic characteristics of the 105 students who participated in this study; most of which 85 (81.0%) were female and the remainder 20 (19.0%) were male. Over half of the participants 66 (62.9%) were in their fourth year of study, whereas the remained 39 (37.1%) were in their third year of study.

3.2. Quantitative Findings of the Research Questions

This section describes the quantitative findings of the responses of the 105 participants to the survey questions. The findings are summarised in order of the research questions stated in section.

3.2.1. Participants' Views Regarding Radiologic Sciences and Medical Imaging Technology Programmes in Their Faculties

Do you think that the radiologic sciences and medical imaging programme in your faculty keeps pace with the latest developments in the field? This was an exploratory closed research question with a quantitative answer that did not involve the testing of a hypothesis. **Table 2** shows that the majority of participants 67 (63.8%) reported that their program kept pace with the latest developments in the field, while 27 (25.7%) stated that the program were not up-to-date and 11 (10.5%) had no comment. Based on student level 28 (82.4%) from third level showed their program kept pace with the latest developments in the field, while 6 (17.6%) stated that the program were not up-to-date and students from fourth level 39 (65.0%) of them confirmed their program

 Table 1. Demographic characteristics of the participants.

| Characteristic | Group | Count | % |
|-------------------|-------------|-------|-------|
| Gender | Male | 20 | 19.0% |
| | Female | 85 | 81.0% |
| Educational Level | Third Year | 39 | 37.1% |
| | Fourth Year | 66 | 62.9% |

keep pace with development, while 21 (35.0%) of tem stated that the program were not up-to-date Table 3.

3.2.2. Participants' Views Regarding the Quality of Clinical Practice

Do you think that the clinical practice you have received is quite enough to achieve its set objectives? This was another exploratory closed research question with a quantitative answer that did not involve the testing of a hypothesis. **Table 4** shows that over half of the participants 61 (57.6%) agreed that the clinical practice they had received was enough to achieve the set objectives of the programmes, while 39 (37.1%) did not agree. Five participants 5 (4.8%) opted not to answer this question.

3.2.3. Respondents' Suggestions Regarding Ways to Improve the Programmes

How do you think the radiologic sciences and medical imaging programmes can be improved? This was an exploratory research question with a qualitative answer that did not involve the testing of a hypothesis. **Table 5** shows that 6 (80.0%) suggested that the programmes needed revision for improvement and only one participant

Table 2. (a) Participants' views regarding radiologic sciences and medical imaging technology programmes in their faculties based on gender; (b) Chi-Square tests.

(a)

| | | Do you think that the radiologic sciences and medical imaging programme in your faculty keeps pace with the latest developments in the field? | | Total | |
|--------|--------|---|------------|-----------------------|--------|
| | yes No | | No comment | | |
| | M 1 | 12 | 6 | 2 | 20 |
| G 1 | Male | 60.0% | 30.0% | 10.0% | 100.0% |
| Gender | г 1 | 55 | 21 | 9 | 85 |
| | Female | 64.7% | 24.7% | 10.6% | 100.0% |
| T | . 1 | 67 | 27 | 11 | 105 |
| Total | | 63.8% | 25.7% | 10.5% | 100.0% |
| | | | (b) | | |
| | | Value | df | Asymp. Sig. (2-Sided) | |

ValuedfAsymp. Sig. (2-Sided)Pearson Chi-Square0.23820.888

Table 3. (a) Participants answers about the curriculum based on student level; (b) Chi-Square tests.

(a)

| Student level | | adiologic sciences and medical imaging programme in os pace with the latest developments in the field? | Total |
|---------------|-------|--|--------|
| | Yes | No | |
| 2md vicen | 28 | 6 | 34 |
| 3rd year | 82.4% | 17.6% | 100.0% |
| 441 | 39 | 21 | 60 |
| 4th year | 65.0% | 35.0% | 100.0% |
| | 67 | 27 | 94 |
| Total | 71.3% | 28.7% | 100.0% |

(b)

| | Value | df | Asymp. Sig. (2-Sided) |
|--------------------|-------|----|-----------------------|
| Pearson Chi-Square | 3.192 | 1 | 0.074 |

Table 4. (a) Participants' views regarding the quality of clinical practice; (b) Chi-Square tests.

(a)

| | | Do you think that the clinical practice you have received is quite enough to achieve its set objectives? | | | Total |
|--------|--------------------------|--|-------|------------|--------|
| | | Yes | No | No comment | _ |
| | Male Gender Female | 12 | 7 | 1 | 20 |
| C4 | | 60.0% | 35.0% | 5.0% | 100.0% |
| Gender | | 49 | 32 | 4 | 85 |
| | | 57.6% | 37.6% | 4.7% | 100.0% |
| Total | | 61 | 39 | 5 | 105 |
| | | 58.1% | 37.1% | 4.8% | 100.0% |

(b)

| | Value | df | Asymp. Sig. (2-Sided) |
|--------------------|-------|----|-----------------------|
| Pearson Chi-Square | 0.049 | 2 | 0.976 |

Table 5. (a) Respondents' suggestions regarding ways to improve the programmes; (b) Chi-Square tests.

(a)

| | | Respondents | Respondents' Suggestions to improve the programmes | |
|--------|--------|-------------------|--|----------|
| | | Review Curriculum | Add advanced imaging modalities | —— Total |
| Gender | Male | 2 | 0 | 2 |
| | | 100.0% | 0.0% | 100.0% |
| | Female | 4 | 1 | 5 |
| | | 80.0% | 20.0% | 100.0% |
| To | otal | 6 | 1 | 7 |
| | | 85.7% | 14.3% | 100.0% |

(b)

| | Value | df | Asymp. Sig. (2-Sided) |
|-----------------------|-------|----|-----------------------|
| Pearson Chi-Square | 0.467 | 1 | 0.495 |
| Continuity Correction | 0.000 | 1 | 1.000 |

1 (14.3%) suggested the introduction of advanced imaging modalities.

3.2.4. Respondents' Views Regarding Ways of Improving the Clinical Practice

How do you think the clinical practice can be improved? This was another exploratory research question with a qualitative answer that did not involve the testing of a hypothesis. **Table 6** shows that 19 (95.0%) respondents suggested that more training hours in imaging modalities should be introduced, while 1 (5.0%) respondents suggested the introduction of advanced training centres in their faculties.

4. Summary, Discussion and Conclusions

The purpose of this study was to explore the views of BSc students on the current radiologic sciences and medical imaging programmes in Sudanese universities *i.e.* whether they were up-to-date). It was also aimed to explore the participants' suggestions and recommendations regarding ways to improve the quality of these programmes. The study aimed to explore:

Table 6. (a) Respondents' views regarding ways of improving the clinical practice; (b) Chi-Square tests.

(a)

| | | Respondents' suggestions to improve the clinical practice | | - Total |
|--------|--------|---|--|---------|
| | | Increase training hours in imaging modalities | Availability of advance training center in faculty | - Totai |
| Gender | Male | 4 | 1 | 5 |
| | | 80.0% | 20.0% | 100.0% |
| | Female | 15 | 0 | 15 |
| | | 100.0% | 0.0% | 100.0% |
| То | otal | 19 | 1 | 20 |
| | | 95.0% | 5.0% | 100.0% |

(b)

| | Value | df | Asymp. Sig. (2-Sided) |
|--------------------|-------|----|-----------------------|
| Pearson Chi-Square | 3.158 | 1 | 0.076 |

- > The participants' views about the radiologic sciences and medical imaging technology programmes in their faculties *i.e.* whether they kept pace with the latest developments;
- ➤ The participants' views about the clinical practice in their faculties;
- > The participants' suggestions regarding ways of improving the radiologic sciences and imaging technology programmes in the Sudanese universities;
- > The participants' suggestions about ways of improving the clinical practice in the Sudanese universities. The research highlighted the following findings:
- ➤ The majority of participants 67 (63.8%) reported that the programmes kept pace with the latest developments in the field, while 27 (25.7%) stated that the programmes were not up-to-date;
- ➤ 6 (85.7%) respondents suggested that the programmes needed revision and that there was room for improvement;
- ➤ Only one respondent 1 (14.3%) suggested the introduction of advanced imaging modalities;
- ➤ Over half of the participants 61 (58.1%) agreed that the clinical practice they had received was enough to achieve the set objectives of the programmes, while 39 (37.1%) did not agree. Five participants 5 (4.8%) opted not to answer this question;
- > 19 (95.0%) respondents suggested that more training hours in imaging modalities should be introduced;
- > 1 (5.0%) respondents suggested the introduction of advanced training centres in their faculties.

Needless to say, involving the students in the process of evaluating the programmes they study and taking their views, suggestions and recommendations into consideration were very important to ensure improved quality of education. Thus, the main purpose of this paper had been planning, designing and focusing on perspectives of students using KAP survey method, which it is the most popular and widely used being the knowledge, attitude, and practice [5].

To the best of my knowledge, this study was the first to seek to explore the views of medical imaging students in Sudan. The various benefits of considering students feedback in evaluating the curriculum had been demonstrated by several authors. Roff *et al.*, for example reported about students' perceptions of their educational environment, his paper reported a body of research in health professions institutions around the world [6]. Another paper by Ostojic *et al.* confirmed that including the student in the assessment of the curriculum enabled faculty to gain more insight into students' opinions about their programme which provided valuable feedback for further program improvements [7].

Consistent with previous studies, the current study reemphasized the importance of identifying the opinions of participants about the clinical practice, Nasrollah Jabbarietl showed that this helped improve the weak points and can develop accessing educational goals, training skillful people, and giving treating and caring services with higher quality with the least error [8]. John Jagrersmaetl paper agreed that the curriculum was constructed with the learner as its central focus and showed positive results when students were included in the curriculum planning process [9]. I chose the open-ended questions to allow participants to come up with their own responses to document the opinions of the respondent in his or her own words. Moreover, it helped record all the information and avoid losing it [10]. John Jagrersmaetl paper agreed that the curriculum was constructed with

the learner as its central focus and showed positive results when students were included in the curriculum planning process [11]. I chose the open-ended questions to allow participants to come up with their own responses to document the opinions of the respondent in his or her own words. Moreover, it helped record all the information and avoid losing it [12]. This was why I chose this type of survey methodology. However, a significant number participant failed to answer some questions, probably because of the tense atmosphere of examinations, as the survey was conducted during examination period.

5. Recommendations

Based on the findings obtained, the following recommendations can be made:

- > It is recommended that different research methods (qualitative methods) be used to evaluate the quality of the programmes under investigation;
- Given that the current study was conducted during the examination period, the present researcher recommends that further studies should be conducted out of the examination period to ensure a broader participation:
- ➤ Radiologic sciences and medical imaging technology programmes should be evaluated regularly by experienced interdisciplinary teams using the latest evaluation models to ensure coping with the rapid developments in this vital discipline;
- > It is also highly recommended that laboratories and clinics be furnished with the state-of-the-art medicale-quipment to allow for better training opportunities;
- The clinical practice objectives shouldbereviewedregualry to covering best training in all modern imaging-modalities.

Acknowledgements

I would like to thank (Dr. AlsafiBalla, Dr. Caroline Ayad and Mr. Salah Fadlalla—Staff members , College of Medical Radiologic Sciences-Sudan University of Science and Technology), Dr. Abdelmoneim Saeed, Faculty of Radiography and Diagnostic Medical Imaging-National University-Sudan and Dr. Mohamed Siddig Abdalla, King Abdulaziz University for their strongly supporting to help me during preparation of this manuscript, although any errors are my own and should not tarnish the reputations of these esteemed professionals.

References

- [1] Website of Medical Radiologic Sciences, Sudan University of Science & Technology. http://radiologic.sustech.edu/index.php/College of Medical Radiologic Sciences/coll about/?lang=en
- [2] Radiography College, National University Website. http://www.nu.edu.sd/radiography.html#
- [3] (2010) Knowledge, Attitudes and Practices (KAP) Studies for Water Resources Projects.
- [4] Launiala, A. (2010) How Much Can a KAP Survey Tell Us about People's Knowledge, Attitudes and Practices? Some Observations from Medical Anthropology Research on Malaria in Pregnancy in Malawi. *Anthropology Matters*.
- [5] Unite Forsight Website, Survey Methodologies. http://www.uniteforsight.org/global-health-university/survey-methodologies#_ftnref13
- [6] The Dundee Ready Educational Environment Measure (DREEM) (2005) A Generic Instrument for Measuring Students' Perceptions of Undergraduate Health Professions Curricula. *Medical Teacher*, 27, 322-325.
- [7] Mechatronic Education at the Faculty of Technical Sciences Novi SAD. By: Ostojic etl. Tehnicki Vjesnik-Technical Gazetteissn 1330-3651(Print), ISSN 1848-6339 (Online). Vol. 22, 805-812.

 http://www.researchgate.net/publication/267752052 Mechatronic Education at Faculty of Technical Sciences Nov i Sad
- [8] (2012) Assessment of Radiology Technology Students' Internship with Objective Structured Clinical Examination. Article 5, Future of Medical Education Journal, 2, 19-23. http://fmej.mums.ac.ir/article 344 0.html
- [9] (2011) Empowering Students as Active Participants in Curriculum Design and Implementation. John Jagersma Parkland Immanuel Christian School, Edmonton, Alberta, Canada, *New Zealand Journal of Teachers' Work*, **8**, 114-121.
- [10] (2010) Module 10B: Design of Research Instruments; Interview Guides and Interview Skills.
- [11] Empowering Students as Active Participants in Curriculum (2011) Design and Implementation. John Jagersma Parkland Immanuel Christian School, Edmonton, Alberta, Canada, *New Zealand Journal of Teachers' Work*, **8**, 114-121.
- [12] (2010) Module 10B: Design of Research Instruments; Interview Guides and Interview Skills.