

An Integrated Approach to Curriculum

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Abstract

The integration of content and language necessitates a directional move by content and language educators. The hypothesis is that this integration is successful within a curriculum design which reflects an integrated dimension throughout all learning areas and when the learning environment encourages learner autonomy and access to knowledge.

This paper covers some key aspects in an integrated curriculum design implemented in radiography from January 2001. Some of the findings in the evaluation of this curriculum, including the design for the integration of generic competencies, assessment of outcomes and selected curriculum evaluation results, are discussed. Selected aspects have been isolated and discussed in order to present some of the realities of a transforming curriculum. Exciting innovations and successes are included as well as some of the problems and pitfalls encountered.

Keywords: radiography, education, language integration, outcomes-based education, learner-centred

Introduction

The concept of integration is not new to the health sciences. In radiography the importance of learning theoretical knowledge alongside the practice of clinical skills was recognized at the inception of training. There is however a revival of the integration debate [1] alongside concern that the traditional approach no longer fulfils all the needs of education for this profession. It is the changing environment of the modern workplace that challenged us to implement a student-centred radiography curriculum underpinned by clinical practice outcomes.

An historical overview

In order to put the curriculum design of 2001 in context it is helpful to do a brief historical review of radiography and radiography training as relevant to the Western Cape Province of South Africa.

On 18 November 1895 Wilhelm Conrad Roentgen identified the visible 'new type of

radiation', called x-rays [2]. The accurate recording of the characteristics of these rays, by this vigilant scientist, set the scene for the almost immediate use of x-rays in medical diagnostic imaging [3]. It was soon after the discovery of x-rays that the first equipment arrived in South Africa in 1897 where the tragedy of war entrenched the valuable contribution of this ionising radiation to health care. A role for persons, soon to be called radiographers, to operate the x-ray equipment was quickly recognized and the need for these operators to be trained was immediately obvious. Radiography training was started in Britain around 1910. In South Africa the skills were passed from one operator to the next until a Johannesburg woman was accepted by KC Clark to train as a radiographer. May Tomkins went to London in 1930 and completed the radiography course. Due to the depression and lack of job opportunities in Britain she returned to Johannesburg in 1933 as the first qualified South African radiographer. She started work and was immediately placed in-charge of training the first in-take of four student radiographers. They worked all day and had lectures from 19:00 to 21:00 each night [4]. According to unpublished information of Dr Muir-Grieve (1983) and Mrs ML Hilson's undated records an increase in radiography training in 1939 was prompted by a need for radiographers in North Africa at the outset of the Second World War. Thus in that year 46 students were trained in Johannesburg and training commenced in the newly built Groote Schuur Hospital, in Cape Town. Diagnostic and radiotherapy training was offered as a dual qualification at Groote Schuur Hospital. These students received no salary but had to pay £5 for the film they wasted and £20 to remunerate the lecturers. Also of note was that the first in-take of students at Groote Schuur Hospital was four plus two 'radiography assistants'. It seems that history does repeat itself as we are again in debate regarding the need and role of radiography assistants.

In 1953 Groote Schuur Hospital started a dedicated training for diagnostic radiography and introduced the first specialized radiotherapy

training course in South Africa. Training in nuclear medicine was introduced in 1977. The hospital-based training model continued in the Western Cape at Groote Schuur and Tygerberg Hospitals, respectively. The Cape and Peninsula Technikon both got increasingly involved until radiography training became the full responsibility of Peninsula Technikon in 1992. This co-operative training model involved an agreement between Peninsula Technikon and the Cape Provincial Administration, now the Provincial Government of the Western Cape. The clinical departments at Groote Schuur and Tygerberg Hospitals respectively have continued to be the major training sites. However clinical training sites have been extended to include all levels of state health care from primary to tertiary services. More recently a small number of private health facilities became involved in radiography education and training in this province.

To complete this brief review of radiographic training the category of ultrasound must be mentioned. A few diagnostic radiographers at Durban-based state hospitals were provided with in-service ultrasound training towards the end of the 1970s and they sat the first certificate in ultrasound examination offered by the Department of National Education at the end of 1979. In 1980 ultrasound training, as an eighteen month post-basic certificate, was offered at the two Durban -based public sector training institutions at that time, namely Addington and King Edward V111Hospitals. A decade and half later saw ultrasound training being offered by Peninsula Technikon at Groote Schuur Hospital in 1995, and Tygerberg Hospital in 1996.

National perspective

Radiography training requires the co-operation of education and health in order to be successful, sustainable, so as to answer health care needs of the country and meet the demands of higher education. It is essential to meet the outcomes of both the educator and the employer. For the purpose of this paper the needs of these role-players are briefly sketched as they are pertinent to the radiography curriculum.

National health policy

The impact of the changes to the health policy, namely that all people of this country can receive equitable health care, has been significant. The country had to transform from a past where the balance was skewed and the sharing of the funds distorted. In this redistribution it was the tertiary institutions of the Western Cape that felt the greatest impact, as this was the place of expenditure cuts so that primary, secondary and regional health care could develop. In educating radiographers it was necessary to prepare them for the realities of health care in South Africa. This meant emphasising primary health care whilst at the same time ensuring competence in the specialised imaging modalities such as computerised tomography and magnetic resonance imaging [5]. The need for recognition of prior learning requires a structure with flexible consideration for individuals with experience in radiography. At the same time there was the need to extend the knowledge and skills of radiographers to meet the demands of the present. All this had to be done within the context of a diminishing work force. The reduction of posts resulted in a severely depleted team. A reality that brought with it both positive and negative effects for training. Due to staff shortages learner radiographers are needed in the workplace hence must carry more responsibility sooner. Daunting though this is, a well-designed curriculum can support them and turn this situation into a very positive learning environment.

Education policy

While health reform, post-1994, has been taking place there has also been dramatic education reform. All in education have felt the impact of the National Qualifications Framework (NQF), South African Qualifications Authority (SAQA), outcomes based education (OBE) and sector education training authorities (SETAs) [6,7]. Somewhere in all of this radiographic educators have had to position themselves as training providers and make adjustments to ensure learners are appropriately educated [8].

Radiographers' response to OBE

The aspirations of OBE were acknowledged and revision of the radiography programmes was approached with the desire to improve access, establish flexible entry and exit levels, initiate professional outcomes directed by industry,

incorporate the critical cross-field outcomes (CCFOs) and inculcate a life long learning ethos. The generation of outcomes and determination of exit levels was approached as a national, collaborative process. This included wide industry involvement and three national meetings. Through all the negotiating there was one clear message: radiography is well suited to education initiated by the generation of outcomes identified by industry.

Once the documentation had been prepared and submitted to SAQA there was a shift in gear as each higher education institution initiated individual implementation of a national qualification. The development of enabling outcomes and tasks that integrated professional outcomes and CCFOs (called generic competencies from here on) was an institutional function [9]. The radiography team at this institution elected for an integrated curriculum design to carry the curriculum reform process forward.

An example of a portion of the SAQA registered 360-credit level qualification for diagnostic radiography follows in order to demonstrate that the notion of integration was entrenched. The bold sections are the generic competencies integrated with the professional outcomes.

APPLY OPTIMAL PATIENT CARE

- **Critically assess** and **adapt** department protocols **applicable** to specialized procedures.
- **Liase effectively** with health care team.
- Display adequate **language and communication skills** in the above.
- **Promote** radiation safety amongst health care team, patient and public.
- Display **insight** in **application** of imaging parameters and operating principles in order to limit radiation dose.
- Display **basic knowledge** of psycho-social factors in order to **assess** and **manage** patient appropriately at this level.

Curriculum design

The requirement of Cape Peninsula University of Technology, (formerly Peninsula Technikon prior to 2005) was that all programmes would be offered in an OBE format from 2001. Radiography at the Groote Schuur Hospital campus followed the route of full-scale curriculum reform of level 1 and curriculum modification for all other levels. The comprehensive revision was phased in until all levels had an integrated curriculum supported by outcomes.

The principles applied to the curriculum design of level 1 were that the curriculum:

- Would be student centred
- Would have a learning focus
- Would be based on the nationally approved professional outcomes
- Would integrate the professional outcomes and the generic competencies
- Would integrate language and content
- Would utilize a continuous assessment structure
- Would incorporate formative, summative and integrated assessments
- Would reconcile outcomes to subjects at assessment

Curriculum evaluation

A decision was taken that the implementation of this curriculum reform would be continuously evaluated. The initial evaluation was a learner-profile and base-line survey of the first intake in 2001. This study was conducted with ethics approval from the site of the research. Informed consent was obtained from the participants and they were assured of anonymity.

Learner profile

A relatively small proportion (37%), of the learners came onto the programmes directly from school. This meant that 63% of them had some post-school life experience ranging from one to more than 10 years.

Base-line survey

A survey of the 30 learners who registered for the English medium class of the national diploma in radiography was conducted on day one of their course. A questionnaire, comprising 14 questions, was used to establish the learners' understanding and awareness of OBE or outcomes, continuous assessment and learning. Twenty six completed questionnaires were returned (87%).

Results

A question that gave an indication of the learners' understanding of radiography and the education and training programme showed: 12% had a good understanding, 15% had a reasonable understanding, 69% had a poor understanding, and 4% had no understanding. The majority of the class (73%) therefore had poor or no understanding of the profession and/or the programme when they commenced their studies.

In contrast the questions that focused on learning showed a level of insight amongst the respondents. Seventeen (65%) had a strong desire to learn integrated, career-focused information while five (19%) wanted theoretical learning only. In terms of what facilitated learning entailed, 54% considered their personal abilities/qualities as most significant to enable their learning, 28% considered that 'learning by doing' is a key factor in their learning, 13% stated they rely heavily on peers to support and facilitate their learning and, surprising, only 5% indicated educator/lecturer qualities and actions as important in facilitating their learning.

The majority of the respondents (85%) answered in the affirmative regarding the use of information in one subject/activity being of use in another subject/activity, which supports the implementation of an integrated curriculum.

There was little clarity on what OBE is and only rather vague notions about the concept. Two respondents (7%) showed a good understanding, a reasonable understanding was shown by 7%, some understanding was shown by eight (31%), and 14 (54%) showed no understanding. This question demonstrated a clear divide between the learners who entered radiography directly from school and those with a break of only one year. It seems that 2000 was an informative year at secondary schools as far as OBE was concerned. The 12 respondents with any understanding of OBE were the 11 who came directly from school, and, one who had been out of school for only a year but who had a sibling still at school.

Continuous assessment seems to be a more familiar concept. Seven respondents (27%) had a good understanding of this form of assessment, seven (27%) had a reasonable understanding, eight (31%) had some understanding and four (14%) had no understanding.

Language proficiency

The Tertiary Education Linkages Project (TELP) funded testing in order to identify learners and subjects that are 'at risk'. This test is consistent for all education institutions in South Africa involved in the TELP project. All first year learners at this institution were given the opportunity to complete the group of tests, which included an English diagnostic test. Twenty of the 30 radiography learners in the cohort completed the test. The general English proficiency of this group of radiography students was good (Tables I and II).

Table 1: English Diagnostic Test: Average for radiography	
AVERAGE %	AVERAGE %
General Proficiency	Writing Proficiency
61%	48%

Table 2: English Diagnostic Test: Summary for radiography			
TEST OVERALL		WRITING	
Passed	Failed	Passed	Failed
20 (87%)	3 (13%)	12 (52%)	11 (48%)

However support was apparently required in writing skills as 48% of the group achieved below 50%. Only one student in this group was identified as critical with a result of 35%. Since the curriculum approach was the integration of language and content all students benefited from the interventions of language support and process writing. The progress of the one student with a result of 35% was monitored so that additional help and support could be offered if necessary.

Reflective essays

The skills of reflection were identified as necessary skills to engender. The group of learners were given a session on reflection and tasked with writing a short essay after reflecting on their time as a radiography learner over a two-month period. Group sessions were arranged in order to allow time for the learners to reflect on selected events or periods. Learners were encouraged to keep a journal of their personal reflections during their clinical placements. This was not compulsory or monitored and evaluation showed the voluntary response to be poor. It is recognized that the benefits of reflection were not adequately conveyed to the learners and that the discipline of self-reflection requires practice as well as

on-going guidance and support. This was addressed by introducing more structured ways of attaining reflective skills in subsequent years.

Learner guide

The Education and Development Centre (EDC) of Cape Peninsula University of Technology developed a questionnaire to evaluate learners' use of and opinion of the learner guides. Level 1 radiography learners were surveyed at the end of the first semester. The questionnaire results are presented in Diagram I.

Twenty-three (82%) of the learners agreed or strongly agreed that the language in the learner guide was easy to understand. What is of great concern is that while the majority of learners knew how to use the guide and found the language understandable only 25% of the class indicated that they made extensive use of the guide. A pointer to understanding this response is the fact that 32% of the learners indicated they found the content of the guide confusing. The qualitative comments given by the learners were insightful and offered constructive ways in which the learner guide could be amended to encourage use of this important learning resource. Based on findings of the survey the learner guide has been revised; follow-up evaluations will continue regularly.

Assessment

Continuous assessment is in use for all radiography programmes and levels at this institution. Formative assessment was introduced with the revision of level 1 as well as self and peer assessment. Although this paper cannot deal in detail with assessment it is worthy of mention as it is considered to be pivotal for the successful implementation of an integrated curriculum.

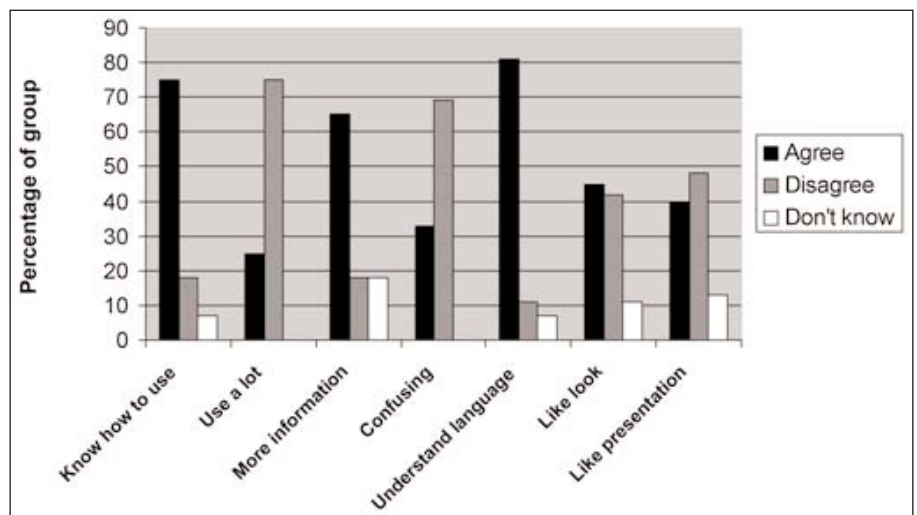


Diagram I: Evaluation of Level 1 Learner Guide

Formative assessment

There was previously no planned formative assessment in the radiography curriculum but attention was given to this deficit in the revision process. Formative assessment is in the form of questionnaires or directed activities that are marked by the educator or the learner (self assessment), against provided assessment criteria. The most exciting assessment with a formative element was the introduction of a 'mini-research' assignment delivered via the process writing approach. This was encouraged and guided by the language co-ordinator and we are indeed convinced of the appropriateness of such an approach. The learners prepared a proposal for their small study with peer support during scheduled group sessions. This proposal was submitted and marked by the content (radiography) lecturer. Learners then conducted their research at primary health care facilities in the region and handed in a first draft of a report on the study. Three fellow learners, under the guidance of the content lecturer, marked this report. Learners were handed the assignments which included comments. The learners then had an opportunity to revise their work and a language expert marked the second draft. The learners could undertake another revision of the work before handing in the final product. There has been a 100% positive response to this process writing approach. The learners stated that they learnt from the experience and would like to have future assignments conducted in this way. Process writing has subsequently been introduced at all levels of radiography. In this and other ways there is a growing component of formative assessments, as the value from these is clear.

Self and peer assessment

Self assessment forms part of formative assessment. When learners are given the opportunity to mark their own work against assessment criteria the response is positive in most cases. The extended use of self-assessment is being encouraged in formative assessments to prepare learners to assess their own work effectively prior to handing in summative assessments. The innovative introduction of an assignment using the process writing approach was the only element of peer-assessment. The positive response to this type of assignment has encouraged lecturers to consider this aspect more comprehensively in later modifications of the

integrated curriculum. Learners were unanimous that reading three other assignments was a valuable learning experience and that the comments from three of their peers were helpful.

Summative assessment

An integrated summative assessment has been introduced into the assessment fold. There is less focus on assessment of each of the subjects and more emphasis on assessment of integrated outcomes including content from all subjects. This means that all content and skills contributing to the outcomes are assessed without loss of the assessment of discipline specific knowledge. Integrated assessment is appropriate to professional education and frequently the assessment is centred on a typical problem/case/scenario of relevance in the real world of radiography. The integrated assessment could include written assignments, written tests, film evaluation, clinical assessment on actual patients and many others.

Detailed assessment criteria must be compiled for all aspects of the integrated assessment. The learner-centred approach requires that learners are aware of the assessment criteria before being assessed against them. The evaluation of the introduction of integrated assessment was based on an action research model; learner as well as educator responses were used to revise the assessment design throughout the year.

Conclusion

This paper presents some findings from curriculum evaluation of a radiography programme. The benefit of a research methodology that involved continuous evaluation at the time of implementation is that amendments could be made immediately when shortcomings were highlighted. Learning to date includes:

- finding the gaps in professional outcomes,
- learners do not find an integrated curriculum easy,
- lecturers have to work extremely hard and have enormous enthusiasm to sustain the integrated curriculum

It is clear that change is not an easy option for the educator or the learner. However the integration of radiography outcomes and generic competencies, including language skills, is worth the effort. We are committed to continuing with an integrated approach to curriculum design and assessment but with adjustment as we learn from the process.

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