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Contemporary practice education: Exploring student perceptions of an industrial radiography placement for final year diagnostic radiography students☆

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ABSTRACT

Introduction: There is a paucity of evidence in diagnostic radiography evaluating a career path into industrial imaging despite several higher education institutes stating this route as a career option on graduation. The link between a career in industrial radiography and diagnostic routes is unknown although there are anecdotal examples of individuals transferring between the two. Successfully obtaining a first post job following graduation in diagnostic radiography can be challenging in the current financial climate. A partnership was formed with an energy sector company that offered non-destructive testing/non-destructive evaluation (NDT/NDE) employing industrial radiographic technicians.

Method: As an initial pilot, 5 ($n = 5$) final year diagnostic radiography students visited an industrial radiography site and underwent theoretical and practical training. Following this placement they engaged in a focus group and the student perceptions/responses were explored and recorded.

Results: Common themes were identified and categorised via a thematic analysis. These were; radiation safety, physics and technology, widening access, graduate attributes/transferable skill sets and working conditions.

Conclusion: Student discussion focussed around the benefits of working conditions in healthcare, the value of technology, safety and physics education in alternative placements and the transferability of skills into other/industrial sectors (e.g. NDT/NDE). Contemporary practice placements are a useful pedagogical approach to develop complex conceptual theoretical constructs, such as radiation physics. An in depth evaluation between the two industries skill sets is postulated. Additionally, this could offer alternative/emerging roles to interested diagnostic radiographers potentially meeting the skill shortage in industrial radiography.

Introduction

It could be argued that the first use of X-rays was for an industrial (not medical) application; Roentgen produced a radiograph of a set of weights in a box to show his colleagues.[1] His most famous image however, was the radiograph he produced of his 'wife's' hand which captured the imagination of the scientific community.

Prior to 1912 X-rays were mostly used within the dental and medical fields. During these years X-ray equipment was fragile and broke down under the high voltages required to penetrate metals, therefore it was not until reliable vacuum tubes and high voltage x-ray generators that industrial imaging became possible. Industrial and medical imaging strands were closely linked until the 1940's until they began to diverge into separate professions.[2] This was due in a large part to the explosion of more technical non destructive imaging and evaluation techniques needed during the conflict of World War 2. From this point in time, industrial imaging techniques have moved away from shared roots and today include varied modalities to image all kinds of products in integrity management from aircraft wings to racing cars. There is no set route or academic criteria to become a non-destructive testing radiographer. Entry into the career is often through school leaver apprenticeships or by completing a certificate or diploma in engineering and then applying for trainee positions.

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There is a paucity of evidence in diagnostic radiography evaluating a career path into industrial imaging despite several higher education institutes inferring this route as a career option on graduation.[3–5] The link between careers in these two strands of radiography is unknown although there are anecdotal examples of individuals transferring between the two. At first glance it would appear that there are some transferable skills and similarities in the knowledge of applying the electromagnetic spectrum in imaging in different situations, however it is evident that further exploration is needed to establish similarities and/or differences between these two imaging fields.

The medical radiography profession is wide reaching and creative. Emerging roles and advanced practice are common place within its culture. Despite this, successfully obtaining a first-post job following graduation in diagnostic radiography can be challenging in the current financial climate[6] therefore, a career in industrial radiography may be attractive. Due to the location of our training institution in Aberdeen a novel and explorative partnership was formed with an energy sector company that offered non-destructive testing/non-destructive evaluation (NDT/NDE) using industrial radiographic technicians. Aberdeen is often referred to as the energy capital of Europe indeed almost two thirds of the City and Shire's employment is directly linked to the oil and gas industry.[7] It has been the centre of oil production and subsequent energy supply for the UK since the 1970's and has a thriving industrial imaging sector.

All undergraduate students on diagnostic radiography courses within the UK have a substantial amount of time allocated to practice education. The majority of time within placements is spent within the traditional hospital and community imaging setting; x-ray, other imaging modalities and nursing environments. Contemporary practice placement research within imaging has more recently focussed upon the caring/communication skill set development. This is undoubtedly in response to the recommendations of prominent enquiries such as the Francis Report.[8] At Robert Gordon University, the use of care homes as contemporary placements for imaging students[9] has highlighted the benefits of innovative and mutually beneficial contemporary placements for students and providers. Other allied health profession groups are also seeking non traditional placements to develop adaptive, responsive graduates and new skill sets. Non-traditional practice placements within Occupational Therapy (OT) have been explored and evidenced over the last 20 years.[10] Despite this substantial research base in OT, it has been highlighted that there is an evidence void of the systematic learning benefits associated with these placements, especially when evaluating the student experience.[11,12] Within OT the pertinence for further evaluation and exploration into non-traditional placements concerning role emergence for the profession and project development for students has been stated.[13]

Alongside these issues, educators have long found teaching and embedding difficult conceptual constructs challenging. It is no surprise that diagnostic radiography students often disengage with physics topics within the imaging curriculum. Amongst students, physics is often considered a difficult and highly abstract subject and interest in it appears to have been on decline for sometime.[14,15] Pedagogically teaching difficult theoretical concepts has been researched but not when evaluating novel approaches such as practice education to help reinforce conceptual physics learning. It is apparent that this is an area which requires more applied and novel pedagogical thinking to assist students in their learning construct.

Through these various ideology strands pursuing a contemporary practice education placement with an industrial imaging partner would seem logical; the aim being to discover similarities and/or differences between the two professions and how the placement was reviewed by the students. No evidence could be found that supported or indeed rejected similar opportunities, therefore in this situation a small scale pilot was preferred.

Methodology

Initial meetings between the radiography placement coordinator and an oil and gas industrial radiography business were arranged. A limited opportunity for final year students to participate in an exploratory pilot placement was organised and planned at the industrial imaging onshore facility.

Population and sample

An opportunistic sample of final year students in the diagnostic radiography programme ($n = 29$) were invited via email to participate in the placement in order to equally advertise the opportunity. Five students (4 females:1 male) replied and were recruited to undertake the placement. The age range of the sample was between 20 and 22 years of age.

Placement

Prior to the industrial placement a risk assessment was conducted and reasonable control methods were actioned. Ethical dimensions were considered and it was confirmed that as an educational service development, formal approval via the School's research ethics procedure was not required. Nevertheless normal governance procedures were employed including establishing informed consent and the right to withdraw, and confirmation of data management and protection arrangements. Additionally, the students were briefed and had to read, agree to and sign the radiation local rules of the industrial radiography site. The students were requested to wear warm, practical clothing due to the nature of the placement. The students were required to take their own radiation monitoring film badges in addition to electronic personal dosimeters provided by the employer. Personal protective equipment was provided by the placement employer to ensure students complied with the health and safety requirements of the working environment.

A learning contract was put in place by the NDT manager in partnership with the radiography placement coordinator and the students to cover the key theoretical concepts before the practical application. This was given to the students before the placement and they were asked to prepare by independently researching the topics in the contract. Theoretical components that were covered by the teaching component included darkroom processes both manual and automatic, radiography of plates and pipe using x-ray and open source imaging (Se75 and Ir192), ultrasonic testing of plate thickness and weld testing, and an overview of magnetics, penetrants and eddy currents. The students then had the opportunity to watch and with assistance or direct supervision conduct some of the non-destructive imaging/testing when on placement at the site.

In the week following the placement, students were invited to attend a focus group to discuss/explore their experiences. All five students attended and gave written informed consent to participate. A facilitator was used within the group to prompt discussions using ‘touch-words’ and phrases to encourage discussion. The purpose of the ‘prompts’ was to encourage a ‘rich’ inductive approach; resultant themes identifying strong links to the data. Inductive analysis was an attempt to process the data without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions.