Title of case study

A blended approach to teaching Therapeutic Radiography students physics

Staff Lead

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School/ Department

Directorate of Radiotherapy, School of Health Sciences

Faculty

HLS

Name of course and module (if applicable) case study took place within

Radiotherapy BSc (RADT229) and Radiotherapy PGDip (RADT722)

Please briefly describe the activity undertaken for the case study

Therapeutic radiography students must develop a wide range of skills in order to provide accurate, efficient and empathetic care to cancer patients. Whilst many students enjoy the patient care aspects of the course, many find the radiotherapy physics technical skills required more difficult to master. This is exacerbated by the limited opportunities to practice using the machinery and equipment needed to master these skills. In order to help students, grasp the physics concepts required to proficiently administer radiotherapy we developed a blended learning approach to enhance and improve on our standard lecture-based approach. This blended approach included the use of virtual reality, scenario based small group work and presentations complemented by individually completed workbooks.

The year group of around 30 undergraduate students in their second year of study, and around 24 in the postgraduate course were split into smaller groups of 6-8 which were then allocated a session to attend. On attendance the group were then divided into 2 groups of 3-4 students. Each group had the opportunity to use the virtual reality system and undertake the scenario based small group work. The virtual reality tool used is the hybrid virtual radiotherapy system (VERT™) and the VERT Physics module within it. This system allows small groups to undertake practical experiments and see their outcomes in the same way they would if they were using a real clinical linear accelerator with dosimetric equipment.

Key concepts such as inverse square law and dosimetric consequences of incorrect set-up (SSD), measurements of quality control parameters and derivation of key data charts were the three main experiments undertaken. Whilst one group was using the virtual reality the others were using specially designed training and workbooks for performing calculations and verifying predictions with simulated dosimetric measurements.

How was the activity implemented?

We developed the blended session over the course of 4 years. Initially in the first year of the session the theory of radiotherapy physics was taught in a lecture, followed by a practical workshop using the virtual radiotherapy system (VERT™); however, students struggled to apply the principles from the lecture to their practical and did not enjoy the lecture format, so in the second year the lecture was removed and students only undertook the practical using the VERT™ and scenario based small group work. Whilst the students enjoyed this more we felt they could still grasp better the key underpinning concepts, so the latest iteration includes an interactive demonstration followed by the practical work. This has been the most successful iteration from both a student and staff perspective.

Has this activity improved programme provision and student experience, if so how?

Students were asked to fill in a questionnaire after the session regarding their experience of the session and any suggestions for improvement. Our results showed that students really engaged with the process and enjoyed it, especially the small group work both using the virtual simulation and the workbooks and whiteboards. The students enjoyed the relaxed atmosphere and the opportunity to try and work things out for themselves. They particularly liked the links made between theory and practice, commenting on the relevance of the clinically applied physics. Students also commended the clear organisation of the sessions and the quality of the experience. The main suggestion for future sessions was more of them! Recent analysis of exam scores (to be presented at a national conference in Sept 2018), show a modest but definite improvement in relevant marks, following implementation of the latest iteration of this activity in the last two years.

Did you experience any challenges in implementation, if so how did you overcome these?

The main challenge was in identifying time within the timetable to implement this workshop, especially as the session has to be run multiple times each year due to the small group format. The multiple deliveries of the session can also lead to “session fatigue” for those delivering it, however we are actively trying to address this by training more staff to be able to deliver the session. The challenge going forward is to ensure enough staff are trained to deliver the teaching to safeguard the sustainability of the approach.

Which Liverpool University hallmarks and attributes does this case study relate to: (tick all boxes that apply)

Research-Connected Teaching	**X**
Active Learning	**X**
Authentic Assessment	
Confidence	**X**
Digital Fluency	**X**
Global Citizenship	

How does this case study relate to the hallmarks and attributes you have selected?

Research Connected Teaching

We have actually used the development of this session to conduct our own research into this type of approach to training therapeutic radiography students. Our work has been presented at 5 conferences in the UK and abroad and a paper has also been published- you can access this via the additional resources tab. Each year's feedback and staff observations have been used to refine and improve our approach to teaching students radiotherapy physics technical skills.

Active Learning

Students are engaged from the start of the session in student-led small group work, either using the workbooks and whiteboards or the virtual reality system. All the activities within the session are about applying their knowledge to particular situations and, in the case of the virtual reality system, being able to see the result of their application of knowledge.

Confidence

As students are unable to use the clinical equipment in real clinical settings this simulation opportunity allows them the chance to use the equipment at their own pace, make mistakes in a safe environment and actually see inside the body and dosimetry equipment using the virtual reality system. Measurements with the system help them to see if their calculations are correct. This means that when students do get the opportunity to use the equipment later on in their studies they have already had some practice, giving them confidence to apply their skills and acquired knowledge in real-world, clinical situations.

Digital Fluency

The students must learn to use the virtual reality system to adjust the equipment, make measurements with it and compare with their own calculations.

How could this case study be transferred to other disciplines?

Whilst the virtual reality system itself is discipline specific, the blended learning approach used here could be replicated in any discipline, and virtual reality software can be used to simulate a wide variety of environments. This is particularly useful to disciplines where access to certain experiences can be restrictive.

If someone else were to implement the activity within your case study what advice would you give them?

Go for it! Make sure you have support from colleagues to experiment with different approaches and that you keep them up to date with your experiences; don't be afraid to try something different and don't worry if it is not perfect straight away, development takes time.