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Research Article

Picture This: Evaluating Healthcare Education Using Student Generated Pictorial Data

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Abstract

Objective: Healthcare student expectation and experience of professional training is likely to impact retention on their chosen programme. Understanding the experience of healthcare students is essential to support programme completion and ensure a future workforce with sufficient staff. The objectives of this study were to: (1) investigate the similarities and differences between undergraduate nursing and radiotherapy students' expectations and experiences of the first year of their programme through pictorial data, and (2) develop a process of interpreting pictorial data for student evaluation.

Methods: With written consent, students participating in nursing (n=31) and radiotherapy (n=22) completed a pictorial data collection tool on commencement and completion of year one. Data were analyzed using an adapted thematic content analysis. Independent data analysis, use of an audit trail and a reflective approach ensured a rigorous process.

Results: Three themes were identified: professional identity, expectation of workload, and confidence. The students in both cohorts indicated an expectation that they would complete their studies, demonstrating a growing understanding of their profession over the first year of their studies, alongside a high workload. Nursing students indicated pride associated with being a nurse that was evident at the start and end of their first year of training. They experienced fatigue and lacked time to spend in activities other than studying and sleeping. Radiotherapy students indicated a better work-life balance.

Conclusion: Informed by the findings, recommendations for healthcare programmes are made. Pictorial data were found to be quick, accessible, and inexpensive to collect and analyse. Impact of the visual data was powerful, giving novel insights into student expectation and experience. Pictorial data may provide a valuable complement to traditional methods of evaluation in healthcare education.

Keywords: healthcare education, pictorial data, visual data, student experience, student evaluation

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1 INTRODUCTION

Globally, countries are experiencing growing demands on their healthcare systems, largely driven by an ageing population, growth in chronic disease and increasing healthcare expectations[1,2]. The World Health Organization[3] estimates that there will be a shortage of 10 million healthcare staff by 2030. The recruitment and retention of healthcare staff is essential to ensure the delivery of high-quality healthcare at the point of need[4], and consequently there are plans to increase the number of nurses and other healthcare staff employed by the National Health Service in the UK in the coming years[5].

Higher Education Institutes (HEIs) have been acknowledged as being an indispensable part of the UK healthcare workforce[6] and a positive student experience is key to improving retention and maximizing the number of students completing pre-registration, vocational health programmes[7,8]. Within the School of Health Sciences at the University of Liverpool, it was identified that there was a difference in retention rates with a higher completion rate for nursing students compared to radiotherapy students undertaking pre-registration programmes, despite many similar programme characteristics. Anecdotal evidence from the students suggested that different expectations of these two groups may have contributed to the retention rates. Therefore, there was a need to better understand the expectations and subsequent experiences of these students.

Programme and module evaluations are well-established methods to assure quality and to elucidate students' experiences in HEIs[9]. These traditionally take the form of a survey or questionnaire. However, these data collection methods are limited by poor response rates and evaluation fatigue[10] with available instruments assessing academic satisfaction lacking validity[11]. There are alternatives to these traditional, word-based data collection methods, and a recognition that a partnership approach may gain an enhanced quality evaluation[12]. There is a growing interest in the use of visual images, such as participant-generated photographs or pictures[13-16] as a means of collecting data, with evidence that visual images offer a different perspective from standard questionnaires[16,17].

It has been suggested that the use of visual images may have several benefits over more traditional methods of data collection. These include the ability to: express complex ideas[18]; be a vehicle to unconscious thought[18] and overcome difficulties of vocabulary by providing an alternative means of expression[19]. Additionally, it has been suggested that visual imagery may be useful to explore change or transitions[15].

The use of visual imagery as a data collection method has increased over the recent years, this may be due to the growth of visual media in society[20]. Previous work has used images combined with verbal narratives to provide connectivity between the image and the participant[15,21-23]. McKenzie et al.[24] utilized drawings by architecture students to explore their university experience. Images were collected alongside written comments. These researchers noted that the images identified issues not articulated in the written data but acknowledged that there was not an established method to analyze the pictorial data. The overarching aim of the current study was to explore students' expectations and experiences of their healthcare programme. The objectives of this qualitative study were:

- To investigate, through pictorial data, the similarities, and differences between undergraduate nursing and radiotherapy students' expectations and experiences of the first year of their programme;
- To develop a process of interpreting pictorial data for student evaluation.

1.1 Theoretical Framework

This study was underpinned by a social constructivist stance[25]. This was selected as the theoretical perspective for this study as the researchers recognised that students use knowledge and social interactions to decide to apply to a healthcare programme, form expectations of the programme, and interpret their experiences. Further, knowledge and understanding are likely to be supplemented by social interactions during pre-application clinical visits or voluntary work, engagement with other students, university staff, clinical staff, and service-users in practice settings.

Whilst this stance recognises the importance of social interactions in gaining understanding, concepts such as feelings and beliefs may not be easily expressed through verbal language. The use of visual material can enable the exploration of concepts that may be unspoken or difficult to articulate, providing a potentially powerful interpretative approach to better understand an area of interest[26]. These assumptions shaped the theoretical stance of this study.

1.2 Researchers' Perspective

When the study was undertaken and the data analyzed, the three female researchers were all university lecturers, holding a professional healthcare qualification, higher degree and were Fellows or Senior Fellows of the Higher Education Academy. All were registered with their professional regulatory body, had been qualified for 20 years or more, with at least 10 years clinical experience and seven years working in higher education. At the time of the study, two researchers (CF and CG) were involved in the provision of the programmes from which students were recruited, whilst one researcher (KJ) worked within the School of Health Sciences but was not connected to either programme.

2 METHODS

This study was a qualitative evaluation of student expectations and experiences of their professional undergraduate training. Ethical approval was given for this study by the University of Liverpool Ethics Committee (Reference Number: IPHS-1415-001).

2.1 Sample & Recruitment

All students registered in the first year of the Bachelor of Nursing (n=42) or Bachelor of Science Radiotherapy (n=26) programme at the University of Liverpool were invited to participate. Students were excluded if they were a second or third year student, or they had joined from a previous cohort or from another programme. Underpinned by an interest in exploring retention, these two programmes were selected as they had similar programme structure but differing retention rates. In this study, the researchers made the decision to focus on year one to capture the transition period where expectations of the programme turn into experiences.

The research was explained, and information sheets provided to all students during an initial face-to-face group meeting, which took place in the first week of the programme. Students were advised that they were not under any obligation to participate. Students who agreed to participate gave written consent. Students were only invited to consent in year one, no further students were recruited after this time.

2.2 Data Collection

A member of the research team handed out and collected all data collection tools. The data collection tools contained no identifying information; they were anonymized and linked only to the professional programme. Demographic information was not collected as there was concern that this information could identify students in the small sample. This approach also reflects usual student evaluation processes.

2.3 Phase One Data Collection Tool

Students who consented to participate were invited to attend a second face-to-face meeting, as a professional group, approximately one week (second week of programme) after the initial face-to-face meeting. This meeting was held in the university and was independent of students' classes. The students were asked to visualize their time on their undergraduate programme and to complete a data collection tool. The phase one data collection tool comprised a traditional paper-based programme questionnaire with the addition of a single sheet of A4 paper. The single piece of paper asked students to "visualize your time on the undergraduate programme and illustrate this in picture form" and provided space for the students to complete their picture. Students could represent any expectations they chose. If a student expressed concerns about their ability to draw their thoughts, they were encouraged to attempt the activity if they were willing to do so, with reassurance that artistic ability was not being evaluated. Students had the option to leave the sheet blank.

2.4 Phase Two Data Collection Tool

Consenting students were invited to attend a final data collection session. This took place in the first week of year two to ensure that all students had completed the academic and placement requirements and could reflect fully on year one. The students were invited to complete a further traditional, paper-based questionnaire and again asked to complete a drawing. The phase two pictorial data collection tool paper asked students to "reflect on your time on the undergraduate programme and illustrate this in picture form".

2.5 Statistical Analysis

This study used a non-traditional methodology, therefore, a process for analyzing the pictorial data was developed. Thematic content analysis[27] was adapted to analyze this pictorial data and explore student expectations and experiences. An established thematic content analysis process was followed. As the data was pictorial rather than text, these steps were adapted. Step 1: Three researchers, with previous experience and training in using this method, analyzed pictures independently and made initial interpretations of the pictures. Field notes were made by the researchers as they worked through the data analysis processes to capture thoughts and reflections, to enable exploration of researcher assumptions and biases and the impact of these on the findings. Step 2: Researchers met to consider areas of agreement and non-agreement from original picture interpretations (Step 1). Where researchers reached unanimous agreement on the interpretation of components of a drawing, these interpretations were included in the final analysis. Where there was not unanimous agreement, discussion took place and if agreement was reached these interpretations were also included. Where agreement was not reached on individual components of a drawing, only the agreed interpretations of that drawing were included. Step 3: The researchers met, reviewed the agreed interpretations and developed initial themes for each profession. Step 4: Using an iterative process, researchers reached consensus about the final over-arching themes. This was achieved by maturing the initial themes whilst continually reviewing the primary data to ensure that the final themes were supported. An example of this process is given in Figures 1 and 2.

Rigor was considered through the four components of trustworthiness[28]. Credibility, transferability, dependability, and confirmability were addressed through a reflective

approach. Data were collected over time, with two cohorts of students providing a means to deepen exploration of the phenomenon. The team analyzed data independently before comparing interpretations, and decisions made during the analysis were recorded to provide an audit trail. Biases and assumptions of researchers were considered prior to, and throughout the analysis to enable explicit examination of these.

3 RESULTS

The full data collection tool consisted of a traditional paper-based questionnaire and space for first year nursing and radiotherapy students to illustrate, through drawing, their expectations and experiences of the programme. This paper focuses on the findings from these drawings.

The first set of drawings were completed at the start of the programme, by 31 nursing students and 18 radiotherapy students. The second set of drawings were completed by 22 nursing students and 22 radiotherapy students.

Table 1 reports the final overarching themes and the profession specific themes that have contributed to these. Three themes are described below. Exemplar pictorial data are included. The images were selected by the researchers as, following review of all drawings, they felt these best represent the data included in the themes. Further data are available in Supplementary Figures.

3.1 Professional Identity

Year one nursing students expressed pride in becoming a nurse and the depiction of the role of the nurse remained strong as they entered year two. An example is shown in Figure 3 which indicates a progression from being an unsure novice and progressing to the excitement of being a nurse. This does not appear to be about graduating, but rather about becoming a nurse.

Whilst there were some images of radiotherapy students undertaking clinical tasks, these were less prominent than those of the nursing students. In both cohorts of students, the drawings showed an understanding of the professional role at the end of year one, which was not apparent at the start of the programme and was clearer in the nursing student drawings. This can be seen in Figure 4 which shows a bed pan, blood pressure monitor, and clinical activity, with the speech bubble stating “please can I redress your arm?”.

There were many examples of clinical tasks students had been undertaking (Supplementary Figures 21, 22, 26, 40, 41).

3.2 Expectation of Workload

The magnitude of the healthcare students’ workload was clearly established in both cohorts of students through their images. In our study, radiotherapy students seemed to have a more realistic expectation of the workload involved in the programme. In comparison, there appeared to be a gap between the expected and reality of the workload in the nursing students.

Figure 5 is a powerful image, indicating a life completely encompassed by the nursing programme by the end of year one, with no time for a social life. There was strong evidence of a poor work / life balance, on both programmes (Supplementary Figures 19, 25, 38). Whilst a few students appeared to be managing their work / life balance (Supplementary Figures 36, 41), there was strong evidence of a high workload and that this was tiring / exhausting. This was exemplified in Figure 6 with the treadmill appearing to represent a constant and relentless work requirement. A number of drawings referred directly to feeling tired and sleep (Supplementary Figures 19, 25, 26, 29, 38); this appeared to be more evident in the drawings by the nursing students.

3.3 Confidence

There was evidence of a feeling of positivity about the students’ vision of the first year of the programme, with evidence that the students had confidence that they would achieve and graduate (Figures 3, 7, 8 and Supplementary Figures 1, 3, 7, 8, 11, 13).

There was strong evidence that the students perceived growth and increased confidence as they gained skills and knowledge. However, there was also evidence of stress and concern for some students. This can be seen in the first image within Figure 7 where a year one student has lots of question marks around them and a speech bubble stating “stressed, confused, help.” The student’s perception is that this will change over the three years, with these images showing fewer question marks and more ticks, alongside more confident words in the speech bubbles, as the student progresses. Figure 8 also indicates a confidence; the student's expectation is that they will graduate after completing their study and undertaking their clinical placements.

At the start of year one, similarities within the two healthcare professions were evident. Both cohorts provided evidence of looking to the future and an expectation that they will complete their programme and graduate. However, there was evidence that students expected their studies to require hard work. There was also an understanding that the journey would comprise three main components: academic, placement and social aspects.

The data also indicated differences between students on the two healthcare programmes. Nursing students illustrated a journey comprising challenges and obstacles

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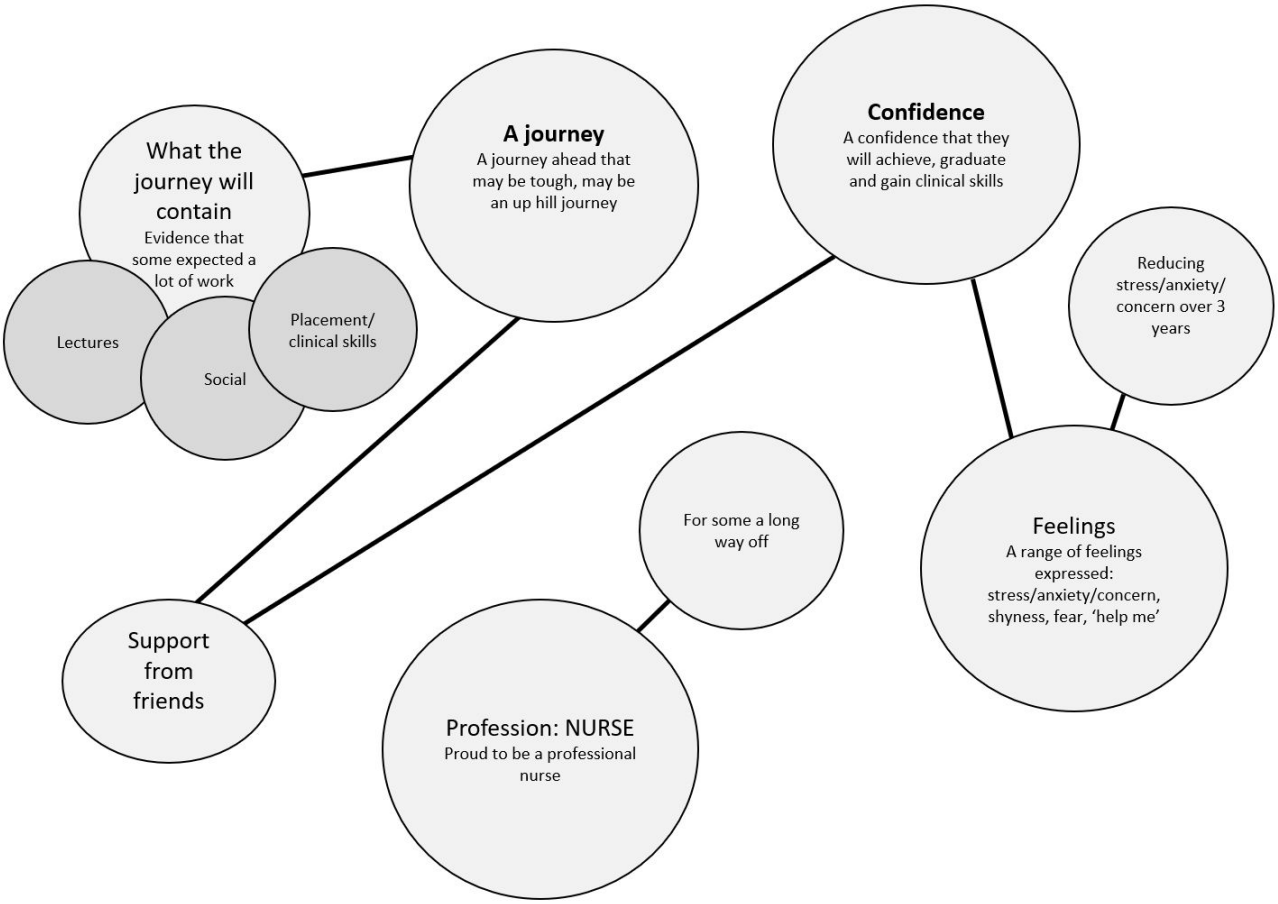

Figure 1. Nursing - initial mapping of themes.

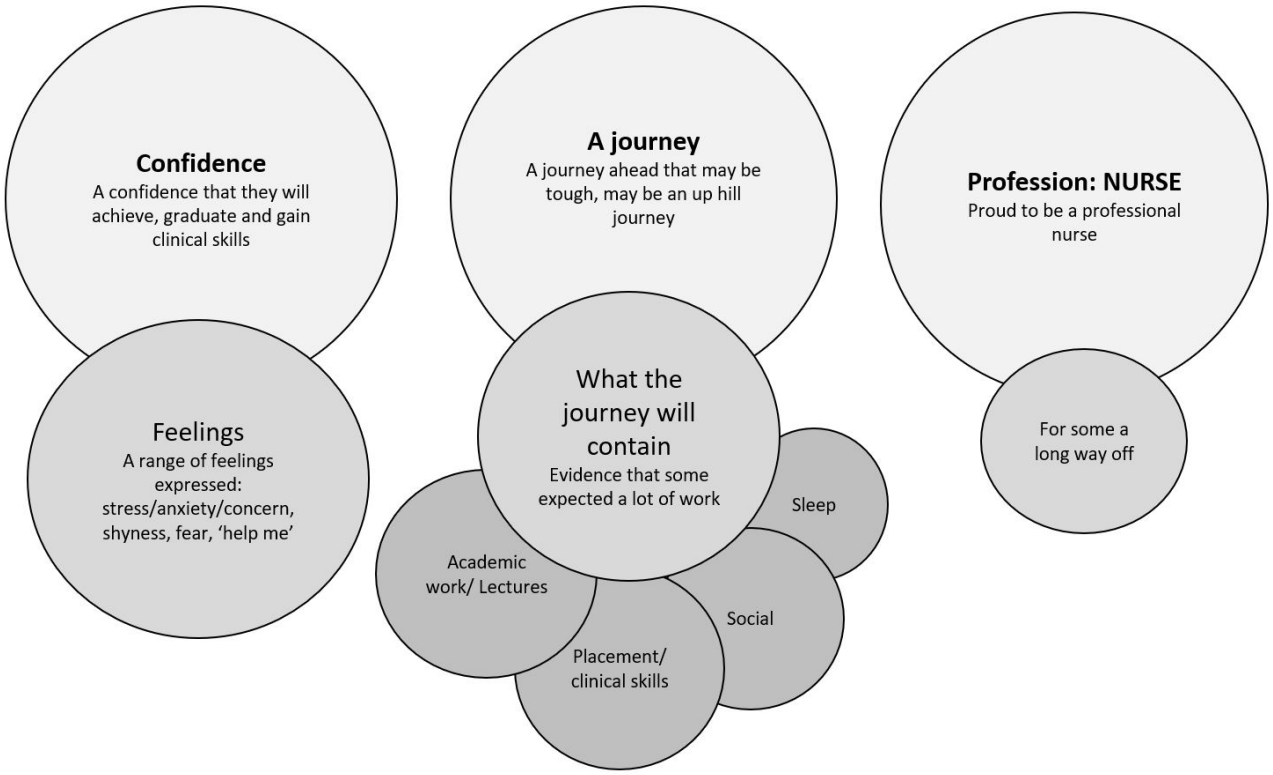

Figure 2. Nursing - developing themes.

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Table 1. Overall Themes

Overarching Themes	Nursing Themes	Radiotherapy Themes
Professional identity	Pride in being a nurse (Nursing 1st) The reality of being a nurse (Nursing 2nd) Workload (Nursing 2nd) Poor work / life balance (Nursing 2nd)	Personal development (Radiotherapy 2nd) What have I been doing? (Radiotherapy 2nd) Workload (Radiotherapy 2nd) Personal development (Radiotherapy 2nd)
Expectation of workload	A tough journey ahead (Nursing 1st) Poor work / life balance (Nursing 2nd)	Expectation of hard work (Radiotherapy 1st) The journey (Radiotherapy 1st) Workload (Radiotherapy 2nd)
Confidence	Confidence of achieving (Nursing 1st) Growth and increased confidence (Nursing 2nd)	Confidence and the future (Radiotherapy 1st) Positivity (Radiotherapy 2nd) Personal development (Radiotherapy 2nd)

Notes: Nursing 1st, theme from nursing students at first data collection; Nursing 2nd, theme from nursing students at second data collection; Radiotherapy 1st, theme from radiotherapy students at first data collection; Radiotherapy 2nd, theme from radiotherapy students at second data collection.

Figure 3. Nursing participant 30 (start of year 1). Notes: Year 1: Shy, scared, help me! Year 2: Happy, confident! Year 3: Yay! I'm a nurse.

Figure 4. Nursing participant 3 (end of year 1).

that must be overcome in order to complete their programme, whilst the radiotherapy students appeared to demonstrate greater insight into the need to maintain a work / life balance. It was also notable that the nursing students appeared to express pride in joining their chosen profession; this was not evident in the drawings from the radiotherapy students.

At the second data collection there continued to be some similarities between the two professions. There

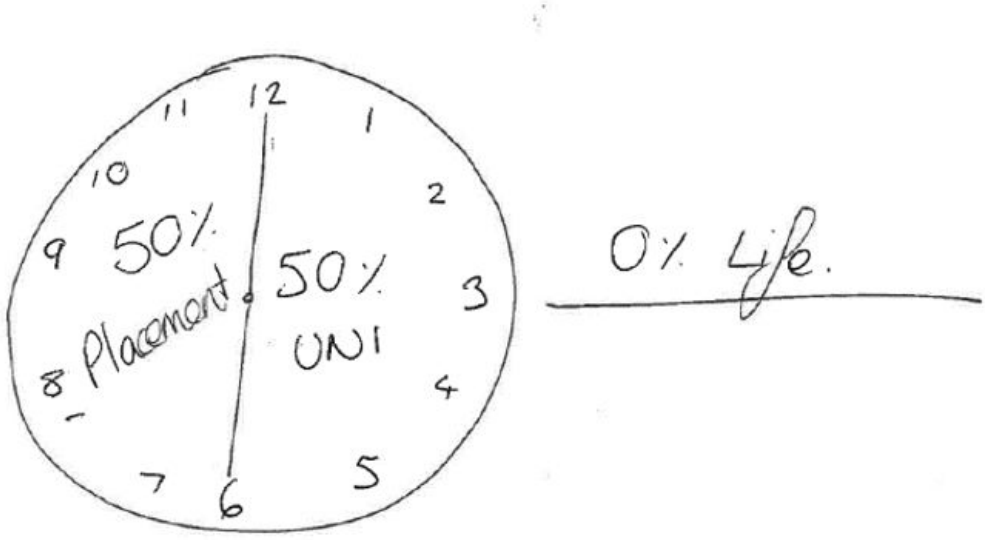

Figure 5. Nursing participant 4 (end of year 1). Notes: 50% placement, 50% UNI, 0% Life.

was evidence of a heavy workload in both programmes which was, at times, exhausting. Some students indicated that they were managing this, whilst some were finding this difficult. Both groups of students expressed a growth of confidence in skills and knowledge. Many students identified that they had learnt a lot during the first year of their studies. There was also some indication that students continued to expect to complete their studies and qualify as healthcare professionals.

Differences at the second data collection point could also be seen. Nursing students expressed a poor work / life balance with only time for study, placement, and sleep. Nursing students clearly expressed tiredness and a lack of social life. There was less evidence of a challenging work / life balance for radiotherapy students.

4 DISCUSSION

Our results appeared to indicate a stronger professional identity in the nursing students. The concept of a nurse is familiar to children from an early age and the profession has a strong profile in the media[29,30]. In addition, children may have contact with a nurse through routine childhood healthcare[31] or knowledge of the profession from those around them[29]. In comparison, the radiotherapy profession lacks visibility[32]; the profession is rarely seen in the media, and many people struggle to describe the role of a therapeutic radiographer. It is inevitable that a new nursing student will have more information about their role than a radiotherapy student; whether this information is accurate remains up for debate.

The findings from this study suggest that a nurses' professional identity starts developing before engaging in training and continues throughout training. Whereas, maybe due to less exposure, this characteristic is less developed in radiotherapy students on starting their programme, leading to a slower route to professional identity.

A nurse's job satisfaction has been found to positively correlate with professional identity[33]. Commitment has also been linked to professional identity[34]. In our study it appears that a strong professional identity may provide some protection to the lack of sleep and hard work that is very clearly articulated in the nursing pictures.

Whilst the link between retention in profession and professional identity has not been comprehensively studied[35], the suggested stronger professional identity at the start of programme may explain why nursing retention was better than radiotherapy at the University despite similar programme characteristics. Future work is required to explore the link between retention and professional identity.

There appeared to be a gap between expectation and reality of workload for the nursing students. This may be due to nursing shift patterns, unsociable hours and extensive clinical placements which may impact the quality of life and well-being of nursing students[36,37]. It may be time to reflect on the number of hours of clinical placements that nursing students need to complete during their education. In the UK, nursing students must complete 2,300h of clinical placement[38], which is substantially more than the requirement for allied health profession students[39,40] and nursing students in other countries[41].

There was evidence that students in both cohorts expected to participate in social and sport activities when coming to university. However, by the end of year one

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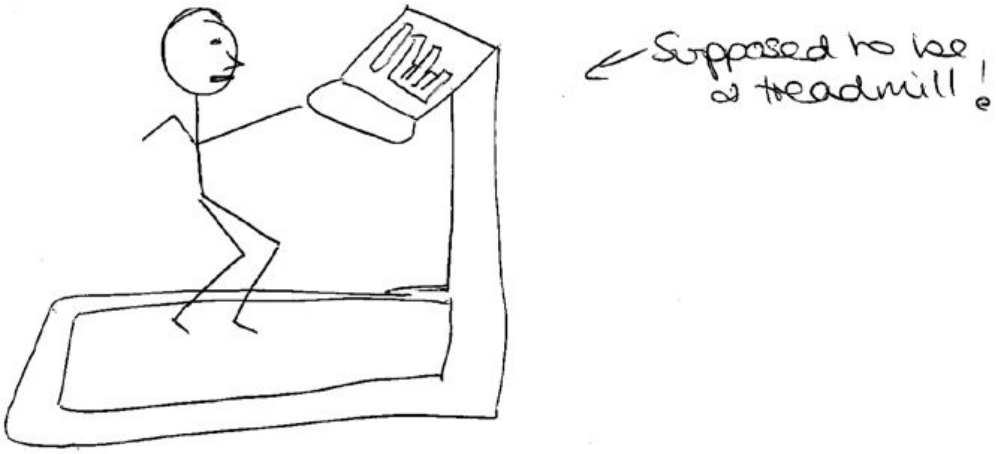

Figure 6. Radiotherapy participant 19 (end of Year 1). Notes: Supposed to be a treadmill!

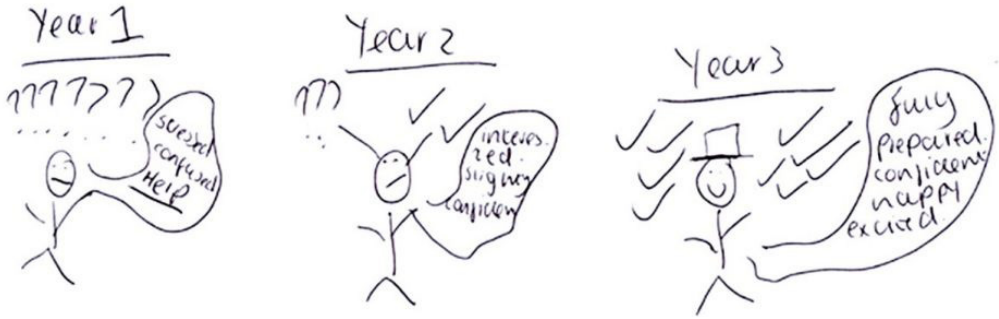

Figure 7. Nursing participant 1 (start of year 1). Notes: Year 1: Stressed, confused, help; Year 2: Interested, slightly confused; Year 3: Fully prepared, confident, happy, excited.

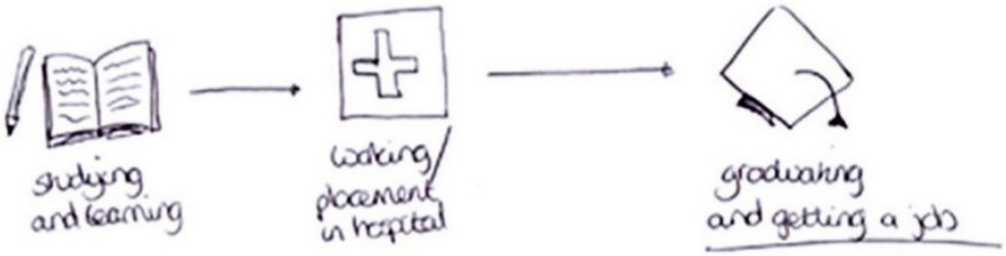

Figure 8. Radiotherapy participant 11 (start of year 1). Notes: Studying and learning, working / placement in hospital, graduating and getting a job.

it was clear that students' time was predominantly taken up with placements and academic study. It is ironic that healthcare students, undertaking a programme founded on health and well-being, apply to university with aspirations to maintain their own well-being through sport and social activities, but find that this is not possible alongside the programme requirements.

The use of visual imagery as a data collection method is not new. This study supplements previous work by utilizing visual imagery as a programme evaluation tool and by introducing a data analysis method. It supports the work of others[18,19] in recognising that visual images provide an alternative means of expression to express complex ideas.

Utilizing the method described in this paper, we found interpretation of each image started almost instantaneously, with the researchers focusing on their immediate response. The first part of data analysis is, therefore, relatively quick compared to other qualitative data analysis methods. Furthermore, during the analysis the richness of the pictorial data became evident through the powerful images. The researchers noted the immediacy of the impact of the images, both in the analysis and the message they imparted.

4.1 Strengths and Limitations

This data collection method and subsequent data analysis offered a novel way of gaining valuable insights into expectations and experiences of health care students. It was inexpensive and very quick to collect the data,

requiring no equipment beyond pen and paper. Most students appeared to find the drawing activity enjoyable, despite initial hesitation from some. Only a few students elected not to complete a drawing, the reasons for this were not explored. It was notable that more radiotherapy students completed a drawing at the second data collection point; the reason for this was unclear. There were no additional students present at the second data collection point, but more radiotherapy students were prepared to engage with this novel data collection method at the start of their second year of study. This may be linked to an increased confidence as the students progressed through the programme.

The data collection method enabled freedom of expression, which was minimally led by the researchers. This appeared to allow students to respond without the constraints of survey questions, allowing representation of what was important to the student at the time of data collection. This method moves the focus away from the researcher and towards the student. The importance of this agency has been reported by others[15,42]. Pictorial data analysis elicited key areas of the student experience that would be unlikely to form findings from a traditional questionnaire. Examples include the lack of sleep and social opportunities, and the significant impact of the heavy workload on students' lives.

The main limitation of this study was that it was not possible to check the interpretation of the images with the participants. Attempts were made to mitigate this using a team of researchers from different professional backgrounds to independently analyze data. The researchers took a reflexive approach. This included the use of field notes and audit trail of decisions during the analysis. Although the data analysis was novel, this process has been articulated in this paper to enable scrutiny and further development. Further work is required to establish the validity of interpretations.

The study was limited by a relatively small sample size, with the inclusion of only one HEI, which may impact the transferability of the findings. The interpretation was limited by not collecting demographic information.

It was possible to identify subtle differences in expectations and experiences between the two student cohorts; however, there was no means to link the first and second data of each student. Linking the data may have allowed the analysis of individual student perceptions over time. In addition, a narrative was not collected, so there was no means to check whether the final analysis of each picture reflected the student's intended message. Researchers have suggested that a narrative should accompany visual data[15,43]. In previous work where students have provided a written comment with their images[24], no attempt has been made to explore if the image could be analyzed rigorously. Future studies need to address this issue.

4.2 Implications

4.2.1 Student Expectations and Experiences

This study indicates that students could be better prepared for their healthcare training. This preparation may differ between professions. It may be beneficial to find ways to develop a stronger professional identity in the radiotherapy students at the start of the programme, by continuing to raise the professional profile. Whereas, for the nursing students, encouragement to observe nursing practice in a range of environments may provide a more realistic view of the profession.

This study also highlights a need to ensure students have a positive work / life balance. Vocational healthcare programmes comprise substantial academic and practice placement components. Programme designers, regulatory and professional bodies should consider the overall workload of both radiotherapy and nursing students. Our study indicates the regulatory body requirement for nursing students in the UK to undertake 2,300 clinical placement hours should be reviewed to facilitate well-being of nursing students.

4.3 Interpretation of Visual Data

This study has described an analysis method for visual data. Future work should investigate the validity of this analysis method, by comparing the researchers' analyses with the participants' explanation of their own work. Further, comparing expectations and experiences of each individual student, by linking individual participants' data collection across time would enrich the analysis.

The decision to include only interpretations on which all three researchers agreed reduced the likelihood of unintended interpretations being included in the analysis, thereby increasing the dependability of the analysis. It is recommended that a minimum of three researchers analyze each picture to ensure rigor when using this method.

5 CONCLUSION

Pictorial data provided a means to collect and analyze rich data quickly and inexpensively. The impact of this visual data was powerful and gave valuable insights which may complement traditional methods.

This study described a process of interpreting pictorial data to explore the similarities and differences between first year undergraduate nursing and radiotherapy students' expectations and experiences of the first year of their undergraduate programme. The themes

identified in the study support recommendations to promote professional identity and to balance academic workloads to ensure a healthy work / life balance. These recommendations should inform future research and healthcare programme planning.

Further work is required to explore the method outlined in this paper to further investigate the rigor and credibility of the interpretation of visual data.

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Conflicts of Interest
The authors declared no conflict of interest.

Ethical Statement
This study was approved by the University of Liverpool Ethics Committee (Reference Number: IPHS-1415-001).

Author Contribution
Fletcher C and Gordon C were responsible for study design, data collection, data analysis and report writing. Jarvis K was involved in data analysis and report writing. This article has been read and agreed by all three authors.

Abbreviation List
HEI, Higher Education Institute

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