An innovative method of data analysis: using art as a lens through which to view pharmacy undergraduate students' learning and assessment practices.

Structured Abstract

Background
It has been argued in the literature that pharmacy is a unique integration of art and science. This paper addresses the art aspect of this and draws on the existence of multiple philosophies, theories and belief systems and describes the methodological process of use fine art (paintings) as a lens through which to view thematic data about a 'scientific' concept; a method which appears to be unique in the literature.

Objectives
What are pharmacy students' assessment practices and how do these influence their learning practices?
How significant is the affective dimension in pharmacy students' learning?

Methods
Data collection took the form of individual semi-structured interviews and was underpinned by an interpretivist qualitative approach. Analysis of data involved exploring the themes relating to assessment. Initially, thematic analysis of the data was carried out using an inductive approach and mind-mapping then Pierre Bonnard's art was used as a 'lens' through which to view the themes.

Results
Eighteen pharmacy students in one UK School of Pharmacy were interviewed. Themes relating to assessment practices which are discussed in this paper and compared to Pierre Bonnard's paintings are: conceptions of assessment (compared with Coffee), the impact of the nature of assessment on learning practices (compared with Dining Room in the Country), feedback (compared with Nude in a Mirror), strategies used in assessment practices (compared with The French Window), the affective dimension of assessment (compared with Red Roos at Le Cannet) and assessment constrains free-thinking (compared with The White Interior).

Conclusions
Using Bonnard's art in analysis has provided an additional way of extending the analysis of participant's assessment practices. Aligning with Bonnard's technique of foregrounding the unexpected or diverting attention away from the obvious has allowed illumination of these practices and previously un-noticed aspects of pharmacy students' learning practices. There were a number of new insights gained from using this approach as well limitations. By attending to a different perspective that art brings, we have been able to see how assessment practices link to learning as pharmacy students.

Introduction

It has been argued in the literature that pharmacy is an integration of art and science[1] with, for example, authors describing the 'art and science' of counselling patients.[2] Similar wide-ranging discussion exists in the literature around other health professions, including medicine and nursing, with debate extending back for decades.[3-10] Authors argue that successful practice as a health professional requires an entwining of both the "so-called 'soft', co-creative, relationship-building art, and 'hard', linear, controlling science"[3] which have been separated in health care recently. Panda[4] posits that the doctor needs to be "an artist armed with basic scientific knowledge in medicine", which requires a combination of emotion and intuition alongside employing rational analysis. Convention tries to distinguish between the 'artist' and the 'scientist' and it is argued that there is a "confused notion that one uses emotion and intuition, drawing support from inward genius, achieving great effects without knowing how or why, but that the other, employing rational analysis, is cold and precise, analytical and detached, surrounded by highly complex instruments that baffle the lay mind".[8]

Thomas[3], in his discussion of combining art and science in healthcare argues that both are required and makes the case for researchers to use multiple methods of inquiry more often to counter the limitations of 'naïve positivism', including using traditions such as constructivism.[11] This paper describes the methodological process of using carefully chosen fine art (paintings) as a lens[12] or an alternative way, through which to view thematic data about a 'scientific' concept; a method which currently appears to be unique in the literature.

The research was conducted as part of a doctoral study using a constructivist socio-material approach[13] with artefacts used to explore pharmacy students' learning and assessment practices.[14] The idea for using art in the analysis came, partly from a desire to use a creative method of analysis, and also from a serendipitous visit to the Tate Modern gallery in London. Whilst conducting the interviews there was a realisation that, in keeping with using a visual and creative method of data collection, the researcher had a desire to analyse the data in a similarly creative way. There was an attempt to juxtapose the ordered, structured and 'scientific' concept of assessment with fine art by comparing the experiences recounted by participants with specific paintings by the early 20th century artist, Pierre Bonnard.

During a visit to the Tate Modern Gallery in London, the researcher was inspired by a painting by Bonnard called The Bowl of Milk[15] which can be viewed at
https://www.tate.org.uk/art/artworks/bonnard-the-bowl-of-milk-t00936
The curator's commentary on Bonnard's technique of painting was striking; he did not paint in front of his subject or 'before the motif'[16] but instead allowed his reflections on, and his memory of, a scene to influence how he portrayed it. He painted entirely from memory; he wanted his works to reflect his subjective response to the subject[17] and attempted to translate the 'first possession of a moment'[18] in his work. His art is 'based on deeply felt experiences, filtered through memory and expressed by relationships between colour, light and composition'.[16]

This idea of Bonnard's representations being filtered through his memory triggered a connection to the data in this study. The conception that what participants represented and articulated was filtered through their memory was one that had been reflected on by the researcher, hence the decision to use some of Bonnard's paintings and their associated commentaries to make sense of the data relating to participants assessment practices and their implications. In addition, student assessment usually evokes a strong emotional response[19] and similarly art can stimulate the affective or emotional dimension of our being. Art evokes emotion via use of colour, form and composition, drawing people in both cognitively and emotionally.[20] There is a language of neutrality associated with how we write about and speak about assessment in academia and by attending to a different perspective that art brings, we may be able to understand better how assessment practices impact on pharmacy students' learning.

Qualification as a pharmacist within the UK involves obtaining a General Pharmaceutical Council (GPhC) accredited Master of Pharmacy (MPharm) degree followed by one year of pre-registration training, during which a trainee demonstrates competence under the supervision of a pre-registration tutor. Passing the GPhC registration assessment and meeting fitness to practise requirements complete these necessary stages.[21] The MPharm is a four-year, undergraduate masters degree which integrates the science and practice of pharmacy,[22] a key component of the curriculum under study. Most entrants to the programme come from high school however some enter having completed a previous degree or other qualification. In the MPharm curriculum at the time these interviews took place, professional development was a key focus in teaching and learning with an emphasis on 'soft skills' for example, empathy, communication, reflexivity and adaptability.[23,24] Although the programme assessment strategy had incorporated OSCEs and other skills-based assessments,[25,26] at the time of the study, traditional end-of-semester examinations were used in throughout the course, balanced with other types of assessment which in many cases contributed as much to the final module grade as the examination.

The findings presented here form part of a larger doctoral project[14] in which the focus was investigating how pharmacy students negotiate[27] the pedagogical demands of a pharmacy curriculum. The overall aim of the project was to use artefacts to explore pharmacy students' learning to try to understand their learning practices in mastering a field of inquiry as well as exploring the impact of assessment and feedback on these practices and the difficulties they experience along the way. The specific questions addressed in this paper are:
- What are pharmacy students' assessment practices and how do these influence their learning practices?
- How does feedback influence pharmacy students' learning practices?
- How does the affective dimension impact on pharmacy students' learning?
- Can fine art be used as a lens to make sense of thematic data?

Methods
Data collection was qualitative in nature and took the form of individual semi-structured interviews with undergraduate pharmacy students in a UK Pharmacy School. The methodological position taken in the study was interpretivist,[28] which

is underpinned by constructivist ontology,[29] and is principally concerned with meaning, understanding and insight.

Participants were asked to select three artefacts (a photograph, an object, a song, a picture or something else) that represented what learning as a pharmacy student meant to them and bring that along to an interview.[30] The interviews were conducted using both the artefacts and a semi-structured interview plan constructed as a mind map. In conducting the interview, flexibility was applied to changing the sequence of themes and additional probing questions were used in response to the stories told by the participants. Data were analysed thematically using mind-mapping[31] and subsequently, theoretical constructs were applied to make sense of the analysis.

Analysis of data for this paper involved exploring the themes relating to assessment. Initially, thematic analysis of the data was carried out using an inductive approach and mind-mapping. Mind-mapping is a thinking tool underpinned by the concept of 'radiant thinking'[32] where associative thought processes radiate from a central idea, allowing concepts to be integrated and connections to be made.[14] For the data on assessment practices, an electronic mind map was created (Appendix I), then a selection of Pierre Bonnard's art was used as a 'lens'[12] through which to view the themes. Tepper[20] argues that art can enhance learning in several ways including making connections in all directions, enhancing higher order thinking skills and creating epistemic curiosity and these were the aims of using art as the theoretical construct in this way.

In choosing to use art, a number of questions were explored including what art might add to the analysis, whether it was possible to use this as a method and would it work? In being reflexive about the data analysis, the researcher also had perspectives of being a pharmacist and artist (as well as educator and researcher) with a strong desire to integrate these multiple 'selves' in the project. Peshkin[33] challenges researchers to be aware of their own subjectivity and to have an increased awareness of my own professional stance. He discusses the different 'I's that affect subjectivity in research and argues that subjectivity is inevitable and that researchers should systematically seek out their own subjectivity while the research is actively in progress and be aware of how subjectivity may be shaping inquiry and outcomes. This was an important part of the process of using art but in the end, the decision was made to just try it and see what happened.

In choosing Bonnard's art, there was a combination of the researcher's passion for impressionist and post-impressionist art alongside the chance encounter with Pierre Bonnard's work and his way of working, described in the introduction. For this reason, using other artists' work was not explored. Firstly, an overview of Bonnard's prolific work and his techniques were explored using a textbook catalogue of a 1998 Tate Gallery exhibition.[34] Other textbooks and articles on the history of post-impressionist art and Bonnard were read[16-18] before images were selected to use. One of Bonnard's most famous paintings is called Coffee,[35] which was also an artefact which featured heavily in student interviews, and this consolidated the decision to use Bonnard's work in this way.

The six inductive themes relating to assessment practices were conceptions of assessment, the impact of the nature of assessment on learning practices,

feedback, strategies used in assessment practices, the affective dimension of assessment and assessment constrains free-thinking. Once the decision was made to select Bonnard's work to compare with the data, a painting was chosen for each theme. This was a major part of the process and was done using Whitfield and Elderfields's catalogue as well as curator descriptions, along with the researchers' own reaction to the paintings. Some choices were straightforward, for example, the use of Coffee[35] and Nude in a Mirror[36], however other choices required more reflection and analysis. The choice of painting is explained in more detail in the results and discussion.

In using art to make sense of the data, six of Bonnard's works were compared to the specific themes relating to participants' assessment practices. In doing so, Bonnard's composition, subject, use of colour, technique and, where documented, the ideas behind the painting were considered. Alongside this, commentators' analysis of the piece along with the researcher's and others' impressions of the paintings and the ideas that each stimulated. In most cases the author was unable to view the original work and used the internet and art textbooks but wherever possible took the opportunity to view the original painting.

Ethical approval was received for the study from the ethical review panel of two higher education institutions; one where the study was carried out and the other the host institution for the doctorate. The ethical issues involved in the study are discussed in detail elsewhere[14] but included informed consent, consideration of power in the researcher-participant relationship and the location of the interview. Pseudonyms are used for the participants throughout.

Results and Discussion

Eighteen students were interviewed over a 6-week period with interviews lasting between 45 – 80 minutes. An attempt was made to identify students with a range of educational backgrounds, a mix of male and female and a range of academic abilities including some who had previously had to resit a module indicating that they may have struggled with a subject area. Each participant was given a pseudonym to protect their confidentiality. Table 1 gives the breakdown of participants' pseudonym, sex, stage, age, previous educational experience and the artefacts chosen.

Table 1. Participant Characteristics

Year of course	Pseudonym	Sex	Age	Educational background prior to MPharm	Artefacts
1	Gordon	Male	51	Science degree	Calculator, RSC membership card
2	Jessica	Female	19	School leaver	iPod, 'achievements' folder, stress man
3	Peter	Male	19	School leaver	Song, desk & nuts, study notes
3	Dave	Male	29	Engineering degree	Mind map, Cosmos book, photo (him & partner)
4	Debra	Female	26	Science degree	Mind map, BNF, photo (family)
4	Gavin	Male	21	School leaver	Wallet, rugby ball/champagne, Facebook page
4	Kat	Female	22	School leaver	BNF, spider's web, bath

4	Emily	Female	21	School leaver	Sticky notes, photo (family), coffee cup
4	Helen	Female	28	Arts & humanities degree	USB stick, diary, results transcript
4	Donna	Female	26	Science degree	Mind map, BNF, colored notes
4	Ewen	Male	21	School leaver	Colored pens, iPod, coffee
4	Lisa	Female	21	School leaver	Coffee cup, diary, iPod
4	Karen	Female	22	School leaver	Photo (friends), study notes, library silent study area
4	Diane	Female	27	Science degree	Assessment criteria, photo (family), highlighter pen
4	Victoria	Female	24	Science degree	Green pen, mobile phone, mints
4	Jill	Female	25	Science degree	Paper/highlighter pens, photo (family), ear plugs
4	Georgia	Female	23	School leaver (overseas) & Further Education College (UK)	Music, highlighter pens, body language picture
4	James	Male	24	Science degree	BNF, external hard drive, study notes

In the interviews, some themes emerged from the objects that participants brought, in other cases these relate to particular questions asked around assessment during the interview. This paper focusses on the themes relating to assessment practices: conceptions of assessment, the impact of the nature of assessment on learning practices, feedback, strategies used in assessment practices, the affective dimension of assessment and assessment constrains free-thinking and each of these has been explored using a different Bonnard painting.

Coffee – conceptions of assessment

The first painting chosen was Coffee[35] and this has been used to explore the theme 'conceptions of assessment'. The painting can be viewed at https://www.tate.org.uk/art/artworks/bonnard-coffee-n05414

This painting was chosen firstly because many participants brought coffee as one of their artefacts but also because of the composition that Bonnard has used in this work. Using composition, Bonnard succeeds in making the viewer feel part of a normal or routine event but yet, at the same time, separate to it. This echoes with the researcher's experience in listening to participants' narrative around assessment. Assessments in pharmacy education are a normal and routine event and by participants sharing their reflections, the researcher felt part of the experience, but at the same time separate.

This idea of being part of but yet separate also echoes with the finding that participants appear to conceive assessments as end of semester examinations; a routine event but separate to their learning rather than part of it. Peter used different study strategies before end of semester exams compared to coursework assessments and only used his desk when studying for exams.

> '[For an essay] *I'll take my laptop through to the kitchen and I'll sit with my mum or dad or whoever's through. I'll sit and read through there but if it's for an exam, I am in my bedroom by myself, sort of at that desk.'*

Crossman[37] in a qualitative analysis of the role of relationships and emotions in Batchelor of Education student perceptions of learning and assessment describes how past experiences of assessment influences current perceptions and this aligns with participants' experiences in this study. Their emphasis on written exams in their past experience (perhaps through the assessment driven culture in secondary school education[38]) may be leading them to over-emphasise the importance of exams. This conception of assessment as the end of semester exam also appears to have an impact on participants views on feedback which will be discuss later.

The MPharm curriculum is designed as a progression, with assessments intended to move students along the journey to becoming a pharmacist, however participants did not perceive assessments in that way. They appeared to conceive them as events in and of themselves, as intense moments in their journey, creating a break (or punctuation) in their learning. Participants gave the impression of assessments as 'hurdles to clear' rather than as an integral part of their learning process. Returning to Coffee, observing the painting, we can see that Bonnard draws attention to a moment captured over a cup of coffee portraying this ordinary event as an intense moment because of his dramatic use of colour and unusual composition. This intensity echoes how participants viewed assessments in this study.

In Coffee, Bonnard challenges convention in the way he composes the painting by not adhering to traditional rules of perspective and by framing the picture in an unusual way. Part of one of the subjects is 'cut off' and the table and the items on the table form the main foreground rather than the people meaning that Bonnard draws attention to the normally un-noticed aspects of the moment. In the same way, the findings of this study have highlighted what is normally in the background (their conceptions of assessment) and has been brought to the foreground. In the spirit of Bonnard's challenge to the convention of composition, in designing assessment for a pharmacy curriculum, a similar challenge to convention is worth considering. A growing emphasis on innovative assessment methods appear to challenge students to learn for understanding and to develop as professionals.[39] It appears, however, that we need to engage with students' fundamental conception of the end of semester written examination being the important assessment.

Dining Room in the Country - the impact of the nature of assessment on learning practices

The Dining Room in the Country[40] is the second painting chosen as it represented the researcher's role in looking through the window on participants' learning and assessment practices. This painting was used to explore the theme of 'the impact of the nature of assessment on learning practices' and it can be viewed at https://collections.artsmia.org/art/1240/dining-room-in-the-country-pierre-bonnard

For a period of Bonnard's work, he was preoccupied with the window as a metaphor; 'a window, like a painting, is both an opening and a barrier, a three dimensional view and two dimensional object'.[7] In this picture the door and the window are open and the subject is looking in from the outside; 'the open door

and windows invite the spectator into the composition and at the same time flatten form in an interwoven network of abstract colour patterns across the surface'.[16] The researcher felt that participants had invited her in to their reflections on assessment but at the same time she remained looking in from the outside. This is not to say that these assessment practices formed an independent reality (an 'out-thereness' to use Law's[41] terminology) but that, similar to the discussions around Coffee, the researcher's role as tutor and researcher kept her part of, but yet separate from these practices. She felt slightly distant from the practices she was trying to make sense of and was aware of a gap, however the researcher's own practices around using artefacts and engaging with students in data generation happened within that gap, analogous with the effect that Bonnard achieves of evoking a 'strong feeling that we are 'in' the space of the represented image'.[18] This allowed the researcher to construct a sense of the practices being explored and enabled her to construe participants' practices in a novel way.

In 'looking through the window' on participants' assessment practices it emerged that the nature of assessments affected their learning practices. Debra discussed multiple choice questions (MCQs) and how she felt that these did not motivate her to understand a subject;

> 'I find when you are studying for an MCQ, it's just like trying to memorise as much as you possibly can … I mightn't always understand what I'm learning and I'm just learning to reach that goal of passing that MCQ. So you're just … surface learning, you're not learning to understand'.

Others discussed using this type of rote learning prior to exams, perceiving this as 'not a very good kind of learning' (Kat) and as a poor strategy especially when this included 'spotting' (predicting what will be in the exam and revising those subjects only).

Hargreaves[42] argues that 'conventional assessment practices do not encourage lifelong learning, critical thinking or a deep understanding of the subject matter'. Barnett[43] similarly asserts that if students 'sense that the forms of assessment are calling for factual knowledge or for descriptive accounts of situations, the students will mirror these perceptions in their knowing accomplishments'. Entwistle and Entwistle[44] describe a distinction between learning as 'reproduction of information presented' or as 'transformation of that information in the process of coming to understand it for oneself' and the assessment practices described by Kat and Debra appear to fit with their categorisation as the reproduction of information. Participants appeared to be adopting this approach without feeling comfortable with it and reflected on the potential negative impact on their professional knowledge in the future.

Participants also described assessment practices which align more with transformative learning.[45] Jill described how the final year assessments were about integration;

> 'Assessments this year is just for me, is actually bringing everything together. I think that's happening in fourth year that everything that you've learned … not everything, but quite like the majority of things

you've learned in first to third year has been pulled together and you're realising why these things are actually important whereas at the time, you would be like, what's the point in this? what's the point in learning that? it's always hard to see the relevance to pharmacy … I'm going to do the bare minimum to pass the exam … you could rote learn it whereas … the assessments this year are bringing nearly everything together, and it's kind of putting a common thread through everything'.

Jill described how the learning in early years started as rote learning but how in final year, in integrating this knowledge, the learning became transformational and part of her development as a professional.

The 'strategic approach' suggested by Entwistle and others,[45-47] where students aim to achieve good grades by using organised study methods and are alert to assessment requirements, appears to link with the practices of these participants. Boud[48] argues that the nature of the assessment task influences the learning but also that students tend to focus on the topics being assessed at the expense of those which are not, aligning with the findings in this study. Gibbs[49] cites course characteristics which he argues are associated with a 'surface approach' to study such as a heavy workload, high class contact hours, an excessive amount of course material, a lack of opportunity to pursue subjects in depth and a lack of choice over subjects. At the time of this study, the pharmacy curriculum possessed many of these characteristics and therefore it is perhaps unsurprising that participants in this study recount these assessment practices.

The perception of relevance to the future was raised by a number of participants and appeared to have an influence on both their learning practices and on their assessment practices. Debra described how assessments that 'examine the subject as a whole' and that she would use in the future meant that she was *'not memorising as such for those because I need to have an ultimate understanding to sit those exams so I find those much more beneficial'.* Karen likewise expressed that she took a different approach to assessments in clinical based modules which she perceived as being important for the future.

Boud[48] argues that it is a commonly held view that assessment measures learning but does not influence it and in 'looking through the window' on these participants' assessment practices it would appear that this view is not supported here.

Nude in a mirror – feedback

The third painting chosen was Nude in a Mirror[35] and this can be viewed at https://artsandculture.google.com/asset/nude-pierre-bonnard/DAE1G-ktwIa8WA?hl=en Bonnard used mirrors in many of his paintings and this picture has been linked to the theme of feedback because of the link between a mirror, reflection and therefore feedback.

Participants expressed a number of views on feedback on assessment and on how and whether it impacts on their learning. The quantity of feedback received was commonly commented on as were the participants' feelings when receiving

feedback. Crisp[50] argues that recent research has emphasised that, rather than the feedback itself, it is how students make sense of this and whether they actively engage with the feedback, which is important. Some participants in this study saw feedback as having a 'benchmarking' purpose and others spoke about how they used it to improve future work.

Many of the participants started by saying they never get feedback;

> '*I couldn't understand where I had gone wrong in the actual written paper and you never find out 'cos no one ever gives you feedback'* (Debra).

When probed further it became clear they were talking about summative written examinations;

> '*say the final exams before the summer you don't really get any feedback on them because you just get your certificate through, you've passed, and then you start next year, so you get your percentage, but that's it, you obviously don't know where you fell down'* (Gavin).

Most who started by saying they did not get feedback then went on to comment on receiving feedback on other types of assignments;

> '*when you pass the OSCEs and stuff that you do during the term you get feedback on them'* (Gavin).

Price et al.[51] argue that students are dissatisfied and staff frustrated about the way the feedback process is working and this appears to be echoed by participants in this study.

Linking back to participants' conceptions of assessment as being the summative written examination, it is perhaps unsurprising that participants in this study perceive that they 'never' receive feedback. Hanna, Hall and Hennessey[52] explored the reasons for low student satisfaction with feedback. Their findings show general dissatisfaction with feedback especially with examination feedback and they subsequently implemented a 'mandatory requirement' for more detailed examination feedback across all modules. They reflect on the difficulties in establishing the correct level of detail in examination feedback but found that student satisfaction improved.

Participants in this study expressed feelings in response to feedback; on receiving a low mark, Kat felt she wanted to do better. Helen and Debra felt, although disappointing, it was motivation to improve;

> '*its kinda really disheartening when you get a low mark and you think you've done really well ... erm … so definitely it makes you work harder the next time ... because you ultimately wanna achieve that higher grade'* (Debra).

On receiving a high mark, Lisa felt proud. The emotional aspects of assessment and feedback are discussed in more depth below.

In terms of how participants used feedback, some indicated they used it as a way of benchmarking themselves. Gordon felt it was 'nice to know where you are at' and Kat tended to compare herself with her peers; *'You measure yourself against your friends, of course you do'* (Kat). Lisa felt that she concentrated on 'could do better' comments;

> *I don't sit down and analyse it completely just because I know myself just how much work I put in or like how well I thought I knew it … I concentrate on, like if they've said 'could have done something better' or if there's something that's been ticked and you're only at like a six compared to like the seven to ten box … then look like 'what could I have done … to make that better this time?'* (Lisa).

Karen explained that she only really looked at feedback if she did not do well in an assignment and Jill felt that by time she had reached fourth year she was set in ways and feedback was less useful to her;

> *'I think in fourth year you've already got your own style of answering exam questions, so if it's like feedback on whether you're writing an essay or something, I think it would be hard for me to kind of change the way'* (Jill).

In Hernandez's study with humanities students,[53] 21% of students took no action as a result of feedback, 63% intended to use the feedback to inform future work and 16% provided evidence that they had acted on recommendations. Brockbank and McGill[54] argue that the impact of feedback may be limited if it is vague and non-specific however participants in this study made no comment on the nature of their feedback.

In Nude in the Mirror, Bonnard has created an interesting illusion with the reflection in the mirror seen by the viewer being different to the one seen by the subject. In considering practices and sense-making, Haraway[55] discusses the metaphor of optical diffraction and how this differs to reflection. Diffraction does not produce *"the same" displaced, as reflection and refraction do. Diffraction is a mapping of interference, not of replication, reflection, or reproduction. A diffraction pattern does not map where differences appear, but rather maps where the effects of difference appear'*.[55]

If we use Haraway's definition of diffraction to consider feedback in pharmacy education, we could reconceptualise feedback as diffraction rather than reflection and reconsider the way that we construct feedback. Crisp[50] reflects negatively on 'unilateral pronouncements by assessors rather than dialogue with students' and perhaps by creating Harraway's 'mapping of interference'[55] in the way that we construct feedback to students allowing disruption of ideas to take place, academics could open up a conversation to support students in knowledge creation rather than making a judgment on successful achievement of propositional knowledge. With large numbers of students on pharmacy programmes however, this may be challenging to operationalize.

The French Window – strategies used in assessment practices

The fourth painting chosen was The French Window[56] to represent the strategies and techniques used by participants in their assessment practices, many of which relate to the study practices discussed elsewhere.[14] The French Window can be viewed at https://www.pubhist.com/w42085. Practices recounted by participants included using assessment criteria, 'loading and dumping', peer support, and using past papers.

In The French Window, Bonnard uses a number of artistic techniques to create the effect he is aiming for[18]; the mirror in the background has the artist himself reflected in it, the use of pencil marks etched into the paint around the hands gives vitality and he uses charcoal marks to define the head's tilt. For participants in this study, their learning was enacted in a number of techniques and strategies described within their assessment practices.

Diane used published assessment criteria to direct her learning. In his review of the impact of assessment on student learning, Rust[57] raises the issue of ensuring active engagement with assessment criteria, challenging the assumption that giving explicit criteria automatically results in better performance. In Diane's case, there appears to be active engagement with published criteria as a strategy in her quest for success. Other participants did not articulate this, and other unpublished research conducted with pharmacy students at the same institution indicates that active engagement with published criteria is not a widespread practice.

Dave, as a mature student, felt that he had well established assessment practices which involved a number of strategies such as the 'ritual' of locking himself away before exams and in some cases a 'load and dump' strategy for subjects he perceived as less relevant;

> 'I do a lot of loading and dumping, which is really shocking … which is why I try and avoid that with the subjects that … I find are … going to be more functional to me as a pharmacist after University … I understand why I'm doing it and I see the function in terms of getting me through the course and getting a really good broader understanding of everything that's going on, but I don't see it as being really useful towards me, like post-university …'.

Peer support in preparing for assessment was important for a number of participants; Karen discussed working with her friend in preparing for assessment. Dave likewise discussed his support strategies during assessments; *'my phone bill normally goes up during exam time as well, 'cos I'm always ringing some of the guys'*. Victoria also used feedback from her peers as she prepared for assessment;

> 'even last time we were practising for the OSCE. There were things that you wouldn't consider even mentioning it in the patient interview … I would never have thought of and there were things I would have thought of that they wouldn't have thought of, and that's where we just kind of pick up from each other'.

Gavin described how he used past papers to help build his confidence for examinations and be clear about the expectations;

> 'everyone kept saying 'why wasn't there a model answer up on Moodle [virtual learning environment] … that would have been a massive help, because then you would … you wouldn't … it felt like you were going into that exam quite blind in terms of … how much depth do they want us to go in to …'

Hanna, Hall and Hennessey[52] found that their participants also wanted model answers but reflected that a comprehensive model answer could stifle independent learning and hamper the ability to apply knowledge. Haggis[58] posits that requests such as Gavin's, for examples are an attempt by students to 'concretise the abstractions' of fundamental concepts such as 'argument' and 'evidence' that they find highly opaque. The challenge of this finding for those designing and delivering pharmacy education is to find a way to address the opaqueness of these abstractions without encouraging students to resort to mimicry.

Like Bonnard in The French Window, participants appeared to be using a variety of different strategies in their assessment practices both in terms of how they approached assessments and of alleviating stress. In comparing participants' strategies associated with assessment to Bonnard's The French Window, which has an interesting and unconventional construction of background and foreground and with the subject side-lined, the strategies described by participants have been highlighted and have brought to the foreground the complex meshwork surrounding their learning and the practices associated with assessment.

Red roofs at Le Cannet – the affective dimension

The fifth painting chosen was Red roofs at Le Cannet[59] to represent the affective dimension expressed about learning and more commonly about assessment. The painting can be viewed at https://commons.wikimedia.org/wiki/File:Pierre_Bonnard,_1942_-_Toits_rouges_au_Cannet.jpg In this study, participants' description of assessment and their reflections on it was given in quite dramatic language at times evoking the affective dimension.

Participants expressed a number of emotional responses to assessment and to feedback, primarily negative emotions hence the choice of a painting with a foreboding air. Bonnard, as a colourist, generally painted with bright colours which are usually associated with positive emotions. Few of his paintings are dark and convey a sense of gloom in the way that the sky over the Red roofs at Les Cannet does.

Kat and Jessica described frustration, usually in response to failure;

> 'I wasn't expecting to fail as I was really confident with what I was doing, so I was more frustrated at myself because I know I can do it' (Jessica).

This experience of disappointment at failing an assessment was commented on by a number of participants. For Ewan it generated annoyance with himself for not preparing as well as he felt he should have;

> 'I was annoyed at myself as well for failing it because I knew that I probably hadn't done as much work for that'.

He also expressed concern that he felt he was letting others down by failing;

> 'I feel as if I've let people down in some respects. Sort of, Mum and Dad, who've, sort of, done so much to try and get me through and get me to uni and all that, and sort of, to have to go to them and say 'I've failed'.

Lisa described feeling disheartened when she found out she had not done as well as she expected but explained that it could still motivate her to do better next time;

> 'the worst one is if you've not done well and you feel like you should have done well. That's disheartening, but … when you've not done well and you get feedback that erm … you've not done well, but you, you think like all that went really bad – it's still horrible to get like that final … thing there, but … it does motivate you'.

Kat described a situation where she recognised she had invested a lot of time and emotional effort into an assignment and as a result was really disappointed when she received negative feedback;

> 'that was for an essay so I was quite into that and when I got my feedback back it was, that was quite a, I took it quite personally. I was quite disappointed when I got it back and I got a poor mark and I thought oh I really went for that …'.

Fritz et al.[60] identified that the 'emotional and psychological investment in producing a piece of work has a much stronger effect on the student than the relatively passive receipt of subsequent feedback' and Kat's experience of emotional and psychological investment appears to echo this. Rust[57] argues that because of this emotional investment, subsequent repetition of the task is more likely to be carried out by replication of the previous attempt, including mistakes, despite these being highlighted in the feedback.

Other potent emotions expressed included shock at failing (Donna), panic during written exams (Victoria) and fear of failure. Crossman[37] identified very similar emotional responses from students in relation to assessment; disappointment, a sense of failure, anxiety, hurt, frustration, stress, loathing and hatred were all noted. As with this study, the expression of emotion when describing assessment was 'frequent, potent and deeply embedded in the data' and similar to the overall emphasis in this study, all the emotions noted by Crossman were negative. Basson and Rothman[61] have explored positive emotion regulation strategies of pharmacy students and determined that students who flourished were more likely to use adaptive positive emotion regulation strategies. The

findings of this study indicate that this is worthy of further exploration by pharmacy schools.

Pride was discussed by a number of participants in this study. Tracy et al.[62] have explored pride and differentiate between hubristic and authentic pride with the latter being 'quiet satisfaction we take from our work, our relationships, our fitness, or even the cleanliness of our homes' and the former as 'ego-driven pride' that leads to bragging and comparing ourselves to others. In this study pride was expressed as a positive emotion, the only one expressed in this study. Lisa described the feeling of pride in doing well;

> *'it's just a natural feeling if you've done well like – yes I've done well and that's great because I feel like I've deserved it.'*

Lisa also described not wanting to 'lose face' in front of other people;

> *'I think that's more of a … a pride thing, than a lot of … I like to know things myself because I don't feel … that I can contribute like in group discussion a bit, if I don't know exactly what I'm on about.'*

Tracy et al.[62] assert that students who experience a lack of pride due to a poor result buckle down and work harder the next time. It seems the lack of this emotion regulates people's behaviour to work harder, not the presence of it.

Similar to the emotional response evoked by Bonnard's dramatic sky in Red roofs over Le Cannet, assessment evoked a strong negative emotional response in these participants. Crossman's findings and the findings from this study would indicate that 'assessment is clearly not a neutral context, although educational professionalism has cultivated the myth that it is.'[37] Crossman concludes that 'higher education would do well to consider further how teaching and learning occurs in a particular human context in which individuals interact, conduct relationships and experience feelings about these relationships' and pharmacy schools should be mindful of these relationships and emotions in assessing and providing feedback to students.

A white interior – assessment constrains free thinking

The sixth painting chosen was A White Interior[63] and this links to the theme that 'assessment constrains free thinking' and to the difference between learning for assessment and learning for understanding. A White Interior can be viewed at https://www.pubhist.com/w44224.

Participants expressed views about taking control of their learning. Kat explained that learning for her own sake is a free process which assessment can constrain;

> *'exams in my head are so tied with fear and trying to do things, cramming, you know trying to do things in that last week, I can't really disassociate exam time from positive learning experiences … when you're just learning for your own sake, when you just want to find things out, it's a very free process ... but when you're trying to learn for an exam, you're*

forcing your brain to go down one route … and sometimes it's quite, quite difficult and that's why the rote learning has to come in'.

Kat felt that the negative emotions surrounding assessment inhibited her from the learning experiences that she perceived as positive. In relation to this free-thinking process, in the White Interior, it appears that Bonnard has not allowed convention to constrain his thinking; his construction of the painting challenges the conventions of perspective, alongside an element of mystery emerges with the floor metamorphosing into a body. Bonnard contrasts the use of the white, which is rarely used by colourists and the bright and dark colours of outside in achieving this effect. The challenge around assessment in pharmacy curricula design is to harness this free thinking and the enjoyment of learning described by Kat without allowing assessment, which in higher education is still required for 'certification' or 'qualification'[64] purposes, to constrain these.

Similarly, Diane contrasted learning for herself and learning for assessment explaining that;

> *'learning for you [is] a lot more than just to get through an exam … it's more work but it's more enjoyable, you feel you get more out of it' …but that's good … because you're always … taking control of your own learning and you're knowing where you want to go with it'.*

Echoing the experience of participants in this study, Entwistle and Entwistle,[65] in their series of studies exploring student understanding, found that students described the experience of understanding as satisfying, (good to have the feeling that you understood at last) and complete (a whole as previously understood things were suddenly integrated).

Elderfield[66] explains how in The White Interior, as with many others of Bonnard's paintings, his construction of the painting challenges the eye to move rapidly backwards and forwards across the picture. The views expressed by participants in this study create a call for pharmacy educators to be mindful of moving their view backwards and forwards across the curriculum to ensure that it is designed in a way that ensures that students will demonstrate 'performances of understanding'[67] When participants in this study felt part of the learning, were enjoying it and were in control of it, they felt that they understood. Biggs and Tang[67] argue that when students 'really' understand concepts they act differently in contexts involving this concept and are capable of using it in unfamiliar or novel contexts i.e. performances of understanding; a desired outcome for professional development in curricula such as pharmacy.

Conclusions

Using Bonnard's art in analysis has provided an additional way of extending the analysis of participant's assessment practices. Aligning with Bonnard's technique of foregrounding the unexpected or diverting attention away from the obvious has allowed illumination of these practices and previously un-noticed aspects of pharmacy students' learning practices.

In relation to Bonnard's Coffee,[35] it became clear that participants' conception of assessment as the summative examination was strong and consequently influenced their views of feedback. In Dining Room in the Country,[40] the nature of the assessment impacting on participants' learning practices was explored; MCQs tended to foster rote learning which participants perceived as negative. Participants recounted understanding the relevance of some of the topics previously studied; it would have been good if this had happened earlier at the time of studying these topics and this will be a challenge for ongoing curriculum design. Following on from this, perceived relevance to the future and the topics being assessed appeared to heavily influence participants' learning.

Feedback was explored using Nude in a Mirror.[36] Perceptions of lack of feedback and the feelings expressed on receiving feedback have had an influence on participants' learning. The idea of diffraction[55] as an alternative way of conceptualising feedback was triggered by Bonnard's composition of the painting.

The French Window[56] enabled exploration of strategies used by students; curriculum design appears to have a significant influence on participants' learning with 'load and dump' strategies reported. An over-crowded curriculum with no time for reflection or consolidation could be part of this. These issues were acknowledged by the course management team, under the leadership of the researcher, and were taken into account in curriculum re-design with reduction in both the numbers of modules and the assessment load across the course to attempt to allow students time to reflect, develop and learn for understanding.

There appears to be a significant emotional element to pharmacy students' learning often not acknowledged by literature or in teaching, learning and assessment practices and this was explored further using Red roofs at Le Cannet.[59] In comparing A White Interior[63] with assessment constraining free thinking, there appeared to be consequences of what participants described as 'learning for themselves' and the creative processes that assessment appeared to inhibit. The challenge for pharmacy educators is to design learning activities and assessments that harness this 'learning for themselves'.

In keeping with the ethos of interpretivistic research, this study has not attempted to generalise findings but instead presents data about the way human beings (pharmacy students in one pharmacy school) progressively construct meanings about the world (their assessments and learning) in their lives.[68] Using art has added another dimension to help make sense of these data. There were a number of new insights gained from using this approach as well limitations. It could be argued that art creates an unnecessary distraction, and that the data could have been explored without Bonnard's paintings but like Tepper[20] the researchers would argue that that arts-based inquiry fostered 'deep, reflective learning and engagement' in this project. Some of the findings and analysis, for example diffraction, would not have emerged without the use of art. Limitations of the approach were that although some comparisons were nuanced and subtle and offered new insights, others were a little contrived, for example the discussion of emotions using Red roofs at Le Cannet.[59] Using art in research in this way, appears not to have been used before (and certainly not in pharmacy education) and therefore the process of achieving this was iterative and

explorative. This means there was no previous work or structured methodology to guide the researcher and therefore the researcher's multiple positions (pharmacist, educator, artist, researcher) have had an influence on the findings. Subjectivity[33] as a positive attribute is an important conceptual underpinning of qualitative research unlike scientific or positivistic research where subjectivity is viewed as bias or a negative trait and these multiple 'selves' (particularly the researchers art background) have enriched the study's findings.

Returning to the integration of science and art in pharmacy, Herman[5] asserts that "when an artist makes a penetrating observation, it often foreshadows a more formal one by a scientist and when science completes a convincing demonstration it can have the same aesthetic appeal as a work of art. One common denominator between the two spheres is the attempt to gain a deeper understanding of humanity's condition" and this study demonstrates the use of art in gaining a deeper understanding of the impact of assessment on pharmacy students' learning. Combining art and science has enabled new insights into the data and may be a helpful technique to use in other types of pharmacy research.

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