



The University
of Manchester



Unpacking links between learning gains, learning styles and achievement amongst 1st year pharmacy students at Manchester Pharmacy School

Final Report to The Centre for Higher Education Research, Innovation and Learning (CHERIL)

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1. INTRODUCTION

This report presents findings from a mixed methods study investigating relationships between first year pharmacy students' preferences for learning, engagement in learning, and learning outcomes. Initially, students' preferences are presented based on findings from focus group discussions; following this, the results of quantitative analyses of the effects of learning style and engagement in learning on performance are presented. Although funding for this project also involved staff interviews, these are on-going, so presentation of findings from these is beyond the scope of this report; however a short report based on these interviews will be made available to the funders once data collection and analysis has been completed.

The qualitative and quantitative findings are then considered in relation to the strategic goals of the university and of CHERIL. We suggest how others might learn from our study as well as reflecting on our own learning gains. The report also makes a number of recommendations for educators at the local level (Manchester Pharmacy School) and for those within the wider learning community.

However, before describing our study in more detail we consider next a number of changes that have taken place in higher education that provide important context to, and rationale for, our study.

1.1 Background

Higher education has experienced a paradigm shift in focus, with a move away from teacher-centred instruction towards the adoption of a student-centred model of education as learning (Barr and Tagg, 1995). Such a shift involves two key elements: a focus on individual learners; and learning and teaching practices that support learning (McCombs & Miller, 2007; McCombs & Whisler, 1997). A focus on individual learners involves recognising the diversity in beliefs, values, backgrounds, learning styles etc and allowing students to learn in their own way so that they achieve the educational outcomes. It also involves a focus on the learning process so that the outcomes achieved are of a high quality.

The University of Manchester's Strategic Vision recognises this shift, and has positioned an outstanding student learning experience as one of three core goals of what it wants to achieve as a university by 2020. An enabling strategy for the outstanding student experience goal is a learning environment that serves the varied learning needs of its diverse student population and delivers quality learning experiences, with a focus on outcomes gained by the students – such as

employability, leadership and global citizenship – rather than a focus on the content of teaching (Barr & Tagg, 1995; Pulist, 2001; Weimer, 2003).

Underpinning both the goal and the enabling strategy is a conceptualisation of how students learn that privileges the needs of the learner. This conceptualisation requires teachers to adopt a particular set of educational practices: for example, teaching needs to be planned and executed from a learning perspective with an emphasis on the learning process, to facilitate active student participation and engagement in learning, to produce an improved, enhanced learning experience. It also requires students to adopt a particular set of educational practices, as making teaching more responsive to the needs of the learners requires students to take a more active role in managing their learning process, to take on an increased sense of autonomy, and to accept responsibility for their own educational development. Underpinning these teacher and learner educational practices is a relationship of interdependence between teacher and learner, mutual respect and a reflexive approach on the part of both teacher and learner (Lea et al, 2003).

1.11 Teaching, Learning and Assessment in Manchester Pharmacy School

Undergraduate pharmacy degrees (MPharm) in Great Britain are FHEQ (Framework for Higher Education Qualifications) level 7 integrated Masters degree programmes that are accredited by the pharmacy regulator, the General Pharmaceutical Council (GPhC) who are responsible for checking the standards of courses leading to registration and annotation as a pharmacist. Like the University's Strategic Vision, these standards are focused on students achieving high quality outcomes (that is, on how learning is achieved) rather than on specifying the content of an MPharm syllabus (or on the inputs of instruction, such as the curriculum).

In order to meet the GPhC standards pharmacy schools must demonstrate that the teaching and learning process at their institution supports the varied learning needs of its students; and that the learning process brings about a number of learning outcomes including graduate attributes such as critical thinking, problem-solving, the ability to apply learning in practice, and an acceptance of the responsibility for continued educational development throughout a graduate's career. The GPhC standards also emphasise that pharmacy school curricula develop independent learning skills, and that underpinning this the assessment strategy should include diagnostic, formative and summative assessments as well as timely feedback.

The Manchester Pharmacy School (MPS) MPharm curriculum is based upon an integrated model (Hall et al, 2014), where teaching, learning and assessment are built upon, year-on-year, both

horizontally and vertically, in each of the key strands (Medicine, Pharmacist, Patient, Public, Integrated Research Skills, Integrated Project and Integrated Professional Practice – see figure 1), to take the learner towards the higher cognitive domains of Millers triangle (Harden, 2000), whilst integrating the core disciplines to achieve transdisciplinary integration, which is realised for the learner within authentic, work-based practice placements (Harden, 2000).



Figure 1. Diagrammatic representation of MPS MPharm curriculum.

Through modelling the curriculum in this way, MPS aspire to produce effective, clinically confident professionals, who are able to apply their knowledge in practice, through an integrated, spiralling curriculum that provides a context for learning that embeds theory within practice. Drawing upon constructivism and adult learning theory (Knowles et al, 1998), MPS positions teaching and learning towards the self-directed, inquisitive, experienced and motivated learner. This learner-centred approach involves students taking responsibility for their own learning, and being active within the process of learning.

Assessment is aligned to this ethos (Biggs, 1996); moving beyond specific knowledge outcomes and reproduction of facts through traditional examinations, MPS adopts an integrated approach to assessment, and through mixed methods, instils high level problem-solving, stimulates impetus and self-directed learning, critical thinking and inquiry, to connect theory to the real world (Everwijn, 1983; Mason, 1996).

MPS aspires that the Manchester pharmacy graduate is a competent, confident leader, prepared for modern pharmacy practice. This is represented diagrammatically in figure 2.

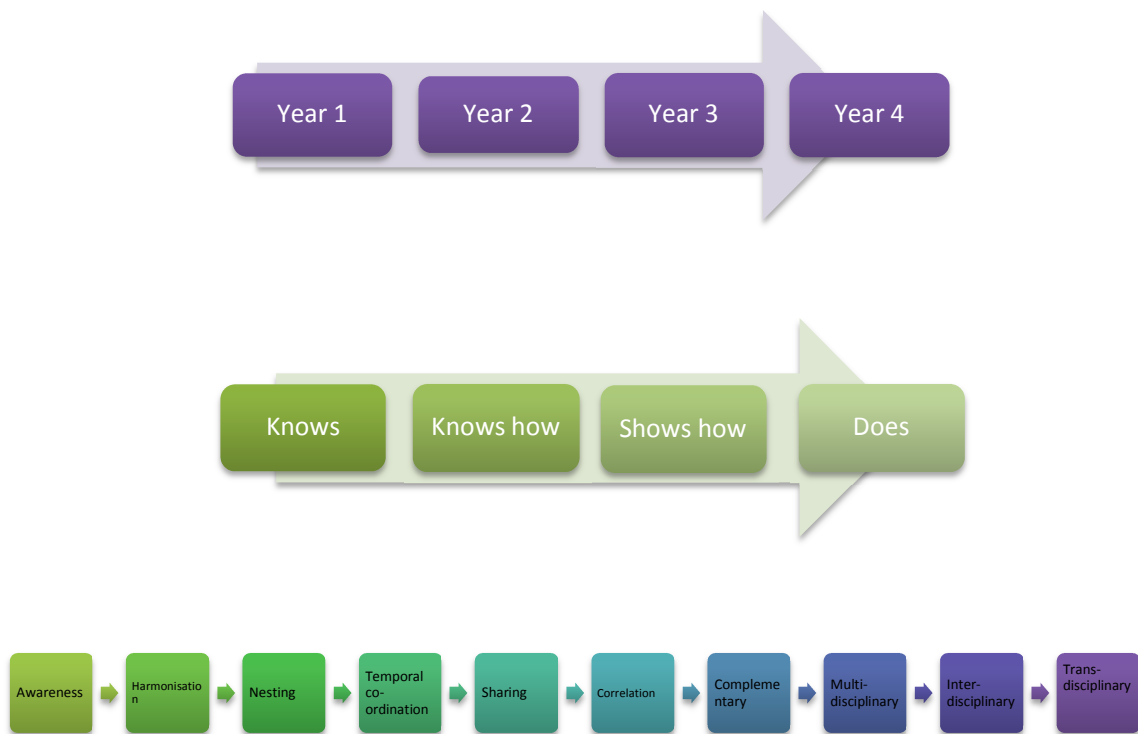


Figure 2. Diagrammatic representation of progressive curricular integration in the MPharm.

MPS teaching and learning strategies draw on constructivist theories of learning, taking a student-centred approach designed to actively engage with and challenge students' understanding in order to bring about learning. This focus on developing understanding rather than on transmitting knowledge requires an educational context (learning environment) where teachers and students have a shared understanding of the learning outcomes of the programme. However the processes for achieving the learning outcomes are intentionally varied in recognition of student diversity in learning preferences in order to allow all types of learners to engage with learning on the MPharm. This diversity in learners – and their preferred learning styles – means that students on the Manchester MPharm are likely to have different conceptualisations of learning in terms of how they view both *what* is learned (or what the content means to them) and *how* they learn based on their backgrounds and previous learning experiences (Marton, Dall'Alba and Beaty, 1993). Underpinning these conceptualisations are two broad categories of beliefs about learning: learning as content-centred (or learning as the transmission of facts delivered by the teacher, the 'sage on the stage', that are memorised and reproduced); and learning as an active process of making meaning and new

ways of understanding as existing knowledge builds on and transforms existing knowledge. Here, students who have a content-centred view of learning may be challenged by the teaching and learning practices of MPS that focus on integrating and developing understanding.

Yet evidence of these learning beliefs (what pharmacy students think about learning, their conceptions of learning), how they approach their learning (their intentions and strategies that are based on their previous learning experiences and preferences) and the implications of them for their learning outcomes (their academic performance), is currently not well explored in undergraduate pharmacy education. Our study foregrounds these different aspects of student learning, and starts with some qualitative focus groups designed to find out more about our students' learning beliefs, as we are interested in exploring relationships between these, learning preferences and gains from learning. The point here is to identify any continuities and discontinuities in students' conceptions of and approaches to learning when they were navigating the various different components of the MPharm programme as first year students, as previous studies have suggested that integrating new ways of learning can create dissonance between previous learning beliefs and the learning practices associated with the 'learning paradigm' (Barr and Tagg 1995) of higher education.

1.12 Learning styles

One aspect likely to contribute to this dissonance is students' learning styles – or 'the ways in which individuals characteristically approach different learning tasks' (Cassidy 2004), the 'particular set of behaviors and attitudes related to learning context' (Brown, 1998) – if a student's learning style is at odds with the learning opportunities provided by a curriculum. However, because learning styles are 'flexibly stable learning preferences' (Coffield et al 2004) that are grounded in previous learning experiences, they can also evolve as students progress through their undergraduate education and are exposed to a variety of learning environments that include clinical practice (Zoghi et al, 2010). This means that learning styles are not a fixed personality trait but are patterns of behaviour based upon a student's prior experiences, knowledge etc that can adjust to suit new learning situations. By gaining an insight into their learning preferences it is therefore possible to help students understand their individual preferences and to then support students in adjusting their preferences so that they develop a repertoire of approaches to their learning.

In our study we used the H-PILS (Health Professionals' Inventory of Learning Styles) tool that is specific to pharmacy education as both a diagnostic tool to initiate a dialogue with students about their learning preferences and as a data collection tool for our own research. The H-PILS is based on Kolb's model of experiential learning, where learning is characterised by four phases of concrete

experience, reflective observation on that experience, abstract conceptualisation and active experimentation that make up a learning cycle (Kolb, 1984). The four phases of the experiential learning cycle correspond to learners' preferences in the way they approach their learning through the learning cycle. Kolb identified four distinct learning styles that he described as Converger, Diverger, Assimilator, and Accommodator that represent four quadrants made up through an intersection between two axes. The horizontal axis relates to preferences for how learners take in information about the world: it is a continuum that ranges from preferences for performing tasks at one end (doing) to a preference for watching at the other end. The vertical axis relates to preferences for how information is processed, and ranges from acting to reflecting.

The results of the H-PILS are presented in section 3.4.2; however before we consider these quantitative findings we next provide the aims and objectives of our research (section 1.2). Following this we describe each stage of our two-stage study together with the results from each stage (Chapters 2 and 3 before discussing the findings and making recommendations based on the findings (Chapter 4).

1.2 Aims and objectives

This study aims to investigate links between learning gains, learning styles and achievement amongst 1st year pharmacy students at Manchester Pharmacy School.

Specific objectives included:

1. To explore students' teaching and learning beliefs, and relationships between these and students' learning preferences (learning styles).
2. To establish the learning preferences (learning styles) of the cohort and the extent of demographic differences in learning styles.
3. To characterise the cohort's engagement with learning, and determine any demographic differences between subgroups of learners
4. To describe the cohort's academic outcomes and investigate the extent to which these vary according to demographic differences within the cohort
5. To investigate the effects of learning style, demographics and engagement in learning on achievement (academic performance)

The study was approved by University of Manchester's Research Ethics Committee 1 (ref: 15100).

1.3 Structure of this report

In this report we use the findings of the Stage 1 qualitative focus groups to explore issues related to students' learning beliefs examined quantitatively in Stage 2.

Appendices contain the data collection tools as well as detailed tables presenting quantitative analyses that underpin the main findings presented in this report.

2. STAGE 1: FOCUS GROUPS

2.1 Introduction

This chapter presents the methods and findings from Stage 1 of the study, qualitative focus groups with 1st year MPharm students.

2.2 Method

2.21 Recruitment

After gaining ethical approval for the study, the study team attended a teaching session with the first year students and explained the purpose of the study and asked if any of those present would like to take part in a focus group. This invitation was then followed up in an email sent to the year group, initially from the study team, and then one week later from the first year tutor. Attached to the email was a Participant Information Sheet, which included details about what would happen in the focus group and details of the incentive being offered for participants (a £10 high street voucher).

As a result of this approach to recruitment, eighteen students contacted the study team expressing an interest in taking part.

2.22 Data collection

Prior to undertaking data collection, a short topic guide covering aspects of learning relevant to our research was developed (see Appendix 1).

The development of the topic guide was iterative and involved a process of going back to the literature and forward to the questions to make sure that we had covered all relevant topics without questions becoming closed or too directional. Opening questions were intentionally broad to allow participants to generate original themes related to their preferences for learning and engagement with learning. Following this, participants asked to describe how they approached their learning, and to provide an example of how they had resolved a problem related to their learning they had encountered since starting the MPharm. These questions were intended to uncover participants' underlying beliefs about learning, to draw out narratives of students' reactions to the MPharm that incorporate assumptions about what learning is and how it happens, and provide insight into how students conceptualise their role as a learner (and in turn how this then might explain their academic performance). Prompts were included to explore perceptions of the extent to which the learning environment and individual teachers were viewed as supporting their learning.

All focus groups followed this semi-structured format to ensure comparable coverage.

2.3 Analysis

The focus groups were audio recorded, with permission, and fully transcribed. Transcripts were analysed using a framework approach, a systematic process that helps to clarify how the results have been obtained from the data. The framework approach involves five phases of data analysis. Phase one involves familiarisation with the data through reading transcripts to identify important ideas and reoccurring themes.

Phase two involves using these themes to develop a thematic framework. In this study, sections of the transcripts were first categorised into broad themes representing learning preferences, approaches to learning and motivations for learning, following the approach taken to data collection in the focus groups (see Appendix 1 for the topic guide). Themes were then further developed through discussion amongst the research team of inclusion criteria for them and of supporting quotes, and were subsequently elaborated on based on our interpretation of quotes coded to a theme.

In the third phase of analysis, this revised thematic framework was systematically applied to each transcript to ensure that all examples of each theme had been identified for subsequent retrieval and exploration. Phase four involved 'charting', where views were summarised in a table or 'framework'. These charts were then used in the fifth phase to make comparisons between participants and interpret the experiences of participants in order to provide explanations for the findings.

The results produced by this process are presented next after a summary of who took part in the focus groups. Results are presented under a number of headings, with the headings corresponding to the broad themes identified through our data analysis.

2.4 Findings

In total, two focus groups were conducted with first year MPharm students, involving 13 participants. The majority of participants were female (n=10), which while broadly similar to the overall gender mix of the cohort from which they were recruited, means that male students were under-represented amongst those taking part (77% of participants were female vs 63% in the cohort overall).

When presenting findings from the focus groups in this chapter, we use the following identifiers to indicate the source of the data: FG1 (focus group 1) or FG2 (focus group 2). To maintain confidentiality, we have decided not to provide further identification of the speaker within the two focus groups, except where necessary to distinguish between a participant (P) and the focus group facilitator (F).

Findings in this chapter are presented in relation to beliefs about learning. Beliefs are articulated by participants as they describe their discomfort or confusion in adjusting to the learning paradigm; as they describe their learning preferences; as they discuss how they approach their learning (including the extent to which they take part in social learning and any strategies or tools they have used to resolve problems encountered in learning); as they struggle to take responsibility for their learning; and as they reflect on how their learning role has (or has not) adapted as they have adjusted to the expectations of learners and academic achievement in a higher education institution. Data are used to illustrate how participants described their learning, with quotes from the focus groups interspersed with our interpretation of what was being said. The chapter ends with a brief summary of the findings.

2.4.1 Beliefs about learning: the teaching vs. learning paradigm

During the focus groups, participants were asked about how they liked to learn (that is, about their learning preferences). Here, many students' narratives suggest discomfort or unease – they describe feeling lost, disorientated and as not knowing how to learn because learning habits (and preferences) developed during school and further education had not prepared them for learning within the student-centred higher education system. Thus students contrasted between their preferences established prior to entering higher education with the learning practices associated with the MPharm:

It felt like kind of getting hit in the face, because everything was so brand new and it just felt really foreign. (FG2)

Suddenly you were just very overwhelmed and...it was completely different to anything we've ever experienced before. (FG2)

One thing that's changed from college is you could have got an A by pretty much memorising everything. Now you have to think outside the box ...It's so hard. (FG1)

But in A-levels you're kind of getting babied a little bit because you go to your lessons, your teachers teach you everything and they guide you very much but here you're just by yourself pretty much and you've just got to...deal with it yourself... it is difficult. (FG2)

Some were nostalgic for the days when learning focused on the reproduction of content:

It's habits that have come from A-level habits like write your notes, learn your notes, repeat it in parrot fashion but you can't really do that here...it's quite difficult to adapt after doing it for so many years.(FG2)

I think it's because with A-levels where you learn this and only this to pass your exams. [now] they want to encourage you to do a bit more reading not just make notes, go off and do your own reading, expand your knowledge and not just read a certain bit from a textbook and learn these key facts. But some people don't like that and some people would prefer to just learn the facts. (FG2)

What is clear from these narratives is that the speakers recognised that although they might be drawn to learning techniques that had previously guaranteed positive outcomes (that is, the best performance at A-level) they now needed to make different study decisions and learn new ways of learning.

Despite this recognition from some students, for many there was an obvious disconnect or dissonance between their learning beliefs and the learning paradigm of the MPharm; and this was particularly noticeable to students when they turned to teaching staff for help, as they would have done prior to entering higher education. When asking for help in this way, students were conceptualising themselves as the objects of instruction; however they often encountered teaching staff who conceptualised students as agents of their own learning, with the result that students were frustrated by the learner-centred reactions they received from staff in response to their questions. For example, students perceived staff as, "Very reluctant to give you answers."(FG1) and as rejecting the role of teacher / transmitter of facts:

*I sent emails to the teachers to ask questions and then...
The ones that answer you very seldom understand and...
All: [Laugh].
Or they're asking more questions back, [but] I wanted the answer not another question!
(FG2)*

Moreover, although students recognised that their learning beliefs were challenged by the MPharm's emphasis on a learning process that focuses on meaning, on making connections between concepts and on understanding, they reported being unable to first of all generate their own learning materials and to then make the connections between different materials and sources when studying – that is, they felt unable to elaborate on their learning, or to develop more complex, emergent understanding of concepts:

I don't even really know what I'm meant to be trying to find out, apart from the actual lecture slides [I] literally just don't have any idea what to do. (FG2)

*Sometimes I feel like the lecturers expect too much from us, granted we are at a top pharmacy school so we should be bright but you can't just expect us to know everything because...
Yeah, sometimes it's not necessarily because you're not bright it's because you don't know how to attempt it... (FG2)*

These discussions between the students attending the focus groups suggest that they have the metacognitive skills to think about learning, and that they have the self-awareness to identify that they lack understanding – but what they lack is skills in addressing how to learn for understanding. Students did, though, acknowledge how important understanding was for the learning paradigm and for their future professional lives:

It's not like A-levels, you have to understand what you're learning now. (FG1)

I do think it's set out in the way that it should be because at the end of the day if you're working in that hospital or something you're not going to have a set syllabus to cover if someone asks you a question you're not just going to have a certain amount of points that can answer the question. (FG2)

Those taking part in the focus groups reported a preference for lectures that they perceived facilitated learning for understanding. They provided an example of how a particular lecturer delivered an improved, enhanced learning experience:

When she's starting a lecture she gives like a briefing kind of what the lecture's about and summarises what she's going to talk about. Then goes through the learning objectives, but they're quite clear anyway so she doesn't need to spend long on them, and then like she starts with the basic and her lecture gets advanced. So it caters for like everyone and it's not that it's so basic but it's like to give an understanding. (FG1)

While this lecturer used a combination of videos (YouTube clips), diagrams, and text in her lecture slides and was viewed as, “giv[ing] you every single thing in the lecture,” (FG1), other lecturers were conceptualised as being teacher-centred, which was perceived as a barrier to student learning and understanding:

Some lecturers just put half sentences [on their slides] and it's like just the chemical kind of words and it's like you don't know how to put it in a sentence, so you don't understand it.

Because for them it's like notes, isn't it, because they know it all?

For them it's notes, yeah.

...[it's] as if they're making a lecture for themselves rather than for us. Like it's just their notes, like revision notes or something...

For them, just to help them. (FG2)

As this exchange suggests, underlying students' reactions to the different teachers and learning opportunities are implicit assumptions about what learning is and how it happens – here it appears that students view the teaching (and the teacher's teaching style) as interfering with their learning and as not creating the conditions under which their learning can take place.

This exchange also suggests that the students taking part in the focus group believe that it is the responsibility of the teacher to construct their teaching so that learning happens. What is missing from these learning beliefs is a reflection on the students' own responsibility to develop their learning skills. The findings from the focus groups related to this are discussed in more detail next.

2.4.2 Taking responsibility for learning

When students were asked about how they liked to learn, they often found it easier to describe their dislikes. Here, students were particularly critical of the learning obligations imposed on them to be self-directed:

[lecturers] feel because you've come to university now that you have to take charge of your own learning, so like they don't really give out too much information. Like they maybe just give you a slight kind of hint and then they'll say that you should be going and reading this book or...

Sometimes it's frustrating because you just want the answer because it's just that one little thing and it'll put everything else into context.

Exactly.

Because like a lot of the lecturers just say, "This is the reading," and when you read the reading it's literally like just technical terms. So it's like even more difficult.

It's even worse than the lecture actually.

It is. So yeah, they were like, "All do this independent learning" and like "Just do this reading", and they said "part of the university is to do blah, blah, blah," and it's like, right, okay. (FG1)

The shift to student-centred learning from teacher-driven instruction was again associated with discomfort and with not knowing how to learn. In one example given during the focus groups a student describes a situation where they were given some directed reading but they were not clear how they were expected to learn from it:

It's about one chapter and that's thirty double pages and you don't know what you need to learn from that. I think sometimes it's a bit confusing because most people just flick through like half of the reading and then they stop because they don't know what they're supposed to get out from the directed reading. (FG2)

Despite this negative reaction to directed reading, others taking part in the focus groups perceived there were benefits to it as it supported the development as autonomous and self-directed learners.

I like do kind of like the way they do it because it is like helping you find out like how you learn because they can't really spoon feed you throughout the whole years...

And it helps you like find ways how you learn. Like it makes you become more independent I think, like doing stuff yourself rather than just going and asking more questions. When you find stuff yourself it's more satisfying. (FG1)

The expectations of students – for them to be able to adjust to the responsibility of becoming self-directed and for them to develop the metacognitive awareness necessary for identifying and subsequently addressing any learning needs – also requires students to conceptualise learning as a social as well as a cognitive process. The value of developing a community of learners was raised during the focus groups as particularly important in helping students to resolve problems encountered in learning, for sharing their feelings as they struggled to take responsibility for their learning and as they navigated their way towards academic achievement – these findings are presented in the next and final section related to the focus group data in this report.

2.4.3 Adjusting to learning – social learning

Activities that were viewed as effective for learning and for adjusting to the MPS learning paradigm were related to developing a friendship network. Having friends was important for helping students to settle in and for making progress with their studies. Thus when asked about what strategies they had used to resolve problems encountered while learning, focus group participants described how they used the mobile messaging application WhatsApp to create a virtual supportive learning environment:

If I have any questions then like we made a group of like some pharmacy students and we ask each other for help.

We post like loads of questions every day.

Because someone might know something you don't. (FG1)

Initially this group had been established as a friendship group, to ease the process of fitting in to higher education, and had been used to express concerns and vent frustrations; however, it had subsequently developed into a group that had a more explicit role in supporting learning:

...At the beginning you just take everyone's number, don't you, making new friends.

That's true.

And then yeah, just this one girl, she just thought she'd put everyone into a group.

And then it got bigger and bigger...

...We discuss answers and...some people don't even talk in it, like they just listen and read what others say. Like this girl said to me that, "I'm in the group but it's really helpful but I don't say anything". Like she hardly says anything ...

...It's just there like for a support, isn't it? (FG1)

The contribution of social transition to academic transition (success) was clearly described in an account of a student who was not part of their social network:

I'll give an example of what happened last week. There was a medicine calculation exam from eleven o'clock to one o'clock and basically there's this boy who doesn't really talk to anybody...thought the exam was at... twelve o'clock...So he missed the exam. He was sat outside the exam revising for the exam whilst everyone else was sat inside doing the exam and then he was really annoyed.

So he's practically failed.

It does affect you because now that will go down as a resit when really he revised and he's capable of maybe passing but yeah.

I: Yeah. Maybe he should...join the WhatsApp group.

Probably we should add him. (FG1)

This example demonstrates the value of social learning, and the role it can play in keeping students on track in their learning; it also suggest that a lack of organisation can adversely affect academic progress, and provides an indication of how to support students as they transition to higher education learning. Given that prior to entering higher education students do not need to take

responsibility for their learning to the same extent because of the highly teacher-directed learning of the secondary school context, it will be important to encourage future cohorts to develop social learning groups to ease their transition to university.

2.4.4 Summary of main findings

In this chapter findings have been presented that illustrate the extent to which students taking part in the focus groups had developed the metacognitive awareness to evaluate how they learned. We presented data related to students' reported difficulties in transitioning from a teaching to a learning paradigm, and provided examples of problems adjusting to MPharm learning expectations (in particular to those for students to be autonomous, self-directed learners rather than objects of instruction) and of strategies used to resolve these problems (in particular using social learning to support their adjustment to learning).

These themes will be contextualised further in this report after findings from analysis of the quantitative data are discussed.

3. STAGE 2 – QUESTIONNAIRES

3.1 Introduction

This chapter presents methods and findings from Stage 2 of the study, where quantitative data were collected and analysed. It begins with an overview of tools used to collect these data, before presenting key findings from our analyses of them.

3.2 Method

3.21 Overview

In Stage 2 we used a number of validated tools to investigate first year MPharm students' learning styles and engagement with their studies: the H-PILS (Health Professionals' Inventory of Learning Styles) and a modified version of UKES (UK Engagement Survey). With permission from students, these data were subsequently linked their records (providing us with both data on their demographics and on their academic performance data [exam marks]).

3.22 H-PILS

The H-PILS is a tool developed by one of the study team, Zubin Austin, that operationalises Kolb's learning style theory in a standardised self-report questionnaire (Austin, 2004). Those completing the H-PILS are asked to respond to 17 items; each item operates as an ipsative measure (a forced-choice response designed to measure how students prefer to respond to various learning contexts out of a range of alternatives offered). Each item has four response categories: usually; sometimes; rarely; hardly. Based on the responses given to the individual items and using instructions for score interpretation provided with the tool, it is possible to calculate a score and to then identify a dominant learning style (see Appendix 2 for further details).

As well as providing those who complete it with insight into who they are as learners, what motivates them, frustrates them, inspires them, and disengages them, the H-PILS also enables researchers to categorise learners in terms of the type of learning that may be most motivating and meaningful for them in relation to four different modes of learning: abstract conceptualisation, active experimentation, concrete experience, and reflective observation. These four modes of learning relate to how new experience and information is perceived, and how perception is processed and transformed.

The way that learners move through the four modes of learning depends on their learning needs, preferences and strategies adopted for optimum learning. For example, in the focus groups it was apparent that some of those taking part in the WhatsApp social learning group were more likely to prefer observing, while others had a preference for active questioning and problem-solving. These differences in preferences are categorised by Kolb (and Austin) in relation to preferences in the way that information is processed – which range between preferences for performing tasks at one end (the active, questioning WhatsApp user) to preferences for watching and reflecting at the other end (the users who never post a question or answer on WhatsApp).

In addition to information processing preferences, preferences for either feeling or thinking in how information is taken in. By considering how learners prefer to take in and then process information learners are categorised as divergers, assimilators, convergers or accommodators. Divergers prefer observation to action, enjoy dealing with complex, ambiguous, theoretical situations and viewing a problem from a number of different perspectives. Assimilators prefer to work alone or with a small group of similar people; they also tend towards observing (and learning) from others, and value logic, order and attention to detail. Convergers like to apply ideas to solve problems and perform at their best when there is only one answer. Finally, accommodators prefer to learn through performing tasks and thrive in new and challenging situations.

Previous studies of pharmacists and pharmacy students have reported a high prevalence of assimilators, with around half of those sampled reported to be assimilators, and of convergers – both of which are learning styles that are characterised by a preference for abstract conceptualisation (Loewen, 2013; Williams et al, 2013; Crawford 2012; Austin 2004). Given this preference for thinking and reasoning over being directly, actively, involved in a learning situation it is likely that pharmacy students taking part in our study will tend to be more comfortable with learning that emphasises facts, memorising and requires students to pay attention to detail – all of which were evident from the focus group discussion. It also not surprising, based on these learning styles preferences, that the focus group participants found being self-directed difficult and that they preferred clearly defined learning outcomes, and highly structured lectures.

By using the H-PILS with a larger sample we will be able to identify the extent to which the cohort of students involved in our study are similar to other cohorts of pharmacy students. This will provide us with insight into the extent to which findings from the focus groups are likely to be generalisable to the cohort overall.

3.23 UKES

In addition to investigating students' preferred learning styles, we also used a number of measures derived from the UKES (UK Engagement Survey; Buckley, 2014), a tool modified from the National Survey of Student Engagement (NSSE) developed in the US. The NSSE focuses on a set of student behaviours linked to educational outcomes – those that are conceptualised as 'educationally purposeful activities'.

In our survey we included sets of questions to investigate six domains of 'educationally purposeful activities'. These domains, and the number of items operationalising them, are:

Higher-order learning

Four questions related to the extent to which coursework has emphasised a range of cognitive activities

Course challenge

Three questions related to the extent to which the course is challenging, and whether students come to sessions prepared

Collaborative learning

Four questions related to the extent to which students interact with each other in educationally important ways

Academic integration

Four questions related to the extent to which students interact with academic staff

Reflective and integrative learning

Three questions related to the extent to which students have combined learning from different parts of their course and reflected on their learning

Skills development

Eight questions related to the extent to which students have developed a range of skills and abilities

Engagement with learning activities

Six questions related to the extent to which students have engaged in educationally important activities

Analysis of data collected using these questions provides insight into a range of domains related to students' engagement, with the domain 'skills development' capturing outcome measures related to engagement in learning activities.

Conceptually, the UKES positions students' engagement as critical for understanding educational quality. It also operationalises a method for investigating students' experiences of the learning paradigm, as it includes measures of the challenge provided to students related to how they make sense of, or process, their learning rather than of their satisfaction with the education they receive.

The items used in our study were included after we had sought permission from the Higher Education Academy to use them, with the aim of helping MPS to understand our students' learning and of providing us with insight into how to improve this learning.

3.22 Recruitment and data collection

Prior to administering the two tools to first year MPharm students, an email was sent to the year group about the study with a participant information sheet. The study team decided to collect the data during two teaching sessions: the H-PILS was completed by students during a session where it was used to stimulate discussion and reflection on preferred learning styles and how preferences might be challenged by the teaching and learning strategies of the school and whether students might need to develop a repertoire of approaches to their learning; the UKES was completed later, at the end of a TBL session.

When completing the surveys, students were asked to consent to their survey data being lined to demographic and performance data, including their gender, date of birth, ethnicity, country of origin, nationality, fee status (home/overseas), overall end of year mark, semester 1 mark, semester 2 mark, TBL mark, OSCE (Objective Structured Clinical Examination) mark.

3.3 Analysis

The survey datasets were merged with the demographic and performance data. Initially univariate, descriptive analysis was undertaken, to determine students' learning preferences; following this, learning styles were investigated further to establish the extent of demographic differences in learning styles. Relationships between learning styles and performance data when then explored using parametric and non-parametric tests; for example, to investigate variation in end of year mark in relation to learning styles one-way analysis of variance (ANOVA) was used to compare mean marks.

Following this, the cohort's engagement with learning was investigated, and any demographic differences between subgroups of learners identified. We then investigated academic performance and the extent to which this varied according to demographic differences and levels of engagement

within the cohort. Finally all data were considered together to investigate the effects of learning style, demographics and engagement in learning on achievement (academic performance).

When analysing the engagement data we created a score for each of the six domains operationalised within the survey; we subsequently treated these scores as interval data and calculated mean values for each scale.

The results of these investigations are reported next, with tests of statistical significance reported where relevant. However, given testing for statistical significance is used to indicate the extent to which it is possible to extrapolate findings from a sample to the population from which the sample is drawn, and our survey is a census of a single cohort of first year pharmacy students, it is difficult to determine how representative our findings might be of other cohorts of students – from other disciplines, year of study, pharmacy school etc.

3.4 Findings

In total, 142 first year MPharm students completed the H-PILS (80.7% of the cohort); 169 completed the UKES (96%); one student completed neither tool. Combining the datasets, 77.3% (n=136) completed both tools.

The proportion of female students completing both tools was greater than the proportion of male students (82.7% compared with 68.2%). There were also differences between ethnic groups in relation to the likelihood of whether both tools were completed: thus while 69.2% (n=18) of Pakistani students completed both tools, the proportion of white (78.8%;n= 37) Indian (83.3%, n=15) and Chinese (88.2%, n=30) students completing both tools was larger.

We also found that overseas fee paying students were more likely than home / EEA students to have completed both tools (82.4% [n=28] vs 77.1% [n=108]).

What follows in this chapter are findings related to preferences for learning (learning styles) and its co-variates. Analysis of domains of learning and engagement are then presented, with co-variate analysis provided. The chapter ends with a brief summary of the findings.

3.4.1 H-PILS

Students completing the H-PILS were largely representative of the cohort in terms of their gender (66.9% [n=95] of those providing data were female, compared to 62.5% [n=110] of the cohort overall who are female).

The predominant learning styles of the cohort were assimilator (58.5%; n=83), converger (20.4%; n=29), diverger (2.8%; n=4), accommodator (2.1%; n=3) and multi-modal (16.2%; n=23). These results are similar to those reported by other studies of pharmacy students and pharmacists (Austin, 2004; Crawford et al, 2012; Loewen, 2013)

Female students were more likely than male students to have been assimilators (66.33% [n=63] vs. 42.6% [n=20]), while male students were proportionally more likely than female students to have been convergers (31.9% [n=15] vs. 14.7% [n=14]). Asian students (those of Pakistani or Indian heritage) were more likely than other ethnic groups to have been assimilators (71.4% vs 60.5% of white and 53.1% of Chinese students).

H-PILS, students' characteristics and exam performance

While there were no statistically significant differences between learning styles and the likelihood of failing any exams during the first year of the MPharm course, convergers were over-represented amongst those who passed all of their assessments (only 11.8% of convergers failed at least one exam, yet 20.4% of respondents to the H-PILS were convergers).

The mean scores achieved by those who had completed the H-PILS on a number of different examinations were then investigated. Here, we focused on analysing variation in performance in:

- Team-based learning in The Patient Unit in semester one
- Integrated exam at the end of semester one
- Integrated exam at the end of semester two
- End of year one mark

When our analysis indicated that H-PILS or students' characteristics were significantly related to students' performance in an exam or the end of year mark undertaken multiple regression analysis was then used to further investigate how much variance could be explained by the independent variables.

TBL performance

Students completing the H-PILS achieved an average mark of 7.68 (range 3.87-9.66; SD 0.88) when completing their TBL assessment. An independent samples t-test was conducted to compare TBL scores of male and female students. There was no significant difference in scores for males (7.64; SD 0.83) and females (7.70; SD 0.91; $t=0.37$, $p=0.84$).

Students' TBL marks varied significantly in relation to their ethnicity. Thus while white students scored on average 8.04 students from ME groups other than Asian or Chinese achieved on average 7.35 ($p=0.003$). The effect size, calculated using eta squared, was 0.08 (medium sized effect).

The learning styles of students were not found to be significantly related to their TBL mark, although assimilators on average achieved a higher mean score than the other types of learners in the sample (7.8 vs 7.6 for convergers and 7.37 for those who had no dominant learning style, for example).

As at least one variable was statistically significant in relation to TBL performance, multiple regression was conducted, using gender, failed any exams, ethnicity and dominant learning style as independent predictor variables. The result of this analysis found that the model was statistically significant ($p<0.0001$), with failing exams ($p=0.002$) and being from a ME group ($p=0.011$) negatively

related to score in the TBL assessment. The variance explained was 13.4% based on the adjusted R square value.

Semester 1 integrated exam performance

The range in scores for the integrated exam at the end of semester 1 was 18-81 (mean 48.21; SD11.08). Female students, on average, recorded lower scores than male students but this difference did not reach statistical significance (47.60 vs 48.45; $t=-0.93$).

White students achieved a higher mark on this exam (50.84) compared to the ME groups within the sample (Asian=47.40; Chinese 48.53; 'other' ME groups 46.00), but again differences were not statistically significant.

Convergers were found to perform better on average than assimilators (49.41 vs 48.92), and students having other learning styles investigated, but again these differences did not reach statistical significance.

Semester 2 integrated exam performance

For semester 2 integrated exam there were no statistically significant differences based on students' characteristics or learning style; however, female students on average achieved a higher mark than male students (64.71 vs 62.9), students from ME groups 'other' than Asian or Chinese scored lower than their peers from other ethnic groups, and students with a multi-modal learning style on average achieved a lower mark than students reporting a preference characterised as accommodator, diverger, assimilator or converger.

End of year mark

The average end of year mark of those completing the H-PILS was 62.53 (range 29.9-82.1; SD 8.41). The mean mark of females was slightly higher than that of males (63.15 vs 61.24). White students on average performed better than students from Asian, Chinese or 'other' ME groups; and students with a with a multi-modal learning style on average achieved a lower mark than students reporting a preference characterised as accommodator, diverger, assimilator or converger.

3.4.2 UKES

Students completing the UKES were very similar demographically to the cohort overall (62.1% [n=105] of those providing data were female, compared to 62.5% [n=110] of the cohort overall who

are female; 27.3% of those completing the survey were white compared to 27.2% within the cohort, 24.9% compared to 28.9% Asian, 18.9% vs 19.3% Chinese).

When analysing at the UKES data, initially we investigated the extent to which the six domains of 'educationally purposeful activities' were correlated with each other, and with the exam performance measures. Here we found a medium, positive association between *higher order learning* and skills development, course challenge, reflective and integrative learning and engagement with learning activities (all $p < 0.001$); small or medium associations between *course challenge* and academic integration, reflective and integrative learning and engagement with learning activities ($p \leq 0.001$); small and medium associations between *collaborative learning* and academic integration and reflective and integrative learning ($p \leq 0.05$); small and medium associations between *academic integration* and course challenge, collaborative learning, reflective and integrative learning and engagement with learning activities ($p \leq 0.05$); *reflective and integrative learning* was associated with all the other domains ($p \leq 0.05$); small and medium positive associations between skills development and course challenge, collaborative learning, and reflective and integrative learning (all $p \leq 0.05$); and that the domain *engagement with learning activities* was positively associated with higher order learning, course challenge, academic integration, reflective and integrative learning, skills development, and engagement with learning activities (all $p < 0.001$).

However, there was almost no association between the domains and the exam performance measures; the one exception to this was between TBL performance and course challenge, where we found a small significant correlation ($p = 0.032$).

Comparing between subgroups within the respondents, we found that with the exception of the domain *academic integration* female students were on average slightly more likely than male students to score highly, suggesting perhaps little gender differences between those surveyed. While overseas students reported significantly higher levels of *engagement with learning activities* than home students and the scales *academic integration* and *skills development* were found to vary according to students' ethnicity ($p \leq 0.05$), overall we found very few important differences between student groups within the cohort, a finding that has also been reported previously (Buckley, 2014).

3.4.3 Summary of main findings

In this chapter findings have been presented that examine the extent to which students taking part in the study varied in their preferences for learning (learning styles), engaged in a range of important educational activities and whether these independently predicted performance in a number of different exams during the course of the first year of their studies. We presented findings suggesting that although overall there are few differences between groups of students, there appears to be some variation when comparisons are made in relation to students' ethnicity and engagement, and when considering performance in the TBL assessment.

4.DISCUSSION

This report has presented findings from a study investigating links between learning gains, learning styles and achievement amongst 1st year pharmacy students at Manchester Pharmacy School. In writing this report we have presented both qualitative and quantitative evidence related to students' learning. What we have found is that our first year students may lack the metacognitive skills to understand and then articulate how they learn, and experience difficulties in transitioning to the learning paradigm of higher education. Yet despite a preference for abstract conceptualization and highly structured learning environments, the majority of students performed well in a range of assessments – perhaps because they have adapted their preferred learning styles so that it is compatible with the curriculum of our pharmacy school.

What follows in this discussion is a consideration of our findings and their implications, with the discussion drawing on the transferability of our findings to other undergraduate courses within the University of Manchester, what others can learn from our approach to our investigation, and how our findings might be used to trigger pedagogic change.

We begin this chapter by considering a number of recommendations for changes to our own teaching and learning practices in MPS and the University.

4.1 Recommendations

Based on our findings:

- a. MPS should provide more active support in developing independent learning skills of 1st year students – the H-PILS may be a useful tool for stimulating dialogue around learning preferences and the learning paradigm of higher education. This would also help students to develop the metacognitive skills to have insight into how they learn, and what might be a stretch on our programme if their personal learning preferences are not a good match with teaching and learning strategies of the course
- b. MPS needs to be more explicit in its learning expectations of 1st year students
- c. MPS should investigate further differences between the outcomes of 1st year students in relation to their ethnicity

For future cohorts we plan to use the results from the learning styles questionnaire as a basis for students to start to plan strategies to enable them to get the most out of teaching and learning at our school during an extended induction period. We also plan to focus on supporting our students

in the transition to learning in higher education so that they are better supported for the learning paradigm.

Based on our findings we would like to suggest that the University invest in a learner development unit – this would help to deliver an outstanding student experience that serves the varied learning needs of its diverse student population and delivers quality learning experiences.

4.2 How has this research contributed to the strategic goals of the University and CHERIL?

The strategic goal of the University is to be learning-centred – yet our study suggests that the learning needs of students differ in relation to their background (demographic) characteristics, with the result that to be learning-centred requires a more personalised learning approach that can enhance the student experience regardless of these differences.

Moreover, given the diversity in MPS students and the multiple points at which they enter the University it will be necessary to continue to collect data to establish whether our findings are a cohort effect or whether they apply more generally. To do so, both the University and CHERIL should commit to ongoing research into the extent to which the strategic goal of learning-centredness is achieved amongst all students, irrespective of their background.

4.3 What can others learn from our evaluation approach?

Our approach has provided us with valuable insight into shortcomings in the 1st year learning experience, and has helped us to identify ways to support our diverse student population better. Others can learn from this approach and use it to help them better understand their own learners.

4.4 What is innovative about this study – how might it trigger pedagogic change?

Our study is the first of its kind to combine multiple data sets to investigate student learning and outcomes of that learning. While quantitative findings suggest that irrespective of learning preferences or engagement in learning, the outcomes of learning (measured using performance in a range of exams) could not be predicted, suggesting that there are other explanations of why some students achieve better outcomes than others that were not investigated. Following this, it is difficult to make suggestions based on these quantitative data for triggering pedagogic change.

However, our qualitative findings do provide evidence for using pedagogic change to provide students with opportunities to develop a range of learning behaviours and to encourage students to engage in the social aspects of learning – the benefits for promoting student use of WhatsApp to

share their learning were obvious from the accounts provided by those taking part in our focus groups.

4.5 How disseminate to make sure the outcomes have the greatest possible impact?

Results from this study have been presented to the Manchester Pharmacy Education Conference and at the Faculty Education Academy Conference.

MPS has a web site for its education group and this will hold an executive summary of the findings. Finally, the team will submit an abstract for presentation at an international pharmacy education conference, to the HEA conference and an article to a peer reviewed journal.

4.6 Budgeting and sustainability

The initial award was for £5130. This has been used to fund incentives for focus group participants, a facilitator for the focus groups, to pay for transcribing and other study support costs including transcribing staff interviews and attending a conference.

The qualitative aspects of the study were the most expensive and are unlikely to be sustainable in the long term. However, MPS is committed to supporting ongoing pedagogic research in this area.

4.7 What would you do differently?

Due to delays in obtaining ethical approval for the study, it was difficult to recruit students to take part in the focus groups. If we were to undertake the same study again we would plan better to collect data at points that fit more naturally into the academic calendar. We would also not try to arrange interviews with staff at the same time as the regulator was in the process of undertaking an accreditation visit to the school. Finally, because the study collected a lot of data, we would increase the time commitment of a research associate to support data analysis.

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APPENDIX 1. FOCUS GROUP TOPIC GUIDE

Topic guide

Unpacking links between learning gains, learning styles and achievement amongst 1st year pharmacy students at Manchester Pharmacy School

Facilitator notes

Thank participants for agreeing to take part in a focus group. Confirm that consent form has been signed. Answer any queries about the research that the participants might have. Confirm that, as per the consent form, the participants are still happy to have the group discussion digitally recorded. Explain the rationale for the research and the aim of the focus group. Reassure participants about confidentiality. Go through the ground rules for the focus group: you do the talking; there are no right or wrong answers; what is said in this room stays here; one person to speak at a time; audio recorded to ensure nothing is missed; all mobile phones off. Remind participants that participation is voluntary; ask again whether they are happy to take part.

Prompts will be used when necessary to obtain more in-depth information

Could you say something more about that?

Can you give a more detailed description of what happened?

You said...what do you mean by that?

Prompts

Tell me what you are thinking

Why did you hesitate just then?

How did you go about answering that question?

1. Tell me about how you like to learn? Why do you like this way of learning?
2. Has your approach to learning changed since coming to University? If relevant - how did you learn before starting your degree?
3. Is your approach to learning about different topics different according to what you are learning?
4. Does (how) your approach to learning vary according to who is teaching?
5. Does (how) your approach to learning vary according to the way the teaching is delivered? (Prompt TBL, lectures etc)
6. Can you describe a situation when you've felt overwhelmed / out of your depth since you started the MPharm?

- a. What was it in particular that made you feel that way?
 - b. What did you do about it?
7. What motivates you to learn?

We would like to thank you for your time. Your contribution has been extremely valuable to the research.

END OF FOCUS GROUP

APPENDIX 2. H-PILS

THE HEALTH PROFESSIONALS' INVENTORY OF LEARNING STYLES (H-PILS)

Think about a few recent situations where you had to learn something new to solve a problem. This could be any kind of situation: While you were taking a course at school, learning to use new software, or figuring out how to assemble a barbecue.

Now, circle the letter in the column that best characterizes what works best for you in situations like the ones you've thought about.

When I'm trying to learn something new	Usually	Sometimes	Rarely	Hardly
1. I like to watch others before trying it for myself.	B	D	C	A
2. I like to consult a manual, textbook or instruction guide first.	B	C	D	A
3. I like to work by myself rather than with other people.	A	C	B	D
4. I like to take notes or write things down as I'm going along.	B	C	D	A
5. I'm critical of myself if things don't work out as I hoped.	B	C	D	A
6. I usually compare myself to other people just so I know I'm keeping up.	B	D	C	A
7. I like to examine things closely instead of jumping right in.	B	D	C	A
8. I rise to the occasion if I'm under pressure.	C	A	B	D
9. I like to have plenty of time to think about something new before trying it.	D	B	C	A
10. I pay a lot of attention to the details.	B	C	A	D
11. I concentrate on improving on the things I did wrong in the past.	C	A	D	B
12. I focus on reinforcing the things I got right in the past.	B	D	A	C
13. I like to please the person teaching me.	D	B	A	C
14. I trust my hunches.	D	C	A	B
15. I'm usually the first one in a group to finish whatever we're doing.	A	C	D	B
16. I like to take charge of a situation.	C	A	B	D
17. I'm well-organized.	B	A	C	D

Now, add up the number of times you circled each letter. A = _____ B = _____ C = _____ D = _____

Your **DOMINANT** learning style is the letter you circled most frequently. Your **SECONDARY** learning style is the next most-frequently circled letter.

APPENDIX 3. UKES

Think about your experiences of learning while studying at Manchester Pharmacy School.

Thinking about how much your *coursework* has emphasised each of the following activities please mark your answer by placing a tick in the circle for each item.

During the current academic year, how much has your coursework emphasised the following activities?	Very little	Some	Quite a bit	Very much
Applying facts or theories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluating a point of view, decision, or information source	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Forming a new understanding from various pieces of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analysing information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applying knowledge to new situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Memorising course material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formulating questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring staff questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploring own questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about your *knowledge, skills and personal development* how much do you think the MPharm has developed each of the following? Please mark your answer by placing a tick in the circle for each item.

How much has the MPharm contributed to your knowledge, skills and personal development in the following areas?	Very little	Some	Quite a bit	Very much
Thinking critically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding people of other backgrounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analysing numerical information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work-related skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Solving real-world problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being an informed citizen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about your *participating in various educational activities* how often have you done each of the following? Please mark your answer by placing a tick in the circle for each item.

During the current academic year, about how often have you done each of the following?	Very little	Some	Quite a bit	Very much
Come to sessions prepared	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connected ideas from the course to prior learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worked with other students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learned something that changed your understanding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Combined ideas from different modules	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prepared with other students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asked questions in class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Explained course material to other students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asked another student to help you understand material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Made changes to work in response to feedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discussed performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discussed ideas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worked with teaching staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about how *challenged* you have felt by the MPharm please mark your answer by placing a tick in the circle to show how challenged you have been to do your best work.

During the current academic year, to what extent has the MPharm course challenged you to do your best work?	Very little	Some	Quite a bit	Very much
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>