

**Application for a Teaching Award in the Rising Stars category
Dr Paul McCague**

1. PREVIOUS TEACHING AWARDS (200 words maximum)

This is my first application for a teaching award.

2. CONTEXT FOR THE APPLICATION (300 words maximum)

Since my appointment as Lecturer (Education) in the School of Pharmacy, Queen's University Belfast (QUB) in September 2015, I have made significant contributions to the Master of Pharmacy and Bachelor of Pharmaceutical Sciences degree programmes. Prior to joining QUB, I held lectureships at University College Cork (UCC) and Liverpool John Moores University (LJMU). I have successfully completed both the Postgraduate Certificate and Diploma in Teaching and Learning in Higher Education. I deliver large ($n=130$) and small ($n\leq 18$) group teaching to undergraduates, employing a range of methods, including lectures, laboratory classes, workshops, high-fidelity simulation and novel online resources. At post-graduate level, I have written and presented learning material for both the Northern Ireland Centre for Pharmacy Learning & Development (NICPLD) and the Irish Pharmacy Union (IPU) to support pharmacist education in the North and South of Ireland, as well as being involved in distance-learning programmes in QUB. I am an external examiner for the School of Pharmacy, Royal College of Surgeons Ireland (RCSI). My specialist area is clinical pharmacy and I coordinate the Advanced Pharmaceutical Care (PMY4107) module. I have played a significant role in the module design and delivery since its inception in September 2015. This forty-credit module runs over both semesters in the final year of the MPharm.

Pharmacokinetics is a fundamental, scientific discipline underpinning clinical pharmacy. Evidence suggests that students find this topic challenging. One of my key objectives joining QUB was to draw on my experience of working in three Schools of Pharmacy and address this issue in a truly innovative way. My teaching philosophy encompasses aspects of the 'teaching for understanding' (TfU) framework¹. I aspire to always take a constructivist² and importantly, a student-centred approach³. With this in mind, I have designed and evaluated a new approach to teaching and assessment of pharmacokinetics.

(297 words)

2. DISCUSSION

(a) Promoting and enhancing the learners' experience (1000 words maximum)

Upon appointment in QUB, I was tasked with delivery of pharmacokinetics across five modules at all four levels of the pharmacy degree programme. Cognisant of the fact that students struggled with this subject, I initially investigated the problems encountered by undergraduates using a variety of sources. Issues were highlighted in previous module reviews, the National Student Survey (NSS), minutes from Student Councils & Staff Student Consultative Committee meetings, data from examinations and external examiner reports.

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“Pharmacokinetics needs to be looked at in detail and changed as majority of the year cannot do it and is an integral part of the Pharmacy course and is worrying that many are leaving the course unable to do any of [it]...”

Student comment from NSS (2014/15)

<i>“Pharmacokinetics needs a total revamp in the way it is taught”</i>
<i>“Lectures were hard to follow. [We] were not given many examples to practice with”</i>
<i>“important aspect of practice and I do not feel confident in my skills in this area”</i>
<i>“More hands-on workshops...small group tutorials”</i>
<i>“Level of teaching left no other choice than to leave it out”</i>

Student feedback (2014/15 cohort)

Many students avoid this topic when preparing for exams. This is evidenced through student feedback and on analysis of examination data (Table 1). Furthermore, this concern has been raised by external examiners.

Table 1. Examination data 2013-15

Academic year	Candidates attempting pharmacokinetics question (n)	Average mark
2013/14	13 (8%)	61%
2014/15	5 (4%)	40%

“Candidates favoured questions that were not linked to PK or any form of calculation and consequently avoided Q4 and Q5. Perhaps some revision of how these themes are taught and/or additional resources provided (on line skills tests/workshop?) is required to try and increase the students understanding and confidence.”

Extract from Professor XXXX's (external examiner) report October 2014

Following discussions with the Director of Education & a number of students, careful assessment of the aforementioned sources and review of pedagogic literature, I decided to redesign the course with the key aim of stimulating student interest and understanding of this topic. In line with the QUB Education Strategy⁴, I utilised a variety of techniques to achieve this objective, while at the same time ensuring that the students engaged more fully with the subject. These include:

- Aligning teaching methods and assessment to the learning outcomes
- Blended methods of delivery including lectures, workshops, seminars, online resources and flipped-classroom approaches in order to address the different ways in which students learn⁵
- A variety of assessment methods including formative, summative and self-assessment approaches with appropriate provision of feedback so students can continually improve their performance
- Case-based learning- linking the material to patient case-studies which helped to stimulate student interest by providing a genuine feel for how the topic is relevant to clinical practice. This also reflects the increasing clinical role of the pharmacist in the healthcare team.

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I have ensured that content increases in complexity over the four year programme in a spiral manner⁶. New, more challenging material is introduced to build upon prior learning in an iterative manner in order to increase student competence in this area. Diagnostic questions and self-assessments are embedded within the slides in order to assess student learning in a formative manner. I endeavour to create a relaxed learning environment and encourage open discussion within my teaching sessions. This is evidenced through peer observation of my teaching. I have had two such evaluations carried out by Professor Carmel Hughes (November 2015) and Dr Lezley-Anne Hanna (February 2016).

“Very good approach to lecture in terms of content, style and pace. Very good use of questions by lecturer & students clearly engaged”

“Comprehensive, up-to-date and relevant. Useful to provide example questions patients could ask in practice- made it authentic. It was clear to see integration with other topics and the role of the pharmacist in this particular area. Confident delivery from the outset and audience engagement evident... Paul made complex issues easy to understand and continually backed up theoretical concepts with relevant examples.”

Staff comments from two peer teaching observations of my teaching

The high standard of my teaching is further endorsed by results of two teaching evaluation questionnaires carried out with students (Table 2).

Table 2. Results from teaching evaluation questionnaires

TEQ date	Result
November 2015	4.9/5
January 2016	4.9/5

In response to student feedback, I use case-based learning in small group workshops ($n=18$), allowing me to bridge the gap between large lectures ($n=120$) where more theoretical concepts are taught. Students are provided with patient case-studies in advance of workshops and asked to attempt these based on material delivered in lectures. Many of the case-studies have been developed using personal experiences drawn from my work in hospital and community pharmacy settings, as well as review of the literature (Figure 1). These cases are subsequently critiqued in detail in the workshop and students have an opportunity to discuss any challenges with subject content. The workshop is assessed in a formative manner and model answers are provided on Queen’s Online (QOL). Using this flipped-classroom approach provides a mechanism to assess student understanding, whilst allowing time in the workshop to work towards higher levels of Bloom’s taxonomy⁷. I also facilitate an inter-professional learning (IPL) workshop allowing pharmacy and medical students to work together in teams to apply their knowledge of pharmacokinetics.

Material is uploaded to QOL in advance of all my teaching sessions. This facilitates a greater extent of undergraduate engagement during sessions, since they can listen rather than attempting to transcribe slide content. Additional reading is placed on QOL for those students who wish to explore the topic in greater depth. Recognising the value of the student voice and feedback has allowed me to further refine my teaching. For

example, in response to student requests, I have produced a glossary of pharmacokinetic terms. This document summarises and explains all the complex jargon and mathematical equations for students.

Self-Assessment 5.1

- Mr AB, a 72-year-old male patient, who weighs 80kg and has a serum creatinine concentration of 120mmol/L, is started on a gentamicin dose of 120mg three times daily to treat a severe infection caused by a gram-negative organism. The drug is administered as an intravenous bolus dose.
- “Peak” and “trough” blood samples are taken one and eight hours after the first dose and the gentamicin concentrations are found to be 5.0 and 1.8mg/L, respectively.
- Is this an appropriate dosage regimen for Mr B? What recommendations (if any) would you make? Show all your calculations clearly in order to justify any recommendations.



Adapted from Pharmaceutical Journal [Vol 273] 7 August 2004

Figure 1. Example of a patient case-study used as part of formative, self-assessment approach

Summative assessment takes the form of an open-book online test. This contributes towards continuous assessment. I developed this novel approach to evaluation using QuestionMark Perception software. Students are required to apply knowledge gained through the lecture series and workshop and use a variety of reference sources to answer a series of case-based questions. This allows students to put their learning into context. Overall, students performed well in this e-assessment with a mean mark of 74%. I devised revision seminars to follow the lecture series and workshops in order to address any outstanding student queries prior to the end of the semester and to present feedback from the e-assessment. Students were emailed in advance and asked to suggest topics they would like to cover. Additionally I launched a ‘pharmacokinetics clinic’ to provide students with access to dedicated, one-to-one or small-group tuition on any outstanding concerns they have with the topic. The end of module summative assessment combines theoretical concepts with a patient case-study, presenting an opportunity for application of knowledge. Aspects of pharmacokinetics are also assessed through objective structured clinical examinations (OSCEs). In line with standards set by the professional regulator (GPhC)⁸, assessment methods are prepared in accordance with Millar’s triangle of clinical competence⁹ (Figure 2).

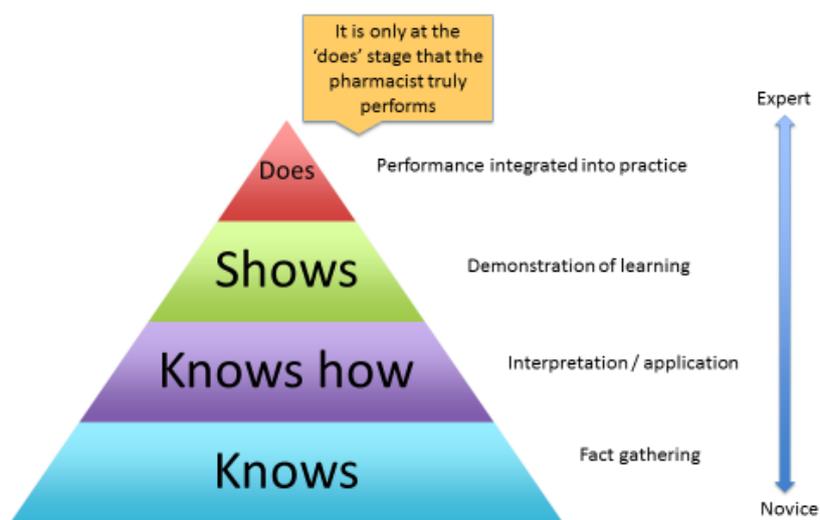


Figure 2. Millar's triangle of clinical competence^{8,9}

In comparison to last academic year, an additional 74% of students undertook the pharmacokinetics examination question with the average mark increasing by 31% (Table 3).

Table 3. Examination data including 2015/16.

Academic year	Candidates attempting pharmacokinetics question (n)	Average mark
2013/14	13 (8%)	61%
2014/15	5 (4%)	40%
2015/16	84 (78%)	71%

Examination data together with staff and student feedback indicates the success of this new approach to the teaching of pharmacokinetics.

<i>"The teaching provided for pharmacokinetics has been excellent. There is a huge amount of support through Dr McCague and the resources he has provided online"</i>
<i>"Great- excellent communicator, went 'above and beyond' to ensure students understood a potentially difficult topic."</i>
<i>"I was not looking forward to this module after reports from the years above who dreaded it, but I really enjoyed it. I thought Dr McCague was engaging and very helpful and pupils responded very well to him. The teaching was brilliant and help was always at hand"</i>
<i>"Dr McCague is very helpful and approachable. Made a very hard topic manageable."</i>
<i>"Excellent. Particularly appreciated that the material was related back to patient scenarios perhaps reflecting Dr McCague's experience working in hospital. Thank you"</i>

Student feedback (2015/16 cohort)

(994 words)

(b) Supporting colleagues and influencing support for student/and or staff learning (maximum 350 words)

I have provided advice and guidance to colleagues who are new to teaching *via* review of teaching material before disseminating to students. This support to postgraduate students, postdoctoral research staff and clinical

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pharmacists has ensured that content is pitched at an appropriate level and aligned with learning outcomes. I have undertaken peer observation of teaching for colleagues and provided one-to-one feedback, enabling them to reflect and enhance their teaching, thereby enriching the student learning experience. I liaise with peers and senior academics to ensure pharmacokinetics is integrated throughout the degree in a horizontal and vertical manner¹⁰. This guarantees students are constantly reminded of the relevance of pharmacokinetics without losing any of the fundamental science. I have been able to draw on my experience working in LJMU and UCC. For example, at a recent away-day we discussed merging existing modules into larger 'super-modules' and increasing levels of continuous assessment. I have shared my experience of similar change in course-structure at LJMU and suggested examples of when this has worked well.

I contribute to a number of institutional initiatives *via* membership of the Teaching & Learning Committee, Assessment Committee, Distance-Learning Committee and School Board. I have developed and shared my expertise with colleagues. I contribute to and coordinate IPL activities work with colleagues from across the University in the development and delivery of these sessions. As module coordinator for Advanced Pharmaceutical Care, I chair module review meetings. In liaison with the module-team, we continually develop and enhance course content and delivery. I am a personal tutor for undergraduates, providing pastoral support and a listening ear. I regularly contribute to student recruitment events such as School Open Days, and outreach events such as Pharmacists in Schools program¹¹.

In line with the Scholarship of Teaching and Learning¹², I have co-authored pharmacy education papers and have been lead author on five pharmacy education conference abstracts^{11, 14-19}. These educational initiatives have been showcased at regional, national and international level. Additionally, I have gained experience as a question writer for the Pharmaceutical Society of Northern Ireland's professional registration examination and through external examining at RCSI in Dublin.

(350 words)

(c) Ongoing professional development (maximum 350 words)

Carrying out a PhD has developed both my qualitative and quantitative research skills. I have attended courses including qualitative research methods, NVivo, SPSS and Good Clinical Practice. I recognise the inextricable link between research and teaching. Indeed many of my research findings are embedded within my teaching, particularly issues surrounding medicines use in children. Furthermore, I have been able to use these skills to continue my pedagogical research^{11, 13-19}. This current body of work on the redevelopment of pharmacokinetics teaching is being evaluated as part of a final year student's research project. An abstract describing my innovative approach has been submitted to a Pharmacy Education Conference being held in Manchester later this year.

During my time at UCC, I undertook a Postgraduate Certificate (2013) and Diploma (2014) in Teaching and Learning in Higher Education. I have partaken in further courses in QUB including Teaching with Emotional Intelligence. As a result, I consider my teaching approach more carefully to ensure a style that is consistent with the TfU Framework¹. Importantly they have inspired me to reflect on my teaching 'post-lesson' so my self-evaluation is 'in-the-moment' consideration of what worked and what could be improved. I understand the value of reflecting on

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feedback from classroom assessment techniques such as minute papers, TEQs and peer observation. I have been encouraged to think about the various ways in which students learn which is consistent with Gardner's theory of multiple-intelligences⁵. I have reconstructed the way I plan, carry-out and assess the module content with students through engagement with these courses.

Additionally, I have attended a two-day Clinical Pharmacokinetics course in Glasgow which was organised by NHS Scotland. This course was delivered by a leading UK Clinical Pharmacokineticist. As a registered pharmacist I also keep abreast of advances in patient care through mandatory continuing professional development. Undertaking these activities ensure that my teaching is up-to-date, clinically relevant and pedagogically sound.

Going forward, I am undertaking training on MediaSite software with a view to increasing online support for pharmacokinetics for undergraduate students as well as developing distance-learning packages for new postgraduate programmes within the school.

(348 words)

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