Queen Mary ADEPT Fellowship Scheme

The Account of Professional Practice
Fellowship Application

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Date
27 March 2016

Evidencing A1: Design and plan learning activities and/or programmes of study

I began teaching at the university level in the year 2000. Previously, I had only taught the equivalent of exercise classes in the United States and did not have much teaching experience, although I did gain some confidence through teaching exercise classes. In the first couple of years after I came here, I taught modules with small numbers of students and, from experience, learned a lot about teaching during that time. Since then I have taught modules with up to 320 students, but have also taught level 7 modules with about 15 students. When I started teaching, I mostly taught probability modules, but since then have also taught financial mathematics, geometry and topology modules. Currently, I am teaching a statistics module and module in stochastic processes. I have volunteered to teach the level 4 Introduction to Probability module next year. I now have a lot of confidence and experience in teaching.

It is important to design learning activities and programmes of study in such a way that students get the maximum benefit given the available time. This means that concepts and examples should reinforce each other and the students should internalize their knowledge, as opposed to memorising it (K2). We want to encourage students to take a deep approach to learning instead of a surface approach to learning (Biggs and Tang, page 22).

I have taught the module Topics in Probability and Stochastic Processes many times. It was originally a special topics module, but due to increasing enrolment it was desirable to change it to have a fixed syllabus, because a large number of students are unlikely to agree on what special topics to cover and with a larger number of students it is likely that a signifiant portion of them will need systematic coverage of the theory of stochastic processess. It covers several kinds of continuous time stochastic processes, starting with the simplest renewal processes and ending with Brownian motion. I wrote the syllabus. In particular, I introduced semi-Markov processes, which are a way of transitioning between renewal processes and Markov processes, in order to make that transition easier (K1). The problem sheets have problems specifically written to help the students

understand the concepts taught in the module and see how they are applied. The evidence that I have been successful is that, on the 2015-2016 course evalation for Topics in Probability and Stochastic Processes, all of the students agreed with the statement “I had good access to learning resources for this module”. Before lectures and tutorials I plan questions to ask them on the material. I believe it is helpful for the students if I ask them questions as it keeps them alert and gets them to participate in the learning activity (K3). It is very important to have a good syllabus and problem sheets. As evidence, on the 2014-2015 course evalation for Actuarial Mathematics, I received the comments “The lecturer is very good. Notes are sufficient. Plenty of examples. Goes at a good pace.” and “The module runs smoothly. Exercise sheets flow very well from the notes and are fun and easy to do plus good practice.”

I know I have been successful in making them think about the material because they ask questions about it. I find that it is not really possible for the students to understand the material completely when it is first presented in lecture. Therefore, if they are too quiet they are probably not understanding the material at all, but if they ask questions then they are at least thinking about the material. They might not ask questions in lecture, but instead ask questions later in exercise class. I think the students who never ask questions are probably not understanding the material well, but when students are asking questions they are engaging with the material and preoccupied with learning (K5).

I have helping to design an entire programme of study as a member of the BSc Mathematics with Actuarial Science Working Group. This group is in charge of setting up the new Mathematics and Actuarial Science BSc programme. Our purpose is to set up a Bsc programme in actuarial mathematics that will attract international students as well as students from the London area (V2). The Institute of Actuaries allows actuarial science programmes to offer students the chance to obtain up to 10 possible exemptions to their Core Technical examinations. The students greatly want to get exemptions from the exams. We have to balance that desire with the fact that representatives from the Institute of Actuaries told us companies are not as keen on students having exemptions as they want students to present themselves well, to work well in a team, and to have other skills such as Excel programming (K6, V4). We have met regularly to discuss what exemptions should be offered, what additional modules should be offered, and how "soft skills" should be taught to the students (K6, V2). This is considered in regard to what graduate attributes are we desire our students to have, a concept explained in (Biggs and Tang (2011)). We decided to offer all 10 exemptions, but to also require the students to attend seminars from working actuaries, to take a module in Excel, and possibly write a project. We also have plans to give the students the opportunity for placements in the actuarial industry during their studies (V1, V2, V4).

One of the main ways I have contributed to the BSc Mathematics with Actuarial Science Working Group was by designing the module Actuarial Mathematics II, which prepares the students for possible exemption from the Core Technical 5 examination. This involved creating an entire syllabus and

sample examination for the module. First of all, I had to read about the material taught in the module from textbooks. This was important, because it is necessary to understand the material taught in a module completely before designing a programme of study around it (K1). I then made a syllabus for the module. This involved a week-by-week breakdown of what would be taught. I did this by starting from the syllabus for the Core Technical 5 examination. It was not enough to put the material from the CT5 exam in the Actuarial Mathematics II syllabus, because a great deal of that material was already covered in our existing module Actuarial Mathematics, which is part of the exemption for the CT1 exam. I decided that Actuarial Mathematics should be mostly unchanged, which meant putting the more difficult CT5 material in Actuarial Mathematics II (K3). We will therefore have one easier module for students of all backgrounds and a second for the more professionally motivated students (V1). After making this decision, it remained to make sure that we could actually cover that material in the 12 week (with reading week) Queen Mary semester. I consulted with other people in the department while doing this, who agreed the current Actuarial Mathematics module's syllabus is already quite full and should not be changed. Afterwards, I wrote a sample final exam for the module. This mostly meant modifying CT5 questions for Queen Mary students. It was necessary to add some easier parts to some of the questions. I also decided that the longer questions asked in the CT5, which required many recursive calculations, were not appropriate for our students and omitted those questions. The reason that I omitted those kinds of questions are that those questions involved lengthy recursive calculations which require mostly surface learning and that it seems that kind of knowledge may be assessed better by computer assisted testing. I have consulted with people in the math department about how we can teach the material in those omitted questions in other ways than in the Actuarial Mathematics II final examination.

My syllabus for Actuarial Mathematics II has been successful so far, because it was used in our presentation of our Bsc Actuarial Mathematics programme to the Institute of Actuaries. It will be successful in the future if it does not have to be greatly modified (K5).

My experience has shown me that the designing of learning activities and programmes of study is of crucial importance, because a great deal of preparation and planning is needed for teaching. If you design things correctly, then while teaching one can concentrate on the students' reactions and act accordingly, instead of thinking about what to do next. (K6).

Biggs, J., and Tang, C. (2011). Teaching for quality learning at University. Open University Press, 15-63. Dennick, R & Exley.

Evidencing A2: Teach and/or support learning

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I have taught many modules in my time at Queen Mary and all of them have involved lecturing. Recent modules in which I have lectured include Topics in Probability and Stochastic Processes, Actuarial Mathematics, and Statistical Theory. Lectures are a good way of presenting new material. Lectures are a time for presenting material carefully, giving the students the basic understanding. I arrive at least 5 minutes before the start of lecture to set up the audio-visual equipment. Usually, I use a visualizer to present the material (K4). This allows me to watch the students as they are reading the material I write down and see if any of them have raised their hands to ask questions. The students occasionally ask questions, which is a good thing, because it allows me to explain the material again in a way they may understand better. During my response to these questions, I may digress from the planned lecture to present material which they did not learn in their previous education or which I had not anticipated would cause confusion. It is important to present examples, as students may not understand theoretical concepts if they do not see examples, and examples can make dry material more interesting (K2, K3). I also make sure to vary between visual and auditory modes of presentation to benefit leaners who prefer one way of accessing information more than the other (Fleming, (1995)). It is important to end the lecture on time to give the students time to get to their next learning activity. After the lecture I stay in the lecture room to allow students to ask me questions they did not have a chance to ask during lecture (K3). My teaching evaluations have been consistently very good (K5). Some comments on the 2014-2015 course evalation for Actuarial Mathematics were “Good lecturer.”; “The lecturer explains the material well. The notes are very good and easy to understand”; and “Teacher is very nice and patient”. On a scale of 1 (worst) to 5 (best), the students' average ratings for 8 questions ranged from 3.75 to 4.32.

An important way in which I get to know my first-year advisees and interest them in the diverse areas of mathematics is through the exercise classes for the special module Mathematical Structures. This is a first-year module which introduces students to some of the main topics in mathematics. Each of the exercise classes is attended by only 6 or 7 of my advisees. This allows me to get to know them individually and for them to get to know me and each other (V2). In the exercise classes, we go over questions from the problem sheets. I go over the answers slowly by asking them questions which make them think about the problem at hand. It may take a long time for one of them to respond to the question, but eventually one of them will, and that creates a starting point for a sort of dialogue between the students and me (K3). There is always a kernel of insight in their answer, although it may only lead indirectly to a correct answer. I point out how their answer might be deficient and, in view of my critique, how their approach could be improved. Eventually we get to a correct solution to the question and by doing so in this Socratic way they will gain confidence and understanding (K3). After the exercise class the students may talk to me about their study programmes, such as what is required to progress to the second year. They may ask about the first-year module Essential Mathematical Skills, which is required for progression to the second year and I tell them i am available to help them in office hours or by making special appointments if they wish. Every advisee is required to give one presentation. Their presentations can be about

any topic related to mathematics, such as theorems or problems from other modules, but are often surprising, such as presentations on sudoku or obscure puzzles. The presentations are about 10 minutes long. The students do their best and afterwards the other students and I always applaud. The presentations hopefully build their confidence and, of course, gives them experience in talking in front of groups (V1, K2). I might them tips on how to give better presentations and then ask them to give a second presentation (K5).

Teaching is a rewarding experience. The main thing I have learned is to see the subject matter from the students' point of view. When answering their questions, it is important not to micro-manage their thinking, but to guide them to the next step, after which they can continue exploring the concepts until they reach a satisfactory conclusion (K2). Their background may be different from mine and they come from diverse cultures (V1).

Fleming, N.D; (1995), I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom, in Zelmer,A., (ed.) Research and Development in Higher Education, Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia (HERDSA),HERDSA, Volume 18, pp. 308 - 313

Evidencing A3: Assess and give feedback to learners

There are two kinds of assessment and feedback I give to students: formative and summative. Formative assessment does not contribute to the final marks of the students, while summative assessment does contribute to the final marks (K2). Formative assessment is also known as feedback and “it tops the list of those factors leading to good learning” (Biggs and Tang, page 97) (V3).

The formative assessment and feedback is generally in the form of coursework. I give about 10 coursework's per module. Coursework reinforces the material the students have been taught in lecture and doing problems points to deficiencies in their understanding. A large part of the assessment comes in the form of exercise classes. The students generally attempt the coursework in small groups but they write up the solutions separately. (This is true of the modules I teach, which are level 6 or 7 modules. The lower level modules have moved to a system where one student writes up the solution for the whole group.) When the students are stymied, they raise their hands for help. The helpers and I circulate around the room and when a student raises their hand we go over to them to help. The questions the students ask allow me to assess their understanding (K5). I may respond in turn by posing questions that need to be resolved, which gives the students an opportunity to learn from their errors (Anthony and Walshow (2009)). Some times they clearly have not understood the lecture material and I point out the relevant material from their notes. If they do not remember that material, I go over the material again, briefly recapping that part of the lecture. If they did remember that part of the lecture, they still may not have understood it well. I try to assess what is missing in their understanding, or

they might recognise the deficiency themselves and ask me about it. I then answer their questions about the lecture material (V1, V2). Often they didn't understand a fine point of an theorem or example. They may have understood the concepts, but their calculations went awry. They may have made mistakes because they forgot the algebra or calculus used in the steps in the calculation, in which case I review the necessary mathematics. On the other hand, they might have made a mistake because they went through the calculation too quickly and carelessly, in which case I would tell them they should go slower and more more carefully. The students receive their marked scripts a week later. They receive feedback on their scripts, pointing out any errors (K5). Solutions to the coursework are posted on the QMPLUS website (K4).

The summative assessment comes in the form of examinations (K5). Examinations are written long before they are given. There are many factors that need to be taken into account when writing an examination. Some of these include lecture material, courseworks, and the level of understanding displayed in the exercise classes. The examinations are written in a way that weak students can pass while allowing better students to get better marks (V2). They are written in such a way that the main concepts covered in the module are all assessed. Detailed solutions are written along with the examination. The examination and solutions are reviewed by a second examiner from the mathematics department and an external examiner outside the university. Their comments are incorporated into the exam. When the marking the examination scripts, care is taken to give partial credit if what they have written shows only partial understanding. It may be the case that their understanding was good, but they made a mistake in calculating resulting in a badly wrong answer. In that case they should get most of the available marks. I make marks on every page to show I've viewed their work. After the scripts are marked, the second examiner checks that all marks have been added correctly and all work has been viewed. It is important to view all the work, mark every question carefully, and add up the marks correctly, because it is our duty to our students to evaluate them properly (K6). If I did not do my professional duty, then it would reflect poorly on my university and the higher education system (V4).

It has become apparent to me that feedback is important throughout the teaching process to let the students know how well they have learned the material, because I have observed that students who do not get feedback, because they do not do the exercises, almost always do poorly on the final exam, while the ones who get feedback do better. The ultimate feedback is the final mark, but in a sense the earlier feedbacks are more important.

Anthony, G., and Walshaw, M. (2009). Effective pedagogy in mathematics (No 19 in the International Bureau of Education's Educational Practices Series). Retrieved March 1, 2011, from www.ibe.unesco.org/en/services/publications/educational-practices.html.

Biggs, J., and Tang, C. (2011). Teaching for quality learning at University.

Open University Press, 15-63. Dennick, R & Exley.

Evidencing A4: Develop effective learning environments and approaches to student support and guidance

I make extensive use of the virtual learning environment QMPLUS in my teaching (K4). As an example, I use the QMPLUS website for the module Statistical Theory. QMPLUS lists basic information for modules such as Prerequisites, Teaching Syllabus, Teaching and Learning Profile, Assessment Profile and Feedback Timetable, Learning Outcomes and Assessment Criteria and Past Exam Papers. I make sure the information contained in those links is up-to-date (K4). The News Forum is used to make important announcements. When I make an announcement on the News Forum, an email containing the information is sent to all students taking the module. There is a Student Forum for students to communicate with each other about the module. I include a link to the National Student Survey because the survey is a useful way students give us feedback and is important for the universities national profile (K6). Under General Information, I give a link to a file with general information about where and when the lectures and exercise classes take place, what constitutes the summative assessment, and list some useful textbooks. I also include a link to the the university's Student Engagement Policy, which informs the students of what is expected of them as far as student engagement and under what conditions they might be deregistered (K6). The weeks the course take place are then listed from Week 1 to Week 12. For each week, the lectures that took place are displayed. It is possible to display this information exactly, because I have the written pages that were displayed on the visualizer. I make minor corrections to the lecture notes when needed. I display the weekly coursework and solutions. It is possible to set the date on the coursework and solutions so the students can only access them at the appropriate times. I also display typed summary notes, which reiterate the important theoretical points of the lectures (without the examples). In the end of the QMPLUS page is a page on Revision, which contains past exam papers and solutions. When appropriate, I include links to outside websites (K4). For example, when teaching Actuarial Mathematics, I included links to current news reports on payday lenders, which was relevant to the theory on compound interest the students were learning (V4).

Advising is a crucial way of supporting students. I have about 35 advisees. When they begin their first year, I sent them an email introducing myself. They some times will ask me where the lectures are held and how they can access their schedules and I tell them how to find out (V2). The first year students get to know me better through the module Mathematical Structures. In the second and third years, they will want advice on what optional modules they should choose. My advice will often depend on how they have performed in previously

taken related modules. They may not have a good idea of what an optional module will cover and I will describe it in ways they will understand (V2). I am especially able to advise the students on joint mathematics/business programmes, as I am the programme director for those programmes. Students may have health or other personal issues which mean they can not attend lectures or exercise classes. In that case, I try to assess how severe is their problem (V1). If they are forced to miss too much of the semester, they might want to fill out an extenuating circumstances form. In that case, they should see the Senior Tutor about whether filling out an extenuating circumstances form is appropriate for them. Students may not know about the counselling available from Student Services, in which case I would inform them (V2) because it my responsibility to not just teach mathematics, but to help them cope with the pressures of university (V4). As students get closer to graduating, they may want advice on what universities they should apply for a postgraduate degree or what careers are available. I generally inform them that their options are affected by their degree classification, which should motivate them to study harder in their third year to get at least a 2i degree. The students often ask me for references, which I always supply. I try to be a good adviser so that the students so that they will have a good impression of the university (V4).

I feel I am a resource for the students when they need information or help. This can be mathematics information or help coping with personal problems. By posting information and links on QMPLUS I am supplying information in an accessible format. Students can download lecture notes even if they have missed the lecture.

Evidencing A5: Engage in continuing professional development in subjects/disciplines and their pedagogy, incorporating research, scholarship and the evaluation of professional practices

I have continued my professional development through both departmental activities and through teaching seminars and conferences, including the Queen Mary Teaching and Learning Conference held on 20 January 2016, the School of Mathematics Teaching and Learning Seminar held on 17 February 2016, and the School of Mathematics Teaching and Learning Seminar held on 23 March 2016, which was on Q-Review and use of IT in teaching. The School of Mathematics Teaching and Learning Seminar held on 17 February 2016 was on public speaking and it has been of use in my teaching (V3) in the way it emphasized the use of loud and quiet speaking to get the audience's attention.

Peer Observation has been a way of evaluating my own teaching and the teaching of others (K6). When I observe teaching I notice how the lighting and sound quality enhances the learning experience. I notice how the lecture is structured to fit within an hour. I notice the level of engagement the students have with the lecture. I pay more attention to those kinds of things than to the topic of the lecture. When I am peer reviewed, I take careful note of what the reviewer says (V3). For example, when I first came to Queen Mary, one of my

first peer reviewers said I did not make eye contact with the students enough. I now make sure I frequently look over the students to see if there are questions. This practice was emphasised in the recent School of Mathematics Teaching and Learning Seminar (V3). I also take into account verbal remarks the students make to me. For example, in exercise classes students remarked that I might go a bit too quickly through the examples during lecture, and I have since evaluated why I might go through examples more quickly and have slowed down (V1).

I have been the Programme Director for the joint Mathematics/Business programmes for the past 4 years and a member of the School of Mathematical Sciences Teaching and Learning Committee. As a member of the Teaching and Learning Committee, I am involved with evaluating practices such as the use of QReview, QMPLUS, curriculum review and the guidelines for the Student Examination Board. These discussions often give me insights into teaching that I have used. For example, it was pointed out that we should never blame the students if they are under-prepared, as we have accepted them and we have as good an intake as our competitors (V2). As programme director, I am ultimately responsible for the information on the web regarding study programmes and I advise students on those programmes about what modules to take. I also interface with the School of Business and Management about things like whether students may transfer between programmes and what alterations can be made in their study programmes (V1).

I supervised a learner with his final-year BSc double-unit Advanced Statistics Project regarding the time it takes time it takes to achieve randomness when shuffling a deck of cards. The learner was aware of my papers in the subject and wanted to do his project to determine how well a typical reasonably priced card shuffling machine will shuffle a deck of cards. I explained the basic mathematics involved and he did an interesting project (V3). In addition he contacted Professor Persi Diaconis, who had held the Hardy Fellowship at Queen Mary in 2001. Professor Diaconis sent him a relevant survey article. Because of my research in the area, I was able to discuss the article with the learner.

I also have given many seminars in the mathematics department, both at the Combinatorics Study Group and the Pure Mathematics Seminar. Giving seminars is a good way of introducing learners to concepts that arise from research (V3).

Professional development has been an ongoing process for me. When I came to Queen Mary, I did not have any previous teaching experience. It has benefitted me to talk to my colleagues about teaching and to take advantage of opportunities for professional development.

The UK Professional Standards Framework

Areas of Activity

- Design and plan learning activities and/or programmes of study
- Teach and/or support learning
- Assess and give feedback to learners
- Develop effective learning environments and approaches to student support and guidance
- Engage in continuing professional development in subjects/disciplines and their pedagogy, incorporating research, scholarship and the evaluation of professional practices

Core Knowledge

- The subject material
- Appropriate methods for teaching and learning in the subject area and at the level of the academic programme
- How students learn, both generally and within their subject/disciplinary area(s)
- The use and value of appropriate learning technologies
- Methods for evaluating the effectiveness of teaching
- The implications of quality assurance and quality enhancement for academic and professional practice with a particular focus on teaching

Professional Values

- Respect individual learners and diverse learning communities
- Promote participation in higher education and equality of opportunity for learners
- Use evidence-informed approaches and the outcomes from research, scholarship and continuing professional development
- Acknowledge the wider context in which higher education operates, recognising the implications for professional practice