

APP Template – Fellow Application

Queen Mary ADEPT Fellowship Scheme

The Account of Professional Practice Associate Fellow Application

Name	Template 1
School/Institute	SCHOOL OF MATHEMATICAL SCIENCES
Date	2016

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

In the last three years at the School of Mathematical Sciences (QMUL) at the lecturer level, I have been involved in the development of some modules and programmes of study.

I was in charge of co-designing and co-developing the module *Research Methods in Mathematical Sciences*, taught at the MSc level (and 4th year MSci Mathematics level) for students in MSc Network Science and MSc Mathematics (K1). This was a brand new module, never taught before in the SMS, and my role included the design of the learning outcomes, the content (syllabus), the feedback and assessment criteria, and the evaluation. This was a very good occasion to apply the knowledge I gained from the module ESDM011: Developing the curriculum in the disciplines on designing a module following a Biggsian constructive alignment method (K2) as I will explain below. I was also in charge of developing all teaching and learning resources (slides, videos, courseworks). We have taught this module for two years now, with very good performance and quite good evaluation results, obtainin 4.12/5 as for “The module is well taught”. Some students comments in the module evaluation questionnaires included “It is a very helpful module for someone that needs to write a project report”, “all material taught will be very helpful when doing final project”, “practical material which is useful throughout the course”, “it introduces to methods and tools that otherwise would be difficult to find”.

I was also part of the team that redesigned the programme of study *MSc Mathematics of Networks* that, according to this redesign, has changed its name into *MSc Network Science* in 2014-2015 (K1). This is a MSc taught jointly between the School of Mathematical Sciences and the School of Electronic Engineering and Computer Science, and is therefore intended to attract both kind of students. The redesign involved changing some of the modules that we offered, in order to make the MSc more interdisciplinary and hence more appealing to indeed a larger cohort of students (K3). On February 2015, I was the recipient of the *Outstanding Contribution to Teaching Award*, awarded by the Faculty of Science and Engineering at QMUL “in recognition of my innovative teaching, module development, and contribution to the development of marketing and study programmes.”

Another module that I designed and developed from scratch was entitled “*Vocal and Oratory Training for Education and Research*”. As mentioned previously, this design was part of my assessment during my attendance to the CAPD module ESDM011: Developing the curriculum in the disciplines. As a matter of fact, the process of designing this curriculum was very enlightening – specially the process of learning and reflecting on Biggs constructive alignment method (K2, V4). I was able to export and apply many of the concepts learned there (V3) at the time I contributed to rebuild the curriculum of the MSc Network Science, but most of all when I co-designed (along with a colleague) from scratch the module *Research Methods in Mathematical Sciences*. For that module I was able to clearly define the programme, the learning outcomes and the assessment criteria following a constructive alignment methodology (K2), to design post-seminar activities that included both formative and summative assessments, constructively aligned around the intended learning outcomes. I also reflected on Bloom's taxonomy to clearly identify the objectives and long term goals of the module I designed, and to distinguish these in terms of knowledge, application and synthesis. Accordingly, I could identify some knowledge-based objectives (including research-specific Tools as computational methods, LaTeX, or powerpoint), application-based objectives (including developing the ability to give high level scientific presentations) and finally synthesis-based objectives (such as being able to write a critical review of a scientific paper). Also, in Bloom's taxonomical words, I tried to focus more on the *application and synthesis* as I build up in the belief that “learning is now more commonly recognised as a process of knowledge construction (rather of knowledge reproduction)” (Maclellan 2001).

I am quite satisfied of the outcome of this design, based on the feedback I got from its evaluation (for instante,

reaching an evaluation mark of 4.16/5 as for the question “I had access to good learning resources for the module” and receiving positive feedback from students such as “This is a great foundation step for further research studies”). Evaluation of the module (K5) is indeed a very relevant aspect of the curriculum design according to Biggs. This was even more relevant within Research Methods in Mathematical Sciences as this module was new, and therefore strategic elements including quality assurance, student satisfaction monitoring, accountability and standards improvement, and innovative practice assessment required a proper and periodic module evaluation. The evaluation of the module was done according to Hounsell's classification of student evaluation (Hounsell: Evaluating courses and teaching, 2009) in terms of peer evaluation, and incidental evaluation, and was intended to be both formal and informal (K5). Formal evaluation included (1) student evaluation surveys, (2) peer evaluation, (3) qmplus engagement data and (4) students summative assessments (courseworks). The results of the student evaluation surveys were a source of formative feedback, I detected the challenges and issues that could be improved in successive years (K6). For instance, I learned that students struggled with the chapter about LaTeX and required this chapter to be explained in larger detail. I expanded both the content and time allocation to this chapter accordingly, to ensure continuing fitness for purpose, and to cope with quality assurance according to QMUL Code of Practice (K6). I also received relevant feedback from the peer evaluation, for instance I learned how to cope with background noise by using simple questions to engage the audience.

Evidencing A2: Teach and/or support learning

I have taught in Higher Education for six years, both at the undergraduate and the postgraduate level, first as an assistant professor at the Technical University of Madrid (2010-2013) and currently as a lecturer in the School of Mathematical Sciences, QMUL (2013-present).

During my former position in Madrid, I was in charge of the modules *Scientific Programming* and *Numerical Analysis* (1st year undergraduate BSc in Aeronautical Engineering), teaching weekly (3 hour lectures and tutorials) to about 160 students. I also taught the elective module *Complex Systems* to a selected cohort of about 20, final year students on BSc Aeronautical Engineering. In my current position, I have been for three years the coordinator and lecturer of the module MTH5102 *Calculus III* (2nd year BSc Mathematics), a popular module that has about 190 students. I have taken care of all the lectures (3hours/week) and tutorials (3 hours/week). Whereas this was a pre-existing module, I have further contributed to develop teaching resources (slides, overheads, courseworks) and am in charge of setting and marking the midterm and final exam, always in alignment with the intended learning outcomes.

I have also been, for two years now, coordinator and co-organiser of two additional modules: Research Methods in Mathematical Sciences and Third Year & MSci Project. The former is a 4th year MSci Mathematics and MSc Network Science / MSc Mathematics module which was designed from scratch by me and another colleague two years ago, delivered to about 25 students, where I am in charge of part of the lectures (50%), and setting and marking the assessment (summative courseworks), while in the latter I am co-responsible for organizing and marking the project presentations from the students developing either a third year project or a MSci project.

At the start of any module, I always introduce myself to the students by sharing a very brief summary of my past teaching and research experience, and give them an idea of my interactive teaching style; I try to create an environment of mutual respect. In my teaching I try to follow a Biggsian style (K2), by clearly defining the programme, the learning outcomes and the assessment criteria following a constructive alignment (J. Biggs and C. Tang, *Teaching for quality learning at university* (Mc Graw Hill)). To make sure that I meet their expectations I encourage them to give me informal feedback throughout (temperature taking). During the introduction I also make sure students have an overview of the module syllabus, assessment and feedback criteria, and learning outcomes.

Then, in every lecture I always start with a short description of the last thing we covered the day before, and give a general idea of what is going to be covered in the lecture, so that the student has the correct expectations (K1). This is particularly important for those modules where each chapter depends on the previous one (such as in *Calculus III*, or in *Scientific Programming*).

At the beginning of each chapter I try to give a general idea of the relevance of the questions that are solved in the chapter, as well as a relation to the big picture (the whole module). This helps me to relate day-to-day activities directly with the intended learning outcomes.

As long as possible, I try to apply the theories explained in class to real world problems. For instance, at the time I teach the chapter “Fourier series” within *Calculus III*, I combine the rigorous exposition of the material with applications of the techniques to digital music compression. Students are very happy to know that the reason why they can store and listen to thousands of songs in their ipod is based on a mathematical theory (Fourier theory) that they can learn and understand (K1). They seem to enjoy understanding how mathematics shape real life technological applications according to the evaluation comments. Indeed, under the question what are the best things about the module? some students said “makes difficult concepts easy to picture with real life analogies” or “the lecturer mentions real life applications of the maths we are learning and it helps in understanding”.

I constantly try to be enthusiastic in my lectures and to have a permanently open communication channel with my students, for feedback (K2). All over these years the students evaluations and other channels of feedback suggest that the students are happy with my teaching techniques and style (with very encouraging comments in the module evaluation including “the lecturer is excellent, provides material in great detail and encourages free thinking”, “the lecturer is great, he explains difficult concepts in an easy, understandable way”, “the lecturer is excellent, I like his teaching style”), and their overall good performance in the summative assessments is further evidence that teaching is done effectively (K5). On February 2015, I was the recipient of the *Outstanding Contribution to Teaching Award*, awarded by the Faculty of Science and Engineering at QMUL “in recognition of my innovative teaching, module development, and contribution to the development of marketing and study programmes.”

Besides my lecturing and tutoring as the responsible and coordinator of the modules, I have also helped out with tutorials for other modules (*Calculus II*, *Convergence and Continuity*).

Furthermore, during the last three years at QMUL I have been the advisor of about 25 undergraduate students. In my previous position in Madrid I supervised three MSc students and one PhD student, and in QMUL I have supervised two MSc students and am currently the supervisor of one PhD student, the co-supervisor of another one, and the second supervisor of yet another one.

Evidencing A3: Assess and give feedback to learners

For six years I have been in charge of setting the main forms of assessment (midterms, summative courseworks, exam) and main forms of feedback (formative courseworks) in several undergraduate and graduate level modules. This has given me much experience and time to reflect on this particularly important aspect of the teaching and learning process. Depending on the module to be taught (i.e. the intended learning outcomes), and according to Biggs approach, different forms of assessment and feedback are required (K3). On top of that, I believe that each curriculum needs to “*address feedback development and engagement in the same way it considers other aspects of the course, such as knowledge development*” (Price et al 2011). I accordingly design feedback for each module following Nicol and Macfarlane-Dick’s (Nicol and MacFarlane-Dick 2006) seven principles as well as QMUL’s code of practice. Some concrete aspects that have been taken into account while designing the following set of assessment tasks include validity, reliability, feasibility, consistency, efficiency and justifiability. The main methods and options I have used to assess learners are as follows (K2):

Formative assessment 1 (theory): Periodic Quizzes.

In some modules such as Calculus III this possibility is available via QMplus.

As a formative assessment, after each chapter the students should answer a quiz (multiple choice test consisting of 10-15 theoretical questions), of 5-10 minutes duration, which are implemented in QMplus. After completion of the quiz, the system will automatically give in an anonymous way the mark to the student. This on itself constitutes a feedback that facilitates the development of self-assessment (reflection) in learning. As already stated, these quizzes are not summative, however, the fulfilment of every test is a necessary condition to pass the module, so these are compulsory activities.

This specific type of structured assessment is designed to aid student’s learning and maintain academic standards, on agreement with QMUL code of practice.

Comment: According to my previous expertise as a QMUL lecturer and using qmplus interactive online resources, participants can be motivated to use these if engaged at the very beginning of the course. In order to keep everybody on track from the beginning, I usually give a briefing about qmplus (specifically the online resources that will be most used during the course) during the first lecture, while explaining the methodology. Note that the fact that the periodic quizzes constitutes a compulsory method of formative assessment is designed as a way to avoid any possible lack of engagement. The fact that these quizzes are short and designed to be “fun” or at least “interesting” is a third way of avoiding any possible lack of engagement.

Formative assessment II non-graded courseworks

Periodic (weekly basis) theoretic courseworks where the students have to submit the solutions to a particular question. These are used in Calculus III as in this module the summative assessment is only made twice in the whole module. In Research Methods in Mathematical Sciences, as summative assessment is made regularly through graded courseworks, there is no need/time for non-graded courseworks.

Summative assessment

The final mark of each student is the result of complementary summative assessments, such as written courseworks, final exam, midterm, oral presentations, etc.

The first three of the summative assessment depicted here are designed to mark the work submitted and not the student submitting it (anonymous marking), following QMUL’s code of practice. However in some cases (such as in the module Research Methods in Mathematical Sciences, or in the module Third Year/MSci project) there is an oral presentation to be marked, which inevitably deviates from the latter criterion. However, an explicit marking scheme is available online in order to guarantee fairness. Let us describe these assessments in more detail:

- *Final exam*: A classical way of summative assessment which is particularly well-designed for mathematical studies.

- *Midterm exam*: This is a short, often multiple-choice based summative assessment designed to measure the level of engagement in the midterm. Questions are not intended to be deep, but to touch as many aspects of the syllabus as possible, so that students raise awareness about those topics that can be assessed in a deeper way in the final

exam. As such, midterm exams are a primary source of feedback as well.

- *Summative Courseworks*: These can be essays, project presentations, practical problems, etc. In the module “Research Methods in Mathematical Sciences” we decided that the method of assessment would be through compulsory courseworks (4 courseworks all over the semester, to be submitted online via qmplus at specific times, plus an extra coursework that consisted in the delivery of a presentation in front of the class). This type of assessment is particularly relevant for those modules that do not require a holistic view. The modules “Research methods in Mathematical Sciences” was a very good example of such a module, whose syllabus consists of usually disconnected topics (for instance: writing mathematical reports / literature search / LaTeX ...) that could be assessed independently.

The main ways I have used to give feedback to learners are:

- *From summative assessment*: Midterms are a primary source of feedback for students, and similarly, in those modules that lack a final exam and where the assessment is performed in terms of graded courseworks, I have tried to mark and distribute the scripts (with marks and comments) of a given coursework as soon as possible, such that this information can be used as feedback for the subsequent courseworks.

- *From formative assessment*: Another important source of feedback is from the comments both me and my teacher assistants include in the non-graded (formative) courseworks.

- From qmplus forum: I encourage my students to engage with the forum facility included in the qmplus webpage of each module (V2). There, from time to time I suggest questions, and I ask students to post the questions/doubts that they often email me. The intention is that other students can profit from any feedback I give to the student (V1,K3). A second intention, more interesting from a pedagogical viewpoint, is that other students are able to answer queries from their peer students (V2). This kind of inter-student feedback helps both parties (those who ask, those who reply) in their learning process (K3). The students appreciate this innovative use of qmplus, according to several evaluation answers to the question “what is the best thing of this module?” some of which being “qmplus forum” or “very active on qmplus”.

- *Tutorial debates*: I also use the tutorials to discuss, either face-to-face or collectively with groups of students, and I try to give them feedback that way.

- email: When a student cannot come to office hours and his/her question is not suited to go to qmplus, I also use email to give feedback.

- *one to one meetings (office hours, appointments)*: This is a classical mechanism to give feedback, I promote the use of my office hours in my lectures, and I always recall my advisees that they should use this very valuable feedback tool with other lecturers as well.

This is the primer method of communication with my phd students (weekly based meetings).

References for this section

- M. Price, K. Handley, and J. Millar, Feedback: focusing attention on engagement, *Studies in Higher education* 36, 8 (2011).

- D. Nicol and D. Macfarlane-Dick, Formative assessment and self-regulated learning, a model and seven principles of good feedback practice, *Studies in Higher education* 31, 2 (2006).

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

The first and most important learning environment is the lecture room. I try to make the best use of the available facilities (K4). In the recent past I have used visualizer, projector, whiteboard, powerpoint, and video projections in my lectures – separately or combined: the best choice depends on the content of the lecture and the type of learning process you aim for. A good module design defines, according to Biggs, the best and most effective learning environments and approaches (K2).

For pure mathematical modules (*Calculus III*), where students require information to be delivered at a slow pace and in a systematic manner, I make use of QMUL’s visualizer facilities, combined with whiteboard (K4). After several years of trying different possibilities I have come to the conclusion that old fashion whiteboard (and its new incarnation: visualiser) is the style that helps the most in delivering at the appropriate pace and it allows for optimizing feedback during the lectures (respond to questions).

For less quantitative modules according to the intended learning outcomes (such as in *Research Methods in Mathematical Sciences*), the lecture delivery is more dynamical and interactive, and for that reason I make use of powerpoint presentations instead of visualiser/whiteboard.

For all these modules I heavily use *qplus* as the primary form of communication outside the lecture room (K4) and am fully engaged with this technology as a teaching/learning framework. There, lecture notes, overheads, slides, video links and additional material are posted regularly, and announcements are made. I post periodically coursework sheets (and coursework solutions templates), and have a collection of past midterms, final exams (and solutions).

I particularly encourage among students the use of the *qplus forum* facility for independent learning, as this is an interactive technology where students can both ask and solve questions, and thus has an incredibly important pedagogical utility.

I also use *qplus* for grading midterms and giving feedback.

The environment for meetings with my advisees and PhD students is my office (or an office for meetings), where we can have 1-to-1 discussions, next to a small whiteboard.

In all these years I have learned that indeed the correct learning environment is crucial for a correct engagement. For instance, I have tried things that “didn’t work”, such as having communication with students only by email (K6). I have learned that to give the student total freedom is not optimal as they are not in general mature enough and they tend to procrastinate if they don’t feel a bit of vigilance. Therefore, a correct balance of face to face interaction (which puts some pressure on them and on their duties) with online facilities (which leaves freedom for independent learning) is important. I have also learned that different topics require different learning environments. For instance, when I first started to teach *Calculus III*, the first weeks I was using slides to expose the concepts of techniques. Clearly this environment did not help the student’s learning as using powerpoint tends to accelerate the pace of the exposition. I then learned that students like the pace that is achieved by using the whiteboard/visualiser (K4,K6). This teaching style, which I once thought was a bit obsolete and overcome by new technologies, has shown to be actually the optimal one for certain mathematical modules. Students have indeed given me great feedback on this respect, as it is not always easy to know in advance what is the best environment to deliver a specific subject. For instance, in the modules *Research Methods in Mathematical Sciences* it became quite evident from the beginning that I had to focus more on the *application and synthesis* (Bloom’s taxonomy) as in this concrete topic Maclellan’s words “*learning is now more commonly recognised as a process of knowledge construction (rather of knowledge reproduction)*” (Maclellan 2001) were fundamental.

References for this section

- E. Maclellan, *Assessment for Learning, Assessment and Evaluation in Higher Education* 26, 4 (2001).

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

I have a sustained interest in pedagogy, and have been reflecting on new ways of teaching in disciplines since I started to teach in university in a full time basis, six years ago. It is quite common to enter into lively discussions about teaching practices with my colleagues and to share best practice. We also make peer-observation to give us mutual feedback on our teaching practices on a yearly basis (K6).

As for certifications, I hold two Spanish certifications by ANECA (the Spanish national agency for evaluation and accreditation): Profesor Ayudante Doctor (akin to Assistant Professor certification) and Profesor Contratado Doctor (akin to Associate Professor certification).

These are certificates you need to have to be allowed to teach at the assistant/associate professor level at the Spanish university system (V4).

At the time I came to UK, I attended the 2-day workshop “Higher Education Academy STEM: Induction Course for New Lecturers” delivered in Leicester (September 2013) organized by HEA Within the UK, which was a good induction to the pedagogical methods and particular teaching style in the UK (V3,V4). I further attended a module from PGCAP (ESDM011: Developing the curriculum in the disciplines (V4)). According to my previous teaching experience in Madrid, I was not asked to attend the full PGCAP. Still, during the attendance of ESDM011, and during the design of the module described in A1, I had the chance to read a reasonable amount of relevant bibliography:

- J. Biggs and C. Tang, Teaching for quality learning at university (Mc Graw Hill)
- QMUL Code of Practice on Assessment and Feedback
- E. Maclellan, Assessment for Learning, *Assessment and Evaluation in Higher Education* **26**, 4 (2001).
- M. Price, K. Handley, and J. Millar, Feedback: focusing attention on engagement, *Studies in Higher education* **36**, 8 (2011).
- D. Nicol and D. Macfarlane-Dick, Formative assessment and self-regulated learning, a model and seven principles of good feedback practice, *Studies in Higher education* **31**, 2 (2006).
- Moon, The programme and module handbook, chap 9
- L. Hendy, The year of the teacher's voice: a vcn initiative, *Newsletter of the International Centre for Voice* **4**, 5(2006)
- S. Martin and L. Darnley, *The Teaching Voice* 2nd Ed. L. (2004) London: Whurr Publishers
- J. Murray, Protect your voice, *Times Educational Supplement* (9th Jan 2004)
- M. Shevlin, P. Banyard, M. Davies, and M. Griffiths, The validity of student evaluation of teaching in higher education, *Assessment and Evaluation in Higher Education* **25**, 4 (2000)
- Hounsell (2009) Evaluating courses and teaching.

Indeed, the module I created and designed was almost entirely a reflection on some of the aspects that we, as lecturers, need to learn (such as oratory techniques, techniques to warm out and use the vocal folds properly, etc). I enjoyed the module and to reflect on these issues during the preparation of my essays very much, and got good grades (69 and 67 in the two assessments). It should be highlighted that these grades were particularly good given the fact that the module I design was in principle outside my discipline, a choice I took to widen my knowledge on education and to reflect on pedagogical issues beyond my narrow area of expertise.

As a further result of my interest in education, I participated (as QMUL representative) in the submission of an Erasmus+ KA2 project in liaison with a consortium of European universities and organisations, entitled “*Transversal Skills for Employability and Entrepreneurship*”, whose aim was to develop basic and transversal skills using innovative methods, to promote entrepreneurship education and social entrepreneurship among young European individuals (V3).

In the last years I have indeed learned how to deliver better explanations, how to be of more help to students, to promote participation (e.g. by promoting qmplus forum (V2)), how to respect the individual process of learning (V1) by providing tailored explanations during office hours, and how to link the day-to-day teaching with the intended learning outcomes so as to enhance organic understanding (K3).

Finally, I also incorporate these pedagogical reflections in my research conference and seminars (last year I delivered invited seminars at seven UK universities) (V3). I now manage to successfully give technical seminars and effectively engage the audience by coming back to the main (nontechnical) questions every now and then

Academic Development Programme

Centre for Academic and Professional Development
Queen Mary University of London



Queen Mary
University of London

(which is the equivalent to relate day-to-day lectures content with the intended learning outcomes).



The UK Professional Standards Framework

Areas of Activity	Core Knowledge	Professional Values
<ol style="list-style-type: none"> 1 Design and plan learning activities and/or programmes of study 2 Teach and/or support learning 3 Assess and give feedback to learners 4 Develop effective learning environments and approaches to student support and guidance 5 Engage in continuing professional development in subjects/disciplines and their pedagogy, incorporating research, scholarship and the evaluation of professional practices 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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