

Quality Assurance / Quality Improvement
Programme for Academic Units
2005-2006



Peer Review Group Report
for the
School of Mathematical Sciences

Prof Martin Newell: NUI Galway (Chair)

Prof Christopher Baker: The University of Manchester & the
University of Chester

Ms Aisling Kennedy: Director of Professional Affairs, The Society
of Actuaries in Ireland

Dr Gerard McNamara: Head of School of Education Studies, DCU

Ms Ursula Baxter: Senior Faculty Administrator, DCUBS
(Rapporteur)

8th to 10th March 2006

Introduction

This Quality review has been conducted in accordance with a framework model developed and agreed through the Conference of Heads of Irish Universities' (CHIU) Inter-University Quality Steering Committee (IUQSC) and complies with the provisions of Section 35 of the Universities Act (1997). The model consists of a number of basic steps.

1. An internal team in the Unit being reviewed completes a detailed self-assessment report (SAR). It should be noted that this document is confidential to the Unit and to the Review Panel and to senior officers of the University
2. This report is sent to a team of peer assessors, the Peer Review Group (PRG) – composed of members from outside DCU and from other areas of DCU – who then visit the Unit and conduct discussions with a range of staff, students and other stakeholders.
3. The PRG then writes its own report. The Unit is given the chance to correct possible factual errors before the PGR is finalised.
4. The Unit produces a draft Quality Improvement Plan (QuIP) in response to the various issues and findings of the SAR and PRG Reports.
5. The PRG Report and the Unit draft QuIP are considered by the Quality Promotion Committee.
6. The draft QuIP is discussed in a meeting between the Unit, members of the Peer Group, the Director of Quality Promotion and Senior Management. The University's responses are written into the QuIP, and the result is the finalised QuIP.
7. A summary of the PRG Report, the QuIP and the Executive Response is sent to the Governing Authority of the University, who will approve publication in a manner that they see fit.

This document is the report referred to in Step 3 above.

1. Profile of the School

Location of the Unit

The School of Mathematical Sciences is located in a single unit measuring 321 square metres. This is on the first floor of the Science Block – the X building. The accommodation comprises seventeen academic offices, a School office and two postgraduate areas. The smaller of the two postgraduate rooms is fitted with 8 desks. The larger area is a thoroughfare with no natural light.

In regard to office space, the accommodation is sufficient for present needs but has no space for expansion of the School. Currently, each member of staff has the sole use of an office, which is fully equipped with a PC having broadband internet access.

Staff

The School has 14 full-time academic staff – 1 Professor, three at Associate Professor level, two Senior Lecturers and eight Lecturers. It has a full-time School Secretary. It also has 1 full-time temporary lecturer (who runs the Mathematics Learning Centre) and 3 part-time adjunct lecturers. There are 10 full-time postgraduate research students accommodated in the unit

Product / Processes/ Programmes

The School of Mathematical Sciences is one of the six component schools making up the Faculty of Science and Health. It serves the mathematical needs of the university, national and international communities through its teaching and individual and collaborative research activities.

The school is solely responsible for two undergraduate programmes – the BSc in Financial & Actuarial Mathematics and the BSc in Mathematical Sciences, and two ~~h~~ postgraduate programmes – the Graduate Certificate in Actuarial Science (part-time over two years), the MSc in Financial & Industrial Mathematics (full-time over 1 year).

A new undergraduate degree, the B.Sc. in Quantitative Finance, offered jointly with the Business School commences in September 2006.

The School also performs “Service Teaching” in degree programmes run by other Schools in DCU (the exception being the Schools of Electronic Engineering and of Mechanical & Manufacturing Engineering).

The Mathematics Learning Centre was set up by the School in February 2004 in order to address the problem of mathematics preparedness in DCU. It is open to students of all faculties who require assistance with mathematics problems.

2. The Self-Assessment Process

The Co-ordinating Committee

Professor John Carroll

Associate Professor Emmanuel Buffet

Dr. Niamh O'Sullivan

Ms Karen O'Shea – School Secretary

Donal Dowling – Manager of the Mathematics Learning Centre

Noel Fitzpatrick – Postgraduate research student

Methodology Adopted

The task for the School Quality Coordinating Committee was the monitoring of the progress of staff who were assembling the various report elements.

The Head of School was responsible for putting the report together with much help from several people in the School for individual sections:

Chapter 2: Jurgen Burzlaff; Chapter 3: Eugene O'Riordan; Chapter 4: David Reynolds; Chapter 5: Angela Murphy; Chapter 6: Emmanuel Buffet; Chapter 7: Brien Nolan. Prof Carroll wrote Chapter 1 and compiled all the appendices except E, F and G. David Reynolds and Turlough Downes had responsibility for Appendix E (Research Data). The major share of the work on Appendix F was done by Donal Dowling

Regarding the School Plan (Appendix G), 4 junior members of staff (John Appleby, Turlough Downes, Brien Nolan and Niamh O'Sullivan) were asked to perform a SWOT analysis the results of which were then brought to a special School meeting. Following agreement there, the same group of 4 was asked to identify the type of actions / objectives which the School should embark on over the next 5 years. Again, these were returned to the School for agreement. The School Plan grew from these events and hence Appendix G.

The School Secretary Karen O'Shea procured and converted graphics files into LaTeX, and assisted in all stages including assembling the final report

3. The Peer Review Group Process

The Review Group

Prof Martin Newell: Department of Mathematics, NUI Galway (Chair)

Prof Christopher Baker: School of Mathematics, the University of Manchester & Department of Mathematics, the University of Chester

Ms Aisling Kennedy: Director of Professional Affairs, The Society of Actuaries in Ireland

Dr Gerard McNamara: Head of School of Education Studies, DCU

Ms Ursula Baxter: Senior Faculty Administrator, DCUBS (Rapporteur)

Site Visit Programme

Day 1 (Wednesday 8 March 2006)

14.00 – 15.00 Meeting of members of the Peer Review Group

	Briefing by Director of Quality Promotion.
15.00 – 16.30	Group agreed final work schedule and assignment of tasks for the following two days
16.30 – 17.30	Consideration of Self-Assessment Report with School of Mathematical Sciences (included 15 minute presentation from School of Mathematical Sciences)
19.30	Dinner for members of the Peer Review Group, Head of School and Unit Quality Co-ordinating Committee
<i>Day 2 (Thursday, 9 March 2006)</i>	
09.00 – 12.00	Meetings with representative selections of students and recent graduates:
	9:00 FM Class Reps
	9:30 MS Class Reps
	10:00 MFM Class Reps
	10:30 Coffee Break
	11:00 Research Students
	11:30 Graduates
12.00 – 13.00	Further consideration by PRG of self-assessment report
13.00 – 14.00	Lunch for members of Peer Review Group
14.00 - 17.00	Further consideration of Self-Assessment Report and other inputs from other School of Mathematical Sciences staff, as appropriate, including administrative and support staff.
	14.00-14.30 Service Teaching – Client Schools
	14.30-15.00 Administrative staff
	15.00-15.30 Contract academic staff
	15.30-16.00 Coffee Break
	16.00-16.40 Lecturing staff
	16.40-17.15 Senior Lecturing staff
17.30 – 18.00	Meeting of Peer Review Group to identify remaining aspects to be clarified and to finalise tasks for the following day
19.30	Working private dinner for members of the Peer Review Group
<i>Day 3 (Friday, 10 March 2006)</i>	
8.30 – 9.00	Meeting with President, Registrar, Secretary and Director of Human Resources (Director of Quality Promotion in attendance)
9.00 – 9.15	Tour of Campus including the Maths Learning Centre room in the Henry Grattan building
9.30 – 10.15	Meeting with Dean of Faculty of Science and Health
10.15-12.30	Further consideration of self-assessment report
12.30 – 12.45	Brief Discussion with the Director of Quality Promotion followed by working (sandwich) lunch for members of Peer Review Group
12.45 – 16.00	Preparation of 1 st Draft of Final Report
16.00 – 16.30	Exit presentation to <u>ALL</u> staff of the School made by the Chair of the Peer Review Group summarising the principal findings of the Peer Review Group.

Methodology

The Self Assessment Report was received in advance of the site visit by all members of the PRG. The DCU Quality Promotion Unit provided adequate information for the PRG during the process. The initial briefing given by the Director of Quality Promotion was useful in outlining to members of the PRG their roles and responsibilities.

The methodology did not include attendance at lectures or in-depth appraisal of research output by members of the PRG, nor did the Review Group meet with any former students who had failed to complete studies. (The Self-Assessment provided background information on the related areas.)

The PRG met on day 1 and Prof Martin Newell agreed to assume the role of Chair. To coordinate preparation of the report, it was decided to allocate responsibility for collating views according to the following distribution:

Background and Context - all

Organisation and Management – Prof Martin Newell

Programmes and Instruction – Ms Aisling Kennedy

Scholarship and Research – Prof Christopher Baker

Social and Community Service – Dr Gerard McNamara

Staffing, Accommodation and Resources – Ms Ursula Baxter

Schedule of Activity

The Committee attended all of the meetings together. The timetable, although very full, left time on the Friday for full consideration and preparation of the PRG Report.

On the first afternoon the PRG attended a short presentation by the Head of School outlining their main concerns.

At the arranged meetings with staff and students all questions were answered fully and completely. All feedback from students and service teaching client schools was very positive about the willingness, helpfulness and availability of the Mathematics teaching staff.

All assistance requested of the Head of School and School Secretary was immediately forthcoming. A formal tour of the campus was deemed not necessary as the PRG had meetings in several different locations and so obtained an overall feel for the university campus.

View of the Self-Assessment Report

In general terms, the PRG was very impressed with the SAR and the Appendices supplied. These were generally comprehensive, well laid out and thorough. The group appreciated the amount of time and effort put in by staff involved in the report preparation.

While not a requirement, it would have been helpful to have the SAR available in Word format. We would suggest that the Quality Office make this a formal requirement.

4. Findings of the Review Group

Background and Context

Successful and sustainable initiatives with a unit such as the School of Mathematical Sciences are contingent upon the environment within which it operates and the provision of reliable organisational support (from the senior University officers, the Faculty and the other DCU faculties, Administration, Estates, etc.), adequate finance, and constraints and perceptions originating in wider society. DCU is similarly constrained by the support and funding from government, its capacity to acquire additional income from private or public sources (including national and European funding, and contract income), and public perceptions of the quality of its activity.

While rigorous standards of professionalism are expected from all members in the employment of DCU, there are limits on what can be achieved simply by increasing demands on staff for whom the University has a duty of care. What is generally recognised by good managers is that high morale amongst the staff contributes enormously to the attainment of the institution's objectives.

The teaching role of a university, disseminating learning and culture at various levels and in varying manners, is quite widely perceived in society. The School of Mathematical Sciences makes a significant contribution not only through its successes in undergraduate and postgraduate teaching and research, but in non-credit courses such as provided in its support for talented children of school age.

At an opposite end of the mathematical spectrum are children who may have potential at mathematics but whose mathematical ability has not been developed. In some cases, this may be a reflection of a mathematical culture that is struggling to survive in schools and is unrecognised within many family traditions. Mathematical understanding and culture should be regarded as *at risk*. The role of mathematics as the foundation for the sciences, engineering, economics, decision theory, etc., (it may be noted that some components of the mathematical sciences, such as statistics, are not included within the School of Mathematical Sciences) makes this a matter of economic as well as cultural concern.

DCU has recently supplemented the perceptions of its mission by the promulgation of a set of strategic objectives. These clearly indicate that DCU sees a role for itself in developing and strengthening its research standing. Such a set of objectives requires an appropriate structural, organisational, and financial basis to succeed. It may be that the organisational basis best suited in this context transcends faculty and school boundaries. (There certainly appears to be a dichotomy between the need to achieve research-linked objectives and a funding model that allocates academic staff to units such as the School of Mathematical Sciences on the basis of student numbers, and the process of allocation of non-staff funding does not appear to be transparent, nor widely understood.) Academic staff need to be reassured that worthwhile objectives supporting the university's strategic initiatives will receive support from the Faculty and the University.

In making assessments of the attainment of its objectives, DCU might wish to examine experience in other countries with processes for assessing quality of research and teaching. Such experience may, in particular, suggest target levels of student retention and distinctions between research that is nationally excellent or internationally leading.

The School is very satisfied with the services and facilities provided by the Library in relation to provision of journals, electronic subscriptions, books and inter-library loans. The Educational Services unit is considered extremely helpful in relation to equipment borrowing and room bookings. It finds response time from Estates Office very slow in many cases, with multiple follow up calls required. Finance and Human Resources departments are sometimes slow to respond and it appears that their information sometimes contains uncorrected errors. The availability of the Finance system Agresso online has greatly speeded up the availability of financial information.

The School is operating in a period of demographic change in Ireland. While the overall participation rate in Irish higher education is quite high at around 50%, new entrants are highly concentrated in the 18-20 year old age group. However between 1998 and 2012 there is a projected fall of 36% in the numbers of school leavers. The annual cohort of second level school leavers is forecast to decline from around 70,000 in 1990 to about 53,000 in 2015.

Organisation and Management

The consultative and management structures within the School are well established and successfully contribute to the efficient running of the unit. The existing range of administrative tasks appears to be, broadly speaking, equitably distributed among staff members and the schedule for staff meetings is well organised. Members of staff expressed support and appreciation for the administrative initiatives undertaken by the current head of department, Professor John Carroll. The departmental committee structure covers the major topics of Research, Teaching and Learning Strategy, Evaluation and Planning and offers all members opportunity to participate in school policy making.

The vital and pivotal role played by the departmental secretary Ms. Karen O'Shea is recognised and appreciated by the school. Her contribution greatly exceeds the expected norms of her present position. The specialist knowledge she has of sophisticated mathematical computer languages is an immeasurable asset to the Department.

Programmes and Instruction

Undergraduate programmes

The School currently offers two undergraduate degree programmes, a BSc in Mathematical Sciences (MS), which is a four-year course in applied mathematics and a BSc in Financial & Actuarial Mathematics (FM), which is designed to enable students to gain exemptions from the "Core Technical" series of examinations of the Institute and Faculty of Actuaries.

The low student numbers on the MS degree pose a serious threat to its existence. Low and falling student retention rates are a further concern. Monitoring of student reactions in the initial weeks (and later) in the first year could avert some of the problems, and positive reaction to student feedback is critical. However, an imaginative yet realistic restructuring of this programme must be an immediate priority for the School. In this respect, it is important to provide a course that is appropriate to students at the level of ability at which they enter the university. It may be possible to provide a four-year course in which the first year served as a foundation in the mathematical sciences for students who have aptitude but have not developed their mathematical thinking, and in which subsequent years drew upon material already taught to undergraduates.

The entry level for the FM degree is higher than that required for the MS degree. While demand for the FM degree is strong, the decision last year to reduce the entry level points for this course in order to increase student numbers, unless reversed, is likely ultimately to undermine student and employer demand for the programme, and will thus be counterproductive. The School has identified this as a major concern and believes that the entry requirement needs to be restored to 500 points.

As a joint initiative between the School of Mathematical Sciences and the Business School, a new undergraduate degree programme in quantitative finance is due to commence in Autumn 2006. This is geared to meeting an identified demand in the financial services sector for quantitative modelling and risk management skills. Initial demand for the course appears to be reasonably strong and, although it may to some extent encroach on demand for the FM degree, it should provide a welcome boost to the School's student numbers.

The School is also collaborating with the Schools of Education, Chemical Sciences and Physical Sciences on the establishment of a Mathematics stream for the BSc in Science Education. This would provide a professional qualification in teaching mathematics (plus either physics or chemistry) to honours Leaving Certificate level. It is hoped that the first intake to the new degree will be in Autumn 2007, with an anticipated annual student intake of 10 initially, rising eventually to 20.

The Review Group received very positive feedback from the current and former students whom it met.

Service teaching

The School teaches a total of 13 modules into programmes in DCU Business School, the Faculty of Engineering & Computing and the other Schools in the Faculty of Science & Health. This is an important component of the School's teaching output, with approximately 1,200 students taking these modules in 2005.

The Review Group received exceptionally positive feedback from the “client” schools on the quality of the service teaching provided by the School of Mathematical Sciences. There are, however, some concerns in relation to the difficulties that first year Science students experience with mathematics. In this context, the support provided by the Mathematics Learning Centre is seen as vital by the school itself, by the “client” schools and by the Review Group.

Postgraduate programmes

The School currently provides two taught postgraduate programmes:

- a one year full-time MSc in Industrial & Financial Mathematics
- a one part part-time graduate certificate for actuarial students seeking exemptions from certain of the "Core Applications" series of examinations of the Institute and Faculty of Actuaries.

Concerns have been expressed by the School in relation to a decline in the quality of students entering the MSc in Industrial & Financial Mathematics over the past two years.

A part-time MSc in Financial Mathematics is no longer offered due to a fall-off in demand.

The Review Group received very positive feedback from the students that it met.

New programmes

There are plans to introduce a further graduate diploma in actuarial science covering the actuarial profession's "Core Technical" subjects. Whilst developments in the actuarial profession's education strategy should help to create demand for this from across Great Britain and Ireland there is likely to be strong competition in this regard from other universities with a financial mathematics capability.

The School has also identified an opportunity to provide further education courses for secondary school mathematics teachers.

Evaluation of programmes

The Review Group believe that there is a need for more systematic evaluation of modules and programmes, in particular with a view to addressing the difficulties being experienced by first year undergraduates. Particular efforts need to be made to provide teaching support for weaker students and to help motivate them to continue their studies.

Scholarship and Research

The Self-Assessment Report identifies attitudes and objectives that are consistent with the DCU Strategic Plan 2006—2008, and the President of DCU has indicated that the University will endeavour to support agreed developments within the School of Mathematical Sciences that clearly foster the mission and strategic objectives of DCU.

The notable research strengths of the School of Mathematical Sciences, as indicated by published research output, lie in clearly delineated research areas of mathematics. In particular, the School is fortunate in having a number of younger members of staff who are prolific publishers of research, in international journals. A breakdown of the refereed publications during the period under review shows relative strengths. There are other research and scholarship indicators, including conference participation and organisation, invited talks, and the award of research grants. There appear to be no other major indicators of scholarship, such as contributions to mathematical software, the authoring or editing of books, the award of national or international prizes, etc.

The School has noted the non-uniformity of research output across the academic staff. The School has a Research Coordinator, and has expressed the intention to develop a methodology for the management of research. The details of such a methodology have not, as yet, been agreed.

Social and Community Service

The School's Self-Assessment Report outlined the work being undertaken in the areas of external relations and also considered this under "Organisation and Management".

The related sections of the self-assessment are very thorough and indicate that a great deal of work is being done by the School in the field of external relations/social and community service and in relation to involvement in a wide range of internal University committees and groups.

For example, considerable work is outlined in areas such as school career talks and other school liaison activities, providing mathematics modules as part of the access programmes offered by the access service and also providing mathematics modules on programmes offered by the Centre for Talented Youth in Ireland.

These sections also detail the work of School staff in relation to service on University committees such as the Research Advisory Panel, Academic Council, the Working Party on Academic Structures and so forth. Relationships with other internal and external bodies are also considered including relationships with other Schools and Faculties, the Society of Actuaries in Ireland and other Universities at home and abroad.

Finally it is noted under international relations that no allowance is made in terms of teaching allocation or promotion for this work of "public service" and a question is raised as to whether this should be the case.

Staffing, Accommodation and Resources

The School, while adequately staffed in its own opinion, is considered under the University budget distribution model to be overstaffed by 5 permanent

members. This is because the budget distribution model allocates resources based on the product of the number of module credits for each module taught, the number of students taking each module, and a weighting. In the case of the Mathematics School the weighting is 0.6. This is less than other Schools in the Faculty of Science and Health but greater than some other schools in the university. The School of Mathematical Sciences feels that this disadvantages them unfairly, and has remarked on the fact that different Units would receive different staffing rewards for performing identical teaching for a given cohort of students. As significantly, the university's system of staff allocation is more appropriate to an institution that has only teaching responsibilities, rather than a university with an additional commitment to scholarship and research.

The office accommodation in a self-contained unit is satisfactory for the School's current needs. It would not allow for expansion of staff or research student numbers. The SAR highlighted a view of the Mathematics lecturers that some of the classrooms are not suitable for the teaching of mathematics. Classrooms are under the remit of the Educational Services Unit of the university.

The lack of dedicated computer laboratory space for students is an issue. The students were without use of PCs for part of Semester 1 but this problem has now been resolved satisfactorily with facilities made available by the School of Computing. While the students were very appreciative that the problem has been resolved satisfactorily it would be imperative that this arrangement would continue and that the same problem would not arise at the start of the next academic year. The open access computer labs in DCU are not suitable for use by mathematics students because the applications used necessitate high spec PCs that are not generally available.

The Mathematics Learning Centre (MLC) and its precarious funding situation was a major concern. It received two years funding under the HEA Special Initiatives scheme, which has now ended. Currently it is being funded by the Faculty of Science and the Office of the Vice President for Teaching and Learning. This appears to the PRG to be a resource that benefits the university as a whole and should be established on a permanent basis. Currently it is open to students from all faculties and is used in the main by non-mathematics students. This is especially important in view of the declining mathematics ability of students coming into the university system

5. Overall Analysis of Strengths, Weaknesses, Opportunities and Concerns

Organisation and Management

Strength:

The assurance that the PRG received from the President of the university that budgetary constraints will not impede concrete development proposals for Mathematical Sciences is accepted as a source of encouragement and

motivation. The prospect of imminent reform of the University Budgetary Model will afford the School a realistic opportunity of achieving important stated goals in its Strategic Plan.

Weakness:

In the context of Organisation and Management the Review Group is convinced that future development will rely crucially on a leadership strong enough to manage change and possessing the vision and drive to create and seize new opportunities, and the support of a body of academic staff enthused by the prospect of a thriving and successful School.

Opportunity:

Within a university structure that is unlikely to change in the near future, it is imperative that opportunities for new joint programmes that exist within the Faculty of Science and Health be explored and exploited.

Threat:

In an environment of steady decline in the number of students reading Mathematics at honours level at University and contemporaneous increasing demand for mathematical support by students in other disciplines, it is vital that under strong leadership the academic staff in the School take ownership of impending challenges and change. If support from outside the School is not forthcoming, this implies an effort on the part of the staff within the School to overcome or circumvent, by their own efforts, what they perceive to be barriers to the development of the School. Determined immediate action in the areas of programme development, student recruitment and increased research activity is critical.

Programmes and Instruction

Strength:

The School's financial and actuarial mathematics programmes have a strong track record.

The School's reputation within the university for its service teaching is excellent.

Positive developments in relation to the development of new programmes include a new Quantitative Finance programme coming on stream this year, and a mathematics stream for the Science Education degree, which is currently being accredited.

Weakness:

The MS degree requires fundamental review and redevelopment.

The feedback that the Review Group received from undergraduate students indicated that some of them were surprisingly uneasy about the computing component of their programmes, and this is an area that may require attention in terms of the delivery of the relevant elements of the programme.

Opportunity:

There appear to be opportunities that have not yet been exploited for creative collaboration, in particular, with other schools within the Faculty of Science & Health, to develop innovative new undergraduate and postgraduate programmes.

It would appear that there is scope for more use of e-learning facilities, including Moodle, the DCU virtual learning environment, within the School.

There is scope for supplementing the Undergraduate Prospectus and Postgraduate Prospectus using additional material on the web.

Threat:

The low student numbers on the MS degree pose a serious threat to its existence. The decline in entry points for the FM degree is also a major cause for concern.

Scholarship and Research

Strength:

The enthusiasm and productivity of a number of younger staff and the high average publication rate for the School are causes of satisfaction.

Weakness:

The establishment of research links, appointments as referees or to editorial boards, the recruitment of postgraduate students, success in securing funding, and the profile of the School, are all fostered or enhanced by good publicity. A major contributing factor is adequate university, school, and personal web pages, where preprints, research projects, links to funding opportunities, etc., can appear (web pages can be used for the dissemination of access to published research and pre-prints). There is considerable scope for improvement in these respects.

Opportunity:

In the view of the Review Group, whilst variations amongst staff are to be expected, contributions to research and scholarship over a period of years should be sustainable and sustained by all the full-time members of academic staff, and a management strategy that fosters this could be and should be introduced. Such a management strategy depends upon an intimate familiarity of senior staff with the record of individual members of staff. One suggestion is that of a Table of Research Activities should be constructed as a tool for research management, to show publications, grants, postgraduate students, invited talks, etc., by staff member. The observation that the size of grants in certain laboratory sciences dwarfs the funding available in mathematical sciences cannot be used to suggest that mathematics funding is of no consequence.

Social and Community Service

Strength:

The review panel were impressed with the range and depth of the activities under this heading included in the self assessment report. It is clear that the School and its staff take their work in this area very seriously and that many, as the surveys presented show, actively contribute.

Opportunity:

The review panel wishes to suggest that a number of these areas require major priority treatment given that the identification and recruitment of new cohorts of students must be made a key priority of the School. In this regard it is recommended that relationships with schools, particularly those within the university's catchment area, be considerably stepped up through the appointment of a schools liaison officer from the School staff.

Urgent development of new advertising and publicity approaches and the creation of links through teacher training and in-service provision with schools

is also needed as is the constant updating of School advertising particularly on the Web.

It is suggested that a possible way forward could involve the extensive advertising of the support available to students who may fear their mathematics is not quite up to the level necessary for success in the University. Particularly important here is the development of the Mathematics Learning Centre which should not only be secured and developed but used in a major advertising drive.

Staffing, Accommodation and Resources

Strength:

The School has active, committed and cooperative academic staff with excellent secretarial and administrative support.

Weakness:

The assessment by central administration that the School is overstaffed .

The School has identified that there is an over reliance on part-time lecturers to deliver core actuarial teaching.

Existing accommodation has no space for expansion of the School.

Opportunity:

Use sabbatical leave to allow staff develop or acquire skills suited to more relevant areas for teaching.

Promote the Mathematics Learning Centre as a support to encourage more students to study Mathematics at DCU and to improve student retention rates.

Threat:

The future of the Mathematics Learning Centre is in doubt because of funding
A guarantee of access to high-spec computers for students should be confirmed

6. Recommendations for Improvement

The PRG's recommendations are organised using the same divisions as in Section 4 and 5 above. To facilitate planning of quality improvement measures, each recommendation is qualified by an indication of priority as follows:

- P1: A recommendation that is important *and* requires urgent action.
- P2: A recommendation that is important, but can (or perhaps must) be addressed on a more extended time scale.
- P3: A recommendation which merits serious consideration but which is not considered to be critical to the quality of the ongoing activities in the Unit.

Additionally, the PRG has attempted to indicate the level(s) of the University where action is required:

- A: Administrative Unit
- U: University Executive/Senior Management

Where considered appropriate, action at multiple levels has been recommended: this should be considered as inclusive, indicating a need for co-ordinated, complementary actions at *both* the indicated levels. For instance: P1A would indicate a recommendation that is important and requires urgent action at Unit level.

Organisation and Management

- P1U.** Under the current rigid promotional policies it is impossible for Ms. Karen O'Shea to advance her career within the school. It was clear to the Review Group that the loss of her expertise and commitment to the School would damage the School. It is recommended that promotional policies be modified to allow the promotion of holders of school secretarial posts to a higher grade or level of appointment, commensurate with the personal skill and qualifications exercised.
- P1A.** It is recommended that the development tasks which will necessarily arise during the term of the next headship should be identified and prioritised.

Programmes and Instruction:

- P1A.** It is recommended that the proposed fundamental review and redevelopment of the MS degree programme be progressed urgently. .
- P1AU.** It is recommended that the entry point level for the FM should not be allowed to fall below 500, even if in the short term this reduces the numbers of students entering the course.
- P2A.** It is recommended that the School should drive the accreditation process for the mathematics stream of the Science Education degree.
- P3A.** It is recommended that the School should consider the provision of further education courses for secondary school mathematics teachers.

Scholarship and Research:

- P1A.** It is recommended that the School should develop a strategic plan for research and adopt a proactive approach to locating or creating research opportunities. This requires familiarity with the staff activity in research and scholarly publication, applications and awards of grants or contracts, postgraduate supervision, and external research collaboration, and the identification, through consultation, of untapped opportunities. The introduction by a Research Officer of a targeted and sustained programme of monitoring funding opportunities and matching them to academic staff could prove to be very positive and should be considered.
- P2A.** It is recommended that appropriate levels of postgraduate supervision/ grant applications/publications should be identified for the School as a whole; the choice of these levels should be informed by the performance of other mathematics departments in Ireland and Europe.
- P3A.** It is recommended that the School instigate a process for semester-long "sabbaticals" from teaching. The scheme could concentrate on (a) those staff who have demonstrated, by past record and the submission of a research programme, an ability to benefit from such leave and/or (b) staff who need to develop new skills appropriate to new areas of teaching or research.

P3A. It is recommended that the School improve its research visibility on web pages (web pages can lead to increased research contacts and postgraduate applications), circulate posters on research opportunities to all departments in Ireland, and continue presentations on research opportunities in DCU.

Social and Community Service:

P1A. It is recommended that the School consider the appointment of a member of staff as a Schools Liaison officer, focusing in particular on secondary schools within the university's catchment area.

P3A. It is recommended that the School continue to develop its links with the actuarial profession. This could potentially include more participation in the meetings and activities of the professional bodies, including research and CPD (continuing professional development) programmes.

P3A. The Faculties of DCU have undergone relatively recent changes in their membership, and it is recommended that the School develop and build on new links within the DCU science education communities and exploit its position in the Faculty of Science and Health.

Staffing Accommodation and Resources:

P1U. It is recommended that the university (Budget Committee, Resource Review Group)/Teaching and Learning should fund the Mathematics Learning Centre as a university wide resource.

P1A. It is recommended that the School increase the pool of existing staff able to teach certain Core Technical modules – in which context it should consider training for existing staff rather than recruiting new staff.

P2U. It is recommended that the School continue to bring to the attention of the University the fact that the budgeting mechanism used by the University is at present inequitable. Provision of incentives is necessary.

P2A. It is recommended that the School liaise internally to ensure that suitable computer facilities are available to students at the commencement of the next academic year.

P3A. It is recommended that the School exploit university resources such as the Public Relations and Marketing office to make Mathematics degrees more attractive to second level students in an effort to reduce falling student numbers.
