

Quality Assurance / Quality Improvement Programme



Peer Review Group Report

School of Chemical Sciences 7 – 9 December 2016

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Introduction

This Quality review has been conducted in accordance with a framework model developed and agreed through the Irish Universities Association Quality Committee and complies with the provisions of Section 35 of the Universities Act (1997) and the 2012 Qualifications and Quality Assurance Act. The model consists of a number of basic steps.

1. An internal team in the School/Faculty/Office/Centre being reviewed completes a detailed self-assessment report (SAR). It should be noted that this document is confidential to the School/Faculty/Office/Centre as well as the Review Panel and 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 DCU and conduct discussions with a range of relevant staff, students and other stakeholders.
3. The PRG then writes its own report. The School/Faculty/Office/Centre is given the chance to correct possible factual errors before the PRG report is finalised.
4. The School/Faculty/Office/Centre 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 draft QuIP are considered by the Quality Promotion Committee (QPC) and University Executive.
6. The draft QuIP is discussed in a meeting between the School/Faculty/Office/Centre, members of the PRG, the Director of Quality Promotion and members of Senior Management. The University's responses are written into the draft document and the result is the finalised QuIP.
7. The PRG Report and the QuIP including the University's response is sent to the Governing Authority of the University, who approves publication in a manner that it sees fit.

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

1. Introduction and Overview

Location

The SCS is located in the Lonsdale Building (also known as the 'X Block'). All undergraduate laboratories, academic offices and majority of School research laboratories are located within the Lonsdale building. It should be noted that some members of staff that belong to University Research Centres, might also have research space or additional research space located in Research Centre buildings.

Staff

The School currently has a total of 29.5 staff members:

- 16 permanent academic staff members (of which 3 Professors are on 1/3rd each secondment)
- 2 contract staff members (one year contracts)
- 10 technical staff members
- 1.5 administrative staff members.

Functions / Activities / Processes

The School of Chemical Sciences (SCS) is a core academic unit within the Faculty of Science & Health (FSH) in Dublin City University (DCU). The School is an active teaching and learning centre of Chemical Sciences education and research. The School is unique in having established expertise across a variety of disciplines, thus allowing the delivery of a range of innovative and industrially-relevant degree programmes. The School was founded in 1980 as one of two schools in the Faculty of Science and Health (FSH, formerly the Faculty of Science and Pharmaceutical Studies) and established the first Faculty degree programme, the BSc in Analytical Science (AS), with collaboration from the School of Biological Sciences (now School of Biotechnology: SoBT). The School subsequently developed a basic and applied flagship chemistry degree programme in 1991 as the BSc in Pure and Applied Chemistry which subsequently changed to the BSc in Chemical and Pharmaceutical Sciences (AC) in 2001. The School plays major central roles within the BSc programmes of Environmental Science & Technology (EST) and Science Education (SE) which are two cross-Faculty programmes, as well as providing a solid, fundamental education in chemistry together with extensive service teaching into several Schools and Faculty degree programmes. The overall quality of teaching within the SCS is measured by the calibre of national and international students that it continues to attract, as well as the success and influence of its active Alumni. Innovation in teaching methods in formal lectures, laboratory practice and outreach programmes is pursued by its academic and technical staff.

The School is an active centre of fundamental and applied chemical research. The SCS supports several intersecting research themes including environmental and geochemical sciences, catalysis, sensors, bio-inorganic and medicinal chemistry reflecting the diverse multi-disciplinary expertise of the academic staff. Most staff are affiliated with DCU-based national centres of excellence and to University designated research centres including the National Centre for Sensor Research (NCSR); Biomedical Diagnostics Institute (BDI); National Institute for Cellular Biotechnology (NICB); INSIGHT@DCU (Centre for Data Analytics); Advanced Process Technology Research Centre (APT); and the DCU Water Institute as well as making major contributions to the International Centre for Neurotherapeutics (ICNT). The quality of the School's research and the international standing of its academic staff are reflected by funding success from numerous national and international agencies (including direct funding from industry). The School has played a central role and has made major contributions to successful HEA research initiatives such as PRTL I, III and IV, that has led to enormous developments in infrastructure, education and research within DCU in the past 15 years. The academic and technical staff have made huge contributions to the quality and quantity of the School's international peer-reviewed research papers, journal front covers, journal editorships, patents and invention disclosures, and with many extensive collaborative links with research groups nationally and world-wide e.g. ISCA-Brazil. The School's various research, training and enterprise missions fully complement the DCU strategy of

'Transforming Lives and Societies' as well as contributing to the recent and highly successful DCU Incorporation process (e.g. through the BSc in Science Education) offered in conjunction with the new Institute of Education.

2. The Self-Assessment Process

Co-ordinating Committee

A School Quality Review Committee (SQR Committee) was established in September 2016 to oversee the planning process for the review and to develop the SAR. The Committee membership is outlined below.

Name	Role in School	Contribution to process
Dr Kieran Nolan	Head of School (HoS)	Chair of committee and coordinator of process. Co-author
Dr John Gallagher	Chair of AC degree programme	Committee member. Co-author
Professor Apryll Stalcup	Director ISSC	Committee member
Mr John McLoughlin	Technician	Committee member

SQR Committee Methodology

The Committee was closely supported by the Quality Promotion Office at DCU who supplied essential statistics and advice in the construction of the SAR. Statistics were also obtained from the DCU Office of the Vice President for Research and Innovation and from Human Resources. As this was an internal reflective approach the committee believed it essential to have input from all staff, postgraduate students and undergraduates. To achieve this objective, the SQR Committee created seven focus groups within the SCS as follows:

- i. Professors
- ii. Senior Lecturers
- iii. Lecturers
- iv. Technicians
- v. School postgraduate students
- vi. AC4 students
- vii. AS4 students

The focus group discussions were led by members of the SQR Committee. On the advice of the University Quality Promotion Office, a series of questions was used to lead these discussions. Analysis of the focus group meetings was then carried out by the SQR Committee to construct a SWOC analysis that was discussed within the SAR report.

3. The Peer Review Group

Peer Review Group Members
Professor Pat Guiry Director of the Centre for Synthesis and Chemical and former Head of School School of Chemistry UCD Dublin
Professor Donald Hastie (Chair) Chair, Department of Chemistry Faculty of Science York University Toronto, Canada
Dr. Richard Murphy Director of Research Alltech European Bioscience Centre Dunboyne, Co. Meath
Dr. Emer Ní Bhrádaigh (Rapporteur) Léachtóir le Fiontraíocht / Lecturer in Entrepreneurship Fiontar & Scoil na Gaeilge Dublin City University
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Self-Assessment Report (SAR)

Overall, the SAR was an internally reflective document, giving an overview of the main functions and structures of the SCS. The SAR and associated review process indicated a good level of engagement in preparation for the Review. The SWOC analysis demonstrated considerable self-reflection by SCS staff in determining their current position, and identifying some of the opportunities open to the SCS. The appendices were detailed and wide ranging. All information provided assisted the PRG in gaining in-depth knowledge of the SCS, its current position and its future potential. The last page of the SAR includes a number of plans for improvement, with which the PRG agrees and which are listed in the Recommendations of this report.

However, there were some gaps in the SAR. The SAR would have benefitted from a presentation and reflection on the School's external engagement. In particular, meetings with faculty level colleagues, the faculty leadership and external stakeholders would have contributed a lot to the self-assessment.

Review Visit Programme

The Peer Review Group spent three days (7 – 9 December 2016) on campus meeting with a wide number of School staff and students, central services staff, external DCU and non-DCU stakeholders, as well as the Senior Management Group. Overall, this process gave the PRG a comprehensive perspective on the School and its environment. See Appendix 1 for the timetable, the topics, and a list of attendees at each meeting with the PRG. It was noted that the external collaborators and employers had very close relationships with the School and that some employers less closely involved could have also made valuable contributions to the quality review. The PRG would have welcomed the opportunity to talk in greater detail to individuals in some university support units who are familiar with the SCS.

Methodology of Review Visit

The PRG first met with the Director of Quality Promotion who outlined the format of the visit, along with an overview of the aims and objectives of the review process. In the first private meeting, Professor Donald Hastie was chosen as Chairperson of the PRG. Following a general discussion of the SAR and appendices, several themes emerged as requiring exploration. Each member of the group took responsibility for a particular theme to explore during subsequent meetings.

Participants engaged with the PRG in an open and frank way, giving valuable feedback on a wide range of issues. Engagement with the SCS staff and the Quality Promotion Office was professional, accommodating and supportive throughout the visit. The Director of Quality Promotion and SCS staff were very helpful in providing additional information and data requested by the PRG at several stages during the review visit (see Appendix 2 for full list).

4. Findings of the Peer Review Group

4.1 Background and Context

The School is operating in a context of an increase in student numbers and a decrease in available funding and in staffing. It has had a number of recent setbacks including the unexpected resignation of a number of staff and the passing of the former Deputy Head of School. Despite these setbacks, the academic, administrative and technical staff all work hard in maintaining the high quality for which the School is known. The PRG was impressed by the staff's engagement in the quality review process.

4.2 Organisation and Management

The School of Chemical Sciences is housed in the Faculty of Science and Health. The Executive Dean is the chief executive officer for the Faculty and is appointed by the President on a five year term through open competition. As the Dean is the principal decision maker in the Faculty s/he is responsible for all budgetary and resource (human, spatial and financial) matters. The Dean is supported and advised by the Faculty Management Board (FMB) which comprises of Heads of School, National Research Centre Directors, Associate Dean for Teaching and Learning, Associated Dean for Research, Faculty Manager, Faculty Facilities Manager and two elected FSH representatives. The Dean disseminates information to the Faculty via the Senior Management Group and lobbies faculty interests to this group. The overall responsibility for the School rests with the Head of School and the management of the School is distributed through an executive committee comprising of the Head, Chief Technical Officer and two members of academic staff. The School also has a Teaching Committee that deals with all undergraduate issues and is comprised of the Head, Chief Technical Officer, School Teaching Convenor and the relevant degree Program Chairs. The School has a Safety Committee comprising of the Head, School Academic Safety Advisor (Academic member of staff), Chief Technician and one additional member of the Technical staff. The School also has a Research Convenor who liaises with the Head of School on research and postgraduate matters and sits on the Faculty Research Committee. The Teaching Convenor sits on the Faculty Teaching Committee (FTC). The Head of School also sits on Faculty Management Board and Academic Council. The interaction with the FSH is mainly through the School Teaching Planning Meetings held twice a year where School staff, student representatives (two student representatives per year and program – eight in total per program) meet to discuss teaching issues.

Findings on General Management

The School is led by a capable and respected HoS. He is supported in particular by the Teaching Convenor and the Chief Technical Officer who are highly dedicated, professional, and effective. It is clear that staff are fully engaged in contributing to the overall direction of the School, despite the challenges of reduced funding and staff vacancies. One key issue that arose is that the School relied heavily on the previous Deputy Head. From discussions with staff members, it is clear that the loss of the significant contribution made by the former Deputy Head has deeply affected staff members since his passing.

The HoS is on all committees and chooses to undertake a very large amount of the resulting responsibilities himself. Furthermore the panel observed that HoS is involved in administrative tasks that could be located with a School manager. A manager would also assist the HoS to manage the financial situation of the School and bring financial clarity to support important

decisions, such as increasing recruitment and enrolment. While the members of the executive committee communicate on School matters there are no formal meetings and no records are available. Furthermore the committee structure of the School has become informal and these committees do not meet regularly and do not report to the School as a whole. As school meetings are infrequent, the opportunity to disseminate important information and discuss issues related to the health and future of the School are limited. The School and HoS would benefit from introducing more structure and more supports, and more co-ordination and delegation of activities in order to reduce the workload. It also leads to staff not being sufficiently informed about the structures, practices and supports available in the rest of the university and hinders the development of the future leadership of the School. This in turn limits the clarity and strength of the School's voice at Faculty level increasing the sense within the School that it is not an active participant in the decision-making processes.

Commendations

The Head of School, Chief Technical Officer and Teaching Convenor contribute a huge amount of time and effort to the smooth successful organisation of the School.

The Safety Committee is commended for its practice of regular meetings, unannounced random safety audits and improvement plans.

4.3 Structure, Staff and Accommodation

The School is located in the Lonsdale Building and some members of staff have research space in Research Centre buildings. Any need for space refurbishment is communicated through the FSH to the University's Space Planning and Management Group (SPAMG) who will deal with any needed additional space allocation / modification to the School. The School currently comprises a total of 29.5 staff members of which 1 FTE on secondment to a number of Research Centres. This 1 FTE is made up of one third of the time of each of three Professor level academics, and is replaced by a 1-year contract academic at Lecturer level. The School occupies 2,864 square meters of space with 32% allocated to teaching, 12% for office space and 56% for non-centre related research. The relevant staff seconded to Research Centres also have space in those centres.

The School's capacity to offer places to highly qualified undergraduate applicants is limited by the current capacity of teaching laboratory spaces and equipment. There exists an opportunity for the School and the Faculty to increase the scale of their undergraduate offering by making available additional laboratory space and equipment. The School considers that there is a positive business case to such a plan. However there would be a need to increase Academic staff, Technical staff and instrumentation resources allocated to these laboratories. A clear analysis of the benefits to the School of going along this path needs to be conducted before any decisions on expanding laboratories can be made. This is a crucial issue for the future development of SCS programmes and must be resolved. The SCS has generated a plan to address this issue which would entail a minor increase in School budget for the upgrading of laboratory facilities. This plan would not only solve the existing overload from CES but would also allow for the expansion of the SCS undergraduate numbers resulting in increased revenue for the School.

During the visit it was clear that staff were stretched on all fronts. Increasing student numbers in conjunction with loss of staff are having a major impact on the functioning of the School. The panel were concerned with the additional burden placed on staff due the delays in hiring permanent academics. In particular it was felt that the reliance on part-time and/or temporary staff that may not be fully engaged in the whole spectrum of the School's activities added to the existing workload of staff.

The focus group feedback provided an excellent insight into the workings of the School. One key outcome was the levels of stress faced by staff as they face this difficult period. It was unclear from discussions with the HR representatives what processes were in place to support staff facing such problems. In addition, there did not seem to be a specific university policy on handling bereavement when staff have passed away while fully employed by the university.

In meeting with them, the PRG noted that among the Academic staff there was a concern about the very limited opportunities for promotion, and a strong perception that when it came to promotions and advancements in their careers that more emphasis was placed on the Research element of their role rather than the Teaching or Service. This led to the perception that such an emphasis had led to behaviours which encouraged a focus on research activities, rather than equally valuing teaching and other engagement activities.

Both research staff and the student body would like to see more common room space to be created within the School to enhance both communication between students and staff and to enrich their overall work/educational experience.

Commendation

The PRG commends all staff for continuing to support and deliver the School's goals, values and objectives, especially in these difficult times.

4.4 Progress report since last Quality Review

The last Quality Review of the SCS was conducted 13 years ago, in 2003-04. The SAR remarked (p. 4) that some but not all of that Review's PRG Recommendations were implemented successfully, and noted that some of the recommendations are now outdated due to changes in the internal and external environment. This PRG commends that the roles of Faculty Dean, Head of School and Directors of National Centres have been clarified, as have the roles of Schools and National Centres. It commends the provision of training to all laboratory demonstrators, and the mentoring of new staff. It also commends that the School set out a more realistic mission and developed meaningful performance indicators. The PRG commends the attention paid to first year teaching, development of new (including multi-media) teaching materials, and improved feedback to students. The PRG also notes the fact that while the SAR states that due recognition is given to teaching including each academic staff member having teaching responsibilities, there is an ongoing issue in balancing the priority between research and teaching, and the comprehensive training in teaching and learning for all academic staff has not been implemented.

This PRG notes in particular that the strong recommendation of making Headship of School more attractive by providing the relevant support and training has still not been implemented; that succession planning is still an on-going serious problem. The 2004 PRG Report also recommended that formal management structures in the School need urgent attention. Despite the School having tried different approaches, this PRG noted ongoing concerns and makes a number of priority recommendations (see below) which it believes will enhance the high quality of the School's activities. This PRG also notes that, while the SAR states that the recommendation that the running and maintenance costs of major pieces of equipment be resourced, there is an urgent issue at present with particularly old and outdated equipment. This PRG also notes that the recommendation of industry being involved in the revision of syllabi has not happened as no formal industry liaison committee has been established and the degree programmes have not been reviewed since that last Quality Review.

4.5 Teaching and Learning

Academic Programmes, Teaching and Learning, Student Perspectives

The School provides the following undergraduate programmes

- BSc in Analytical Science (AS)
- BSc in Chemical and Pharmaceutical Science (AC)

The School also plays a major role in the following cross-Faculty programmes:

BSc Environmental Science and Technology (EST) (425 CAO points)

BSc in Science Education (SE) (430 CAO points)

CAO points for both AS and AC are 470 and 490 respectively. CAO applicants for AS and AC can apply via denominational entry directly to AS or AC, or via the Common Entry to Science (CES) (480 points). At the end of 1st year the any spare places in AS or AC are offered to the Common Entry students with the highest grades. Many Common Entry students do not receive their first or even second choice due to the laboratory limitations in the School. Students in AS choose to specialise in Chemistry or in Biotechnology in 4th year.

The School discontinued the taught Masters programme in the past few years and is currently discussing its reintroduction. There are currently 61 PhD (including PhD track) students registered with the School – a reduction from a high of 79 students in 2011.

Students spoke very highly about the knowledge and support they get from both academic and technical staff. Both students and their subsequent employers recognise the benefits of the extended laboratory experience and the longstanding experience of the technicians – considered unique to DCU. Employers of graduates and of INTRA students state that the high practical content of the degree prepares the students very well for their work in industry. DCU students have significant leverage due to their practical experience, especially the AS students. In terms of transferrable skills they are also very good. The PRG noted that employers report that DCU graduates of the School's programmes compare favourably with any other graduates from similar programmes in the whole of Ireland. They are very grounded and are able to think for themselves. As one employer said: 'We seek people who are able to work in a team and also understand that they have a role to play'. One employer considered that DCU does a great job on metrology and the analytical aspect, and questioned whether the School should go back to its roots. One student was of the opinion that the AC course was a bit too specialised. It was agreed that Good Manufacturing Practice (GMP) certification could be considered for inclusion in the degree programmes.

Undergraduate Programmes

While the School is to be commended for its commitment to avoid the dilution of the core laboratory experience for its UG students this is becoming more challenging based on the heavy reliance on PG students in the teaching labs (see section 4.6 below). The School also promotes its degrees based on a state-of-the-art laboratory experience for its students. However most of the equipment in the School's undergraduate laboratories is now approaching obsolescence (e.g. analytic 3rd year laboratory has serious problems, including PCs that are running on old software systems). Traditionally key instrumentation such as atomic absorption (AA) are only running by cannibalising instruments as parts are not available and need to be replaced. The more modern methods that are becoming ubiquitous in other undergraduate laboratories, such as inductively coupled plasma/mass spectrometers (ICP/MS) and liquid chromatography/mass spectrometers (LC/MS) are absent. To maintain the profile of the School's programmes a plan for the continual updating of these laboratories is needed as the School is clearly unable to meet the maintenance of the teaching laboratory facilities at this time. A wider range of SCS practitioners need to be involved in laboratory design.

The PRG notes that there was little active discussion about the School's comprehensive School Teaching Policy Document in the SAR or during the course of the discussions with academic staff. While it states that the laboratory manuals should clearly state what assessment criteria apply for each laboratory module (p.13) and that tutors will receive an assessment scheme from the Module

Coordinator (p.14), postgraduate demonstrators reported that no rubric was available for some of the work they are required to assess. They reported that both they and the assessed students were happy with the rubrics being used in some modules. In addition, while the Teaching Policy Document states (p. 14) that the marking of laboratory scripts should be monitored by the Module Coordinators, both students and demonstrators reported that there did not seem to be any / sufficient regulation or normalisation of differing tutor / demonstrator grades by the responsible academic staff member in some cases. A new Loop-based system within one 1st year module had proven to be very popular among students, demonstrators and teaching academics. Similar systems could be considered in all modules.

It was also strongly recommend that all examination papers be reviewed per semester in each section (organic, inorganic, analytical and physical) for standards, breadth, and minor typographical errors prior to uploading on GURU for external examiners to review.

It was noted that since 2001-12 there has been a relatively high (11.6 to 40.0%) failure rate and lack of progression from first year to second year. These figures are higher than those of both the Faculty of Science and Health (8.0 to 15.3%) and the overall university (11.4 to 17.2% since 2011-12). There was no evidence presented of particular initiatives to address this issue, although the Technical staff expressed a desire to receive training in education and learning, especially so that they could support 1st year students more, given that they spend so much time with them. While the university has a Maths Learning Centre; a Writing Centre; and a recently introduced policy of contacting directly and personally every student who fails two or more modules in the first semester of their first year, a more comprehensive review and suite of supportive practices should lead to a lower failure rate. Both technical and academic staff noted that there is an increasing number of students with various disabilities (physical, sensory, learning) coming into the School and that accommodating and supporting them is a resource intensive activity for which they have little if any expertise. The PRG notes the comprehensive support available from the university's Disability and Learning Support Services. In conjunction with the first year progression issue, there were a considerable number of students who struggled as far as 3rd year but were unable for 4th year (2.0 to 5.5% a year since 2001-12) and thus were unable to gain a degree. A review of the CAO minimum requirements for relevant subjects (maths and all science subjects), comprehensive career advice in 1st year; training in education and learning for technical staff; and a review of 1st year curriculum, teaching methods and learning supports should lead to a higher 1st to 2nd year progression rate and an earlier exit for students who will not be able to complete the degree, to allow them to complete a more suitable course elsewhere earlier in their careers. The PRG notes a suggestion by the School that a 'general degree' exit point at the end of third year be offered, and suggest that this would require careful review and consideration.

Postgraduate Programmes and Laboratory Supervision

The 61 PhD students are all expected to work a certain amount of laboratory demonstration hours during each of their first three academic years. This practice has recently changed with students now required to also deliver these demonstration hours in their 4th year as well. This heavy reliance on PhD students is not tenable, especially in their final year. It was noted that the School had no clear transparent policy for a fair method of allocating this work, and of payment to self-funded PhD candidates for their laboratory demonstration work, leaving them at a disadvantage compared to their scholarship-funded colleagues. It appears that awareness of the QQI (Quality and Qualifications Ireland) Guidelines and the DCU Graduate Research Studies Board's statements and guidelines on graduate research contribution to academic activities for professional development and for payments for this work, was low. The PRG proposes that the allocation of demonstrator hours in the future should be cognisant of these policies.

Postgraduate students raised the issue of the relevance, level and choice of Graduate Training Elements. The Horizon 2020 initiative would provide a good guideline on future priorities. The Graduate Training Elements available across the university and similar modules available in other universities in Dublin would form part of the review. The School can avail itself of these pre-existing offerings or develop its own. Examples of topics that should be addressed at postgraduate research level are contextual issues such as environmental issues, technology transfer, evolving markets, regulatory issues, frameworks within which regulations are initiated, formed and

implemented. Considered input from current and past students, and employers would be beneficial.

While the Teaching Policy Document states that during experimental project work by students, a postdoctoral level researcher should be present in the research laboratory, many of the full-time permanent academic staff stated that the insurance requirement was that they themselves had to take on this role. They stated that this equated to around 5 days a year each, during the second semester and that they worked out the rota among themselves. It is recommended that the requirement and insurance be clarified. Some modules are provided on a reading (rather than laboratory) basis due to staff constraints, and this too should be addressed.

Programme Review

It was noted that none of the School's degree programmes had been reviewed comprehensively for quite a number of years. As the chemistry, business and research landscapes have changed a lot in the last 5 – 10 years it would benefit the School, the staff, the university and future employers if each programme was fully reviewed. International and national external and internal stakeholders should be comprehensively consulted as part of the process. Employers not too closely associated with the School should be included. The DCU Generation 21 Graduate Attributes (creative and enterprising; solution-oriented; effective communicators; globally engaged; active leaders; committed to continuous learning) framework gives the School an excellent opportunity to ensure its revised programmes include the knowledge, skills and competencies that set DCU graduates apart. There would be great benefits for the School if it considered gaining Royal Society of Chemistry accreditation as part of this review process.

Commendations

The PRG commends the particularly high quality of undergraduate laboratory training and the commitment and development aspirations of the technical staff, and the award of Educational Laboratory of the Year prize received at the Irish Laboratory Awards of 2014. In addition, the School is commended for its commitment to maintaining the full (and necessary) laboratory experience for its UG students despite the considerable overhead that this imposes on the School's activities.

4.6 Scholarship and Research

The research in SCS covers a range of topics including separations science, sensors development, photochemistry, medicinal chemistry, microfluidics, synthetic chemistry, CO₂ capture / energy production, biodiagnostics, crystal engineering, chemical education, marine sciences and geochemistry. The research performed in SCS is supported by grants obtained from a range of national (SFI, EI, IRC, EPA) and international (EU Marie Curie and Horizon 2020) and industrial funding. SCS academic staff are members of major research Centres in DCU and currently lead three of these. Although the traditional division of Chemistry topics is still used for teaching purposes (Organic, Inorganic, Physical and Analytical), the academic staff have recognised the opportunities offered by interdisciplinary research topics at the interfaces between these topics and related sciences.

The information supplied in the SAR report was insufficient to accurately evaluate the research activity of the School. Further information (detailed publication listing from 2012 to present; detailed research funding per academic staff member and grant applications submitted per academic) was provided during the visit and discussions with the PIs gave a better insight into the SCS research activities.

The PRG could not identify a research strategic plan for the School, which should be established as part of an overall School strategic plan. The plan should take a holistic view, to align itself with the forthcoming university strategic plan, and (inter)national developments. This plan would also address the perception that the School is a teaching unit rather than a teaching and research unit with research being conducted via the Research Centres.

Currently there is a Research Convenor who represents the SCS at the Faculty Research Committee. There was some confusion as to whether or not there was a Research Committee in SCS and the relationship between the Research Convenor and possible Research Committee, and

the Research Centres was not clear. More clarity on this and on the relationship between the Centres and the School would be beneficial, especially in light of the Centres' Directors current plans for institutional and collaborative bids (PRTL16 and SFI Centres). It was noted that two of the Centre Directors stated that their loyalty is to SCS first, particularly in terms of teaching and student interactions and programme development. Nevertheless it was also noted that the fact that researchers are allowed to step away from their teaching is not in the best interest of the School and the university's education responsibility. It was not uncommon in 2006-12 that senior researchers got a derogation and left postdoctoral researchers teaching their modules. Some researchers felt forced into centres to gain funding for their research. This leads to a fundamental disconnect in terms of teaching and research in the School.

The management / administration of research within DCU was discussed and the role of the Research and Enterprise Hubs, STEP, Research Support and the Office of the Vice President for Research and Innovation (OVPRI) has given rise to a degree of confusion for SCS members. The PRG acknowledges that the role of Vice President for Research and Innovation is currently filled on an interim basis. The PRG recommends that the School continue to develop and sustain a strong working relationship with the VPRI and appropriate research support services to ensure clear communication about available research supports and to provide feedback on the research support needs of the school. A strong Research Committee in the School would ensure the School's voice is heard, rather than relying on the Centres and / or Faculty. Without that strong voice the School might not get the same benefits as the Centres. There was some anxiety in the School about the status of the sciences in the new expanded incorporated DCU.

The research effort of SCS requires state of the art equipment and there is a considerable concern that many pieces of equipment are approaching obsolescence and need to be replaced in order to ensure the continued high quality of both research and teaching in the School. It was noted that SCS X-ray diffractometers, NMR and mass spectrometers require upgrading with a conservative estimate of €1m noted by one academic staff member. In addition, more clarity is required regarding equipment and access for SCS members.

Commendations

The Review Group noted a very good research output with publications in a range of specialist and interdisciplinary journals and top level chemistry journals. Taking into account the decline in research funding and the increased teaching workload, this output is noteworthy, and also exceeds the targets set out in the university's Transforming Lives and Societies strategic plan (2012-17).

4.7 Community Relations and Service

SCS staff members are or have been members of DCU committees including: Academic Council, University Standards Committee, Graduate Research Studies Board, Research Committee, Budget Committee, Appeals Committee, Disciplinary Committee and Library Committee amongst others. At a higher level, members of SCS have served as Research Centre Directors and in University management positions. The School interacts with Irish Universities and Institutes of Technology and with the broader research community. Collaboration with external industries could be enhanced through a permanent Vice President for Research and Innovation appointment. School staff have numerous research contacts both nationally and internationally.

Members of the academic staff are highly active in promoting chemistry to the wider community as demonstrated by their involvement in the annual Science Olympiad events for secondary school students. Furthermore, the School opens its laboratories up every year to Leaving Certificate students giving them the opportunity to carry out experiments prior to their final examinations. Members of the School have also initiated an Environmental Programme called Teach to Learn and Science Promotion in collaboration with Trinity Comprehensive School, Ballymun. This endeavour won a 2016 President's Award for Engagement in the category of Special Mention Staff Category.

Commendation

The PRG commends the School's activities and achievements in promoting chemistry to the wider community, especially to second level students.

4.8 SWOC and Plans for Improvement

The following is the PRG's SWOC analysis.

Strengths

- Clear commitment of hardworking staff to the successful operation of the School
- Staff fully engaged in the review process, in particular the highly valuable focus groups, illustrating strong commitment to School's future.
- High level of experience, ambition and valuable contribution made by the technical support staff, e.g. eagerness to upskill by sitting in on academic staff modules and to receive training in education and learning.
- Strong research profile of the majority of the school staff with a good track record with respect to both number and quality of research publications and research grant success
- Significant contribution made by the school to the university's enterprise engagement goals.
- The quality of the undergraduate and postgraduate programmes is well regarded among graduate employers, and graduates enjoy a high employment rate.
- Undergraduate programmes include a particular emphasis on high quality and extensive laboratory training.
- Students report being very happy with staff in general and finding them approachable.

Weaknesses

- Reduced staff numbers and loss of key faculty members, and the delay in replacing them.
- The current funding levels within higher education and the Employment Control Framework has reduced the number and frequency of promotional opportunities for academic and technical staff within the School, leading to an element of frustration and demoralisation.
- The development of formal decision-making structures, including regular staff and committee meetings, is required in order to delegate tasks, streamline the administrative burden, and improve communication within the school, and between the school and other units in the university.
- Undergraduate laboratory space limits the entrance numbers from the Common Entry Science programme.
- Reliance on postgraduate students as laboratory demonstrators.
- Heavy reliance on smaller number of postgraduate research students to act as demonstrators during undergraduate laboratories
- School research equipment requires significant investment for upgrade to maintain relevance and appropriateness to meet the teaching and research needs of the School.
- Research structures within the School, and between the School and the relevant Research Centres, require further clarity, including the development of a strong research committee and a clearly defined role for the Research Convenor.

Opportunities

- Increased links (e.g. via Chemistry Open Day) with industry, alumni and other external decision-makers (ie. IDA, SFI, EI) to improve awareness of research strengths; to create opportunities to get industry support / donations for laboratory equipment; and to review UG and PG degree programmes.
- Professional accreditation of undergraduate degree programmes by an appropriate accrediting body, (e.g. The Royal Society of Chemistry) to externally validate the quality and attractiveness of the degree offerings.
- Increased participation by PG students in Graduate Training Elements available elsewhere in the university and in other universities, especially in developing transferrable and soft skills.
- Increased number of laboratory spaces in order to accommodate the increased demand from undergraduate students interested in SCS courses.
- Greater engagement of School within planning of new national funding initiatives (e.g. PRTL 6).
- Leveraging School committee structures to invite cross-university support units to present at regular staff meetings to improve communication between SCS and other university units.
- Increased use of common space for increased socialisation of SCS staff and students.
- Introduction of a transparent talent management system, and examination of areas of national and international excellence and competitive advantage, to drive a new recruitment strategy, e.g. within materials science.
- Increasing the attractiveness of HoS role by recruiting a School Administrator / Manager to allow the delegation of tasks from HoS.
- The development of a postgraduate taught MSc with the potential to meet demands for upskilling and professional development within the sector, although resourcing any such programme will be challenging within the current resource complement of the School.

Challenges

- Retirement of senior staff members, rotation of HoS role and succession planning.
- Re-definition of the relative strategic importance to DCU of the School of Chemical Sciences programmes and research profile following the Incorporation process and the relative growth of other disciplines.
- Perception that many decisions taken from academics and centralised (for example, to Hubs and Research Support units); academics need to be more central to key decision-making.
- ➔ International and national funding streams being so closely tied to the needs of industry may limit the scope for academic enquiry.
- Improved clarity and communication between SCS and other units to clarify, streamline and simplify the relative and inter-related roles of OVPRI, Hubs, STEP, Invent, Disability and Learning Support Service and their relationships with SCS to ensure that SCS staff are supported to advance teaching, research and careers efficiently.
- Lack of awareness of university-wide policies and practices to maintain and improve health and well-being of all staff.
- Funding and staff FTE reductions have led to an increased workload and in particular a sense of increased administrative burden on academic and technical staff, which in turn has affected staff morale.
- Over-dependence on individual key staff members creates risk for the School across a number of activities. Achieving increased levels of delegation and sharing of information and responsibilities are required to overcome this risk.
- Despite the School's considerable focus on commercialisation activities, as yet no funds have been received by the School. This could be an important source of funds.
- Full implementation of university and QQI policy with regard to demonstration and supervision hours for all PhD students is required to ensure the fair distribution of workload, and enabling final year PhD students to primarily focus on thesis completion.

- Staff secondment to National Centres creates a strain on resources and increases administrative burden on permanent staff. *(In some respects the danger is that the School becomes the teaching function and the Centre becomes the research function).*
- Lack of paid placements for INTRA students.

In addition to a short SWOC analysis, the SAR also included some plans for improvement, namely the immediate recruitment of replacement staff (1 Professor and 2 or 3 Lecturers); the formation of an industrial advisory committee; a review of undergraduate programmes; and forwarding an undergraduate laboratory upgrade proposal to the new Dean, and possible modification of the teaching workload allocation model. The PRG commends and supports these plans.

4.9 Management of Financial and other Resources

The School is currently operating under a reduced budget (due to national policy) and is overspending its much-reduced non-pay budget by around 30%. Increased funding is greatly needed to address the equipment shortcomings outlined above. Key to the strategic development and growth of the School are both the upgrading of the undergraduate laboratories, and the speedy appointment of the three replacement staff. Investment in the equipment and staff will allow increased undergraduate student numbers and an alleviation of the stressful administrative burden on the current staff.

There is little evidence for financial management other than being frugal. The School needs (preferably multi-year) recruitment and equipment plans with a built-in source of funding. The School Manager would be invaluable in developing, supporting and implementing these plans.

5. Recommendations for Improvement

The PRG commends the School's staff on their commitment to teaching and research. It recognises that the department is working well under difficult circumstances. The following recommendations are made in the spirit of reinforcing the School's existing reputation of excellence in teaching and research. By adopting practices that will lead to more efficiency, more effectiveness, better communication, and more involvement in decision-making, all staff and students should have a clearer understanding of the School's vision and of the supports available to achieve it.

Indication of Priority:

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.

Level(s) of the University where action is required:

A: Area under review

U: University Senior Management

Recommendations of the PRG for University

No.	Priority	Level	Recommendation
Organisation and Management			
1	P1	A	Increase the involvement of all SCS members in the management of the School to avoid over-reliance on key individuals, in particular the Head of School.
2	P1	A	Formalise the T&L, Research, Postgraduate and Safety functions by reinstating and/or reactivating the committee structures.
3	P1	A	Establish and maintain a formal schedule of minuted School and committee meetings with standing items from research, teaching and safety convenors, and with presentations from other units in the university, in order to improve the communication within and without the School.
4	P1	A	Develop and implement a 3 to 5-year recruitment and succession plan informed by the strategic plan of the school, pending retirements, and changes in student enrolments; and to develop new and additional leaders including the appointment of a Deputy Head role and the anticipated rotation of the Head of School role.
5	P3	A	Develop a common room space and regular social / informal research events to encourage staff and research students to network and exchange information.
6	P1	U	Recruit a School Manager to support the Head of School in executive decision-making and management of School operations and finances, and to allow the HoS to concentrate on the strategic development of the School.
7	P1	U	Require that all future SAR reports contain all the information required for the PRG to carry out its task This may require sign-off by the Dean prior to submission to the QPO.
Progress since last Quality Review			
8	P1	U	Review and improve the induction and leadership training processes for newly appointed Heads of School, with particular reference to faculty processes and interactions, budget management, induction content and communication. This should be tuned to the specific

			needs of a given school and contain an ongoing mentoring process (which could be cross faculty).
9	P2	A	Form an industrial advisory board to ensure regular meaningful representative external stakeholder expertise contributes to the strategic development of the School.
10	P2	U	Address the Technical staff promotion recommendation from the previous quality review.
Structures, Staffing and Accommodation			
11	P2	A	Share the non-Research related responsibilities of the School in an equitable manner so that all staff have sufficient time and energy to develop their research.
12	P2	U	Develop and/or ensure School staff are aware of policies for dealing with bereavement when a staff member passes away in service, so that colleagues and students can grieve as appropriate and can continue to work to their own best potential and to the good of the School and the university.
13	P2	U	Develop and/or ensure that School staff are aware of supportive policies for dealing with staff stress and overwork so that staff can regain their health and a healthy work-life balance and can work to their own potential and to the good of the School and the university.
14	P3	U	Ensure in staff promotion policies, that proven teaching excellence is not overlooked, and criteria are transparent, and appropriately reflect excellence in all areas.
15	P3	U	Develop an enhanced university-wide programme of training in supporting students for technical staff, given their close interaction with students especially in 1 st year.
Teaching and Learning			
16	P1	A	Review both undergraduate (AC & AS) and postgraduate (GTE elements) degrees to meet the current and future needs of Irish BioPharma (including GMP, validation, regulatory environment, soft skills); to streamline cross-over modules; to improve first year progression; and DCU's Generation 21 Graduate Attributes.
17	P1	A	Seek formal accreditation by the Royal Society of Chemistry of the UG and PG degree programmes.
18	P1	A	Produce a clear, comprehensive, well-informed plan (incorporating costs, benefits and implications) for expanding the laboratory facilities to accommodate the increasing undergraduate (CES) demand for SCS programmes.
19	P1	A	Develop a strategy to increase the number of PG research students to support and enhance the School's research activities; to act as laboratory demonstrators; and to improve the School's reputation of providing excellent state-of-the-art teaching experience.
20	P2	A	Review and improve assignments, grading, feedback, co-ordination between lecture and laboratory work, exam paper preparation and grading.
21	P2	A	Review minimum entry requirements and approaches to supporting weak students, and address progression in 1 st and 2 nd year.
22	P2	A&U	Review the School's reliance on part time teaching staff. Often such staff may not be fully engaged in the whole gamut of the School's activities, which can add considerably to the workload of the permanent staff.
23	P2	A	Review / update teaching allocation workload model, in line with the DCU Principles for Academic Workload Allocation.
24	P3	A	Review insurance and safety policies of laboratory supervision requirements (academics, technicians and demonstrators), in order to make optimal use of staff while maintaining high standards.
25	P3	A	Reconsider the benefits of placing INTRA students in unpaid

			placements.
26	P1	U	Taking into account the long-term benefits for the School, the Faculty should review the School's undergraduate laboratory upgrade plan, for submission to the university's budget committee.
Scholarship and Research			
27	P2	A	Review and re-clarify the School's research USP, especially in light of the H2020 and national research priorities.
28	P2	A	In light of DCU's stated mission as a University of Enterprise, pursue any income developed from SCS staff's considerable commercialization activities and distribute to the relevant staff/unit.
29	P3	A	Ensure the School Research Committee includes the Research Centre Directors.
30	P1	U	Review the interaction of the support units within the university to address the perception that the additional layers have increased the work load on the front line academics in the SCS.
Community Relations and Service			
31	P2	A	Publicise (via e.g. newsletters, permanent wall-posters and staff social events) all staff activities, achievements and awards in community engagement.
Management of Financial and other Resources			
32	P2	A&U	Review existing equipment / instrumentation and implement a five year maintenance plan and lifecycle funding model. Commence discussions with the Faculty Office and Faculty Management Group on a procedure to obtain, allocate and spend the funds for this plan.

Appendix 1: Peer Review Group Visit and Meetings

QUALITY REVIEW OF THE SCHOOL OF CHEMICAL SCIENCES DATE 7TH – 9TH DECEMBER 2016

Day	Time	Peer Review Group (PRG) Activity/Meeting	Venue	Meeting No.
Day 1 Wed	10.00- 11.00	Briefing by Director of Quality Promotion; Guidelines provided to assist PRG during the visit and in developing its report.	A204	Arranged by QPO
	11.00- 12.30	PRG selects Chair. Discussion of main areas of interest and/or concern arising from the Self- Assessment Report (SAR).	A204	Arranged by QPO
	12.30- 14.00	Lunch with Director of Quality Promotion and PRG members	A204	Arranged by QPO
	14.00- 15.00	Consideration of SAR with Area Head & members of quality review committee. Short presentation by Area followed by discussion of SAR. <i>(Director of Quality Promotion in attendance)</i>	A204	Arranged by QPO
	15.00- 15.45	PRG Private meeting (1 hour)	A204	Arranged by QPO
	15.45- 16.00	<i>Coffee</i>		Arranged by QPO
	16.00- 16.30	Area Head Meeting	A204	Arranged by QPO
	16.30- 1700	Area Management Team Meeting	A204	Arranged by QPO
	17.00- 18.00	Informal Reception – PRG, Area Head, Members of Quality Review Committee, Director of Quality Promotion	Albert College	Arranged by QPO
	18.00- 20.00	PRG Dinner	1838 Albert College	Arranged by QPO
Day 2 Thurs	08.45- 09.00	PRG Private meeting NRF Building	GAG04	
	09.00- 09.45	Area staff- Meeting 1 (Academic Staff)	GAG04	1
	09.45-	Area Staff Meeting 2 Deputy Head , Teaching	GAG04	2

	10.30	Convenor , Research Convenor, Programme Chairs School of Chemical Sciences School Academic Staff		
	10.30-11.00	<i>Coffee</i>	GAG04	
	11.00-11.45	Area staff- Meeting 3 (Research Centres)	GAG04	3
	11.45-12.15	Area staff- Meeting 4 (Administrative/ Technical)	GAG04	4
	12.15-13.00	Heads or Senior staff in Support / Service Offices working with Area	GAG04	5
	13.00-14.00	<i>Lunch</i>	GAG04	
	14.15-14.30	Tour of Facilities	GAG04	
	14.30-15.15	Representatives from Students from various academic programmes – Meeting 6	GAG04	6
	15.15-16.30	<i>PRG Private Meeting Time (1.5 Hours)</i>	GAG04	7
	16:30-17:00	<i>Coffee</i>	GAG04	
	1700-17.30	Open forum for any member of Area staff	GAG04	
	17.30-18:15	Meetings with external stakeholders (alumni, employers, suppliers, Colleges of DCU, members of Governing Authority depending on relevance to Area...)	GAG04	8
	18.15-18.30	Area Head (update and clarifications if required)	GAG04	9
	19.30	PRG private dinner	Crowne Plaza Hotel	
Day 3 Fri	08.45-09.00	PRG Private meeting		Meeting No.
	09.00-09.55	DCU Senior Management Group (SMG) <i>(Director of Quality Promotion in attendance)</i>	AG01	10
	10.00-10.25	Area Reporting Head (usually member of SMG) <i>(Director of Quality Promotion in attendance)</i>	AG01	11
	10.30-11.00	<i>Coffee</i>	GAG04	
	11.15-	PRG private meeting time	GAG04	

	13.00			
	13.00-14:15	<i>Working Lunch</i> Clarification of outstanding issues for PRG if required	GAG04	
	14.15-14.30	Dr Kieran Nolan Head of School of Chemical Sciences	GAG04	
	14.30-15.00	PRG Prepare Exit Presentation	GAG04	12

Meetings with Peer Review Group

Meeting No	Name(s)	Position
1	Prof Robert Forster Prof Apryll Stalcup Dr Pat O'Malley	Academic School of Chemical Sciences Academic School of Chemical Sciences Academic School of Chemical Sciences
2	Dr Blanaid White Dr Aoife Morrin Dr Mary Pryce Dr Brendan O Connor Dr John Gallagher Dr Phil Cummins	Teaching Convenor Research Convenor Chair of Analytical Sciences Chair of Analytical Sciences Biology Option Chair of Chemical & Pharmaceutical Chair of Common entry into Sciences
2A	Dr Brian Kelleher Dr John Gallagher Dr Odilla Finlayson Dr Andrew Kellett Dr Blanaid White Dr Peter Kenny	Academic School of Chemical Sciences Academic School of Chemical Sciences Academic School of Chemical Sciences Academic School of Chemical Sciences Academic School of Chemical Sciences Academic School of Chemical Sciences
3	Prof. Fiona Regan Prof Robert Forster Dr Olga Zlydareva	Director of Water Institute Director of NCSR HUBS
4	Ms. Julie McArthur Ms Veronica Dobbyn Mr Damien McGuirk Ms Mary Ross Ms Catherine Keogh Ciaran McKenna Gerta Nestorowicz	School Secretary Chemical Sciences Chief Technical Officer Technical Staff Technical Staff Technical Staff Administrator Faculty of Science & Health Administrator Faculty of Science & Health

5	Ms. Gillian Barry Prof. Niall Moyna Mr. Brendan Gillen Ms. Bernadette Dowling Prof. Anne Matthews Mr Brian Hogan Dr Enda McGlynn Dr Carolyn Hughes Dr Muireann O Keeffe Dr Brien Nolan Dr Ana Terres Mr Robbie Sinnott Dr Anne Parle-McDermott	Deputy Director, Registry Head of Health and Human Performances Finance Manager Senior Administration, Faculty of Science and Health Nursing and Human Sciences Human Resources Head of Physical Sciences INVENT Digital Education (Representative) Lecturer in Mathematics Director of Research Support Step Research Administration Representative of Biotechnology
6	Alex Forte AC4 Eric Healy AS4 Jack Helay AC4 Jack Robinson AS4 Karmel Gkika Nicolo Fantoni Teresa Lauria Darragh O'Connor Natasha McStay	Representative of Students Chemical & Pharmaceutical Sc Representative of Students Analytical Sciences Representative of Students Chemical & Pharmaceutical Sc Representative of Students Analytical Sciences 1 st year Postgraduate & Member of PGAC 2 nd Year Postgraduate 2 nd Year Postgraduate 2 nd Year Postgraduate 3 rd Year Postgraduate
7	Declan Moran Cormac Duffy Dr Margaret McCaul Dr Jamie Walsh	Intra Employer & Graduate Ipsen Pharmaceuticals Henkel Loctite Graduate of School of Chemical Sciences Graduate of School of Chemical Sciences
8	Dr Kieran Nolan	Head of Chemical Sciences
9	Prof. Brian McCraith Prof. Daire Keogh Dr Declan Raftery Prof Colette McDonagh Prof Barry Mullin Ms Marian Burns Mr Ciaran McGivern Prof Greg Hughes	DCU President Deputy President Chief Operations Officer Dean of Faculty of Science & Health (Acting) Dean of Faculty of Engineering & Computing Director of Human Resources Director of Finance Acting Vice President of Research & Innovation
11 12	Dr Kieran Nolan Exit Presentation by PRG	Head of School All staff invited to attend

Appendix 2

Additional Information requested and received by PRG during Review Process

- Staff research activity (publication listing from 2012 to present; detailed research funding per academic staff member and grant applications submitted per academic)
- List of laboratory equipment held by the School
- Account of SCS floor space allocation IP-related data for year 205-16
- Teaching policy document
- List of recent awards received by School staff
- Progression rates from 1st year to graduation
- Outline of HR department support for schools/areas suffering in-service bereavement following death of colleague
- Training programme provided by HR for new Heads of School who have not previously held the role