

HEADS OF UNIVERSITY BIOLOGICAL SCIENCES

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POSTGRADUATE QUALIFICATIONS IN BIOLOGY

Royal Institute of British Architects

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Professor Nick Harris (Quality Assurance Agency, Gloucester)

Postgraduate aspects of the National Qualifications Framework

National Qualifications Frameworks (NQF's) have their origins in the 1997 Report of the National Committee of Inquiry into Higher Education (NCIHE) that identified the need for a common framework to encompass all the HE qualifications currently offered in the UK.

National qualifications need to be:

- Coherent - developed from a set of logical and consistent principles
- Clear - easy to understand by UK and EU employers and academic institutions
- Consistent - they should allow for continuing, although not necessarily continuous, education (lifelong learning)
- Applicable to likely future trends - should be flexible enough to allow for part time and conversion studies

The NQF must

- identify achievements, not failure
- map the diversity of study
- respect institutional autonomy
- identify flexible routes of progression
- provide a common language

20 or 30 years ago, graduates were relatively rare new employees. It is now, however, commonplace for employers to seek out graduate employees and therefore the NQF has to be widely understood outside of the academic community.

The consultation on postgraduate qualifications established that the term "postgraduate" should refer to the level of achievement, and not the time taken to obtain a qualification. Nomenclature should be consistent and clearly understood, in contrast to the present situation. Qualifications should not be given as compensation for failure (at present the pass degree for failure in honours examinations and, in some cases, the MPhil as compensation for failing a Ph.D.).

Key issues that arose from the consultation document are:

- the need to define the term "postgraduate"

- To regulate the wide range of Masters degrees currently available. At present conversion degrees confer the same title as one year taught Masters.
- To make these enhanced undergraduate programmes (i.e. MPhys/MEng) uniform and clear to the employer in terms of their level and what achievement they represent.

Postgraduate consultation outcomes:

1. **Proposed principles from current postgraduate consultation**

- Definition of postgraduate to mean a qualification that is intellectually more demanding than an honours degree.
- Module credit should be at one level, appropriate for the type of degree conferred.
- Define the position within the NQF of intermediate awards
- Use consistent nomenclature
- Ensure that all qualifications with the same title reflect the same standard of academic achievement, particularly in the case of Masters degrees
- Restrict the use of the Masters title. At present there is considerable confusion over the meaning of the title and the level of achievement it represents, particularly abroad where first degrees take longer. International standards for Masters degrees would ideally be set.
- The mode of study should be made clear i.e. taught or research Masters
- A system of credits should be retained in most cases so that the number of full time year (or equivalent) of study are obvious
- Restrict the PhD and DPhil titles for research doctorates that are examined at the termination of study and are not obtained on a modular basis
- The titles of doctoral awards are currently an international standard and indicate an ability to conduct original research and to think independently. These standards must be preserved in the light of practice based doctorates that are currently being awarded in some fields
- Honorary awards can be confusing and perhaps should be renamed to avoid employer confusion between honours and honorary degrees
- The amount of undergraduate teaching permitted in postgraduate qualifications produced a mixed response of opinion. A maximum should be stated and individual institutions should justify why they need to mix undergraduate with postgraduate teaching.

2. **Model for postgraduate outcomes from current consultation**

A number of different levels have been suggested, but the minimum requirement is to retain two levels of qualification; those that are clearly Masters level and those at Doctoral level.

Masters

The mode of study (taught/practice based/research) does not matter, but the majority of the credit should all be at Masters level. Although most institutions consulted wanted to retain the Masters title, many individuals also wished to retain their own version of the Masters title, thus the present confusion over standards would remain.

Doctoral

There was support for a range of study modes amongst those consulted. Obtaining credit was not supported by the academic sector, but some industrial employers felt that it would be a useful indication of the standard obtained. Credit would be of value for those qualifications with a taught element. It was strongly felt that if other types of doctorates (such as those obtained through practice based courses) were to be counted as a PhD, then all the credit would have to be obtained at doctoral rather than masters level. There was also strong support for "ring-fencing" the terms PhD and DPhil to mean doctorates obtained by original research.

Summary of current consultation on graduate and undergraduate levels

- The NQF principles were endorsed, except for regulating the mix of undergraduate teaching with postgraduate
- The number of levels required is generally thought to be three in England (undergraduate, masters and doctoral) and four in Scotland.
- Only positive awards should be awarded, so that the MPhil and pass degree should not be awarded as compensation for failing to obtain a doctorate or honours degree, respectively.
- Nomenclature at undergraduate level should be consistent

Where and how the consultation responses fit into the existing framework

- Subject benchmarking is possible at the skills, rather than academic level
- Programme specifications should state clearly what is provided and what is expected of the student
- External examiners and academic reviews are the basis for setting standards (note this does not mean standardization and loss of institutional autonomy)
- National and international aspects indicate that the EU is moving towards a pattern that fits the UK framework and ensures that our students can transfer freely across Europe with their UK qualifications.

Questions and discussion

Dr. P. Nichols (Queen Mary and Westfield College)

Q. Should a new qualification be introduced to replace the MPhil?

A. At present the hard-line approach is that if the candidate fails to obtain the standard required for PhD the thesis should be rewritten and resubmitted as a MPhil thesis. The speaker's personal view is that the institution should be capable of defining the standards required for a MPhil, such that the candidate can be judged on whether he or she has met these requirements at the same time as being judged on the standard required for a Ph.D. Students could be registered for both degrees at the time of their viva and the result would be the potential award of both MPhil and Ph.D. i.e. a "stepping up" system, rather than the MPhil being seen as a failed Ph.D.

Prof. C. Lichtenstein (Queen Mary and Westfield College)

Q. At present many UK students are required to do a Masters before their three year UK degree is seen as equivalent to a four year European one. Have there been any studies on this?

A. At present only small studies have been conducted, but it is thought that the rest of the EU is moving into line with the UK. There is, however, such a huge variation in the UK, ranging from single honours degrees to broad based modular degrees. It is perhaps better to provide transcripts of the marks rather than just certificates.

Q. At present different countries use a different scale of marks, for example in the USA 70% is seen as a bad mark

A. In that case it may be useful to provide both the marks and the position of the student within their cohort.

Professor Robert Freedman (University of Kent at Canterbury)

Do we have the right postgraduate qualifications and the right names for them?

There is currently confusion about the qualifications that the postgraduate sector is offering - those from within the sector in general understand the meaning of the titles, but many outside the sector do not. Therefore, we as the academic sector need to address "brand image." Currently, a B.Lit. or BPhil from Oxford has higher academic standing than an MA from another institution, but this is not obvious to outsiders. There is currently no documentation to define the standards represented by the current degrees and so employers have no means of resolving this. A document is therefore required to locate and define degrees and a framework should be established so that it is possible to describe the different kinds of awards available and to facilitate comparison.

Issues

- National and International comparisons
- Maintenance of standards
- Consistency of nomenclature
- Routes for progression

Who are the "stake-holders?"

- Applicants and students
- Sponsors
- Employers
- Professional bodies
- Universities (also included in above two categories as employers and professional bodies).

Is this a real problem?

The pattern in Biological Sciences pre: 1992 split postgraduate study into four main areas:

1. Taught MSc. (with a 3-6 month research project)
2. MSc. by research (mainly self-funded students)
3. MPhil by research (pre-PhD threshold). Some employers concerned that students they were sponsoring to get a PhD were only being registered for a MPhil.

4. DPhil/Ph.D.

Most postgraduate students were full time, with the exception of research assistants who were studying for a PhD during the course of their normal work.

What constitutes a MSc.?

1. Conversion courses: (final year undergraduate teaching and an extended research project) examined in parallel to the undergraduate degree. Many overseas students took this option with widely varying results. Some achieved a standard not much beyond a good undergraduate degree whereas others already had a relevant first degree and could achieve a considerable amount by the end of the project.

2. Specialist taught Programme. These are specially designed advanced courses, assuming a graduate level of knowledge.

3. Research degree Programme.

Is the problem more complex now?

Degrees such as MPhys/MChem and MEng have complicated the issue. These arise as a result of a four-year undergraduate programme, although the institutes claim a much higher level of achievement than a three-year undergraduate programme. How different are these masters degrees to those entitled "B.Sc. Biology with a year in industry?" Are these also equivalent to a Masters?

MRes degrees place the emphasis on research training involving specific elements of laboratory skills, grant proposal-writing etc. Should a one-year training programme have such a specific name or be called a MSc. by Research?

Certified training programmes such as these do ensure that the student gets credit for the skills learned even if they do not subsequently complete a PhD.

Practice based doctorates and professional doctorates are increasingly being offered, but they lack the essential component of original research that traditionally sets a PhD or DPhil aside from other postgraduate qualifications.

What will be new or difficult to enforce?

- Reserve the title Ph.D./DPhil for traditional doctorate
- Need to force through consistent nomenclature
- There should be no qualification by failure such as the MPhil. However the pass degree does fit into the current undergraduate degree structure and scale of marking.
- Postgraduate qualifications obtained in time, rather than academic achievement should not be called postgraduate diplomas/Masters courses unless the outcomes are set at the appropriate level. This leads to difficulties in marketing such courses if they do not retain a Masters title.
- Restrict postgraduate qualifications to two levels of achievement instead of the current three or four represented by the same titles.

- MSc. by Research should perhaps be removed and the title MSc reserved for taught programmes?

What remains unresolved?

What is a MPhil?

University regulations on MPhil awards need defining. A MPhil is neither a large Masters nor a small doctorate in terms of volume. It is usually awarded in the event of the;

- a. Research being adequate for a PhD, but the student, not understanding the full implications of the research, not being considered an independent researcher
- b. Student being unable to interpret his or her results in the wider context of the subject
- c. Student attaining the required intellectual standard, but not having achieved much through the research, perhaps due to problems with supervision.

Clearer instructions to examiners are required emphasizing the level of intellectual achievement needed for a particular award.

Questions and discussion

Prof. H Evans (Liverpool John Moores)

Q. The MPhil is not always seen as a failure, but can be obtained part time by research and is seen in these cases as evidence of technique development.

A. Prof. Freedman agreed that in these cases the MPhil should be recognized as a positive achievement.

Prof. S. Reynolds (Bath)

Comment. Following on from the previous comments it should be clear that the MPhil is considered in different contexts:

- a. A goal per se
- b. Fallback after failing to reach the standard required for a PhD
- c. A part time, self-funded student may see it as a genuine stepping stone towards gaining a PhD and will subsequently submit something at doctorate level.

Dr. C. Skidmore (Reading)

Q. The discussion thus far relating to level/volume of academic achievement to be obtained for a certain level of award assumes that students all start from the same base point. It also assumes that they acquire knowledge at the same rate, and have the same capacity for learning. On the contrary, many different factors influence the outcome.

A. I agree that this is the case and it is difficult to quantify academic achievement. However, everyone agrees that some clarity is required and it should be possible for everyone to define their degree without losing the right of universities to preserve their own diversity and autonomy. The present consultation was not designed to attack these aspects of university teaching.

Prof. M. Edmunds (Central Lancashire)

Comment. If specific learning objectives and outcomes were defined for Masters by Research, MPhil and PhD it would be possible for people to study for one, two or three years and obtain positive awards at whatever stage they chose to stop.

Prof. T. Hocking (Wolverhampton)

Comment. The MPhil is presently a two-part Programme - either an intended result of a two-year research Programme after which the student transfers to a PhD, or a fallback from a three-year Programme intended to provide a PhD. The MPhil itself needs closer definition, as it should be recognized that not all students gaining a MPhil wish to study for a PhD.

Prof. M. Griffin (Nottingham Trent)

Comment. The MPhil is usually awarded as a result of 21 months of research, but transfer from a MPhil to PhD usually takes place after 12-15 months. At this time, the student hasn't completed sufficient work to be awarded the MPhil, but is deemed to have shown potential to obtain a PhD. The MPhil should perhaps be defined as a demonstration that the student has learned how to do research and has done some. A Ph.D. could be defined as, the individual having learnt how to do research, has done some, and demonstrated ability for original thought in the process.

Mr. Ken Sloan (University of Warwick)

The Life Science PhD - the work of the UKLSC Postgraduate Training Working Party.

This presentation gave an overview of the final report that is due around mid-December on the results of the survey conducted by the UKLSC.

Remit of the working party.

To undertake a review of Research Council funded degrees in UK Life Science. Focus was to be on the length of training provided and the level of stipend provided and, from this, to make recommendations for the future.

Search for data.

To date there is no real source of qualitative or quantitative data on where students are at when they begin their doctoral studies, how they perform and where they go on to be employed.

There was a wide range of views expressed across the community that compounded an already complex issue.

Data sources

Primary sources:

University sector

Biochemical Society

Wellcome Trust

Secondary sources

Surveys already in circulation

Initial findings

Approximately 70% of surveys were returned. This indicated that the issues addressed were in an area the institutions felt to be important.

44% research students are currently supported by research councils

9% are overseas student

9% are sponsored by industry

13% are funded by universities

When asked about the submission rate only two replies mentioned the number that submitted within three years. Most places talked of the number that complete within four years which is typically 80-90% of students starting a PhD.

The current system claims to teach both research skills and transferable skills, and most replies suggested that the PhD did give adequate (but not good) coverage in both of these areas.

About 50% of institutions would support a shift of resources to allow more people to do a MRes prior to spending three years obtaining a PhD.

The level of stipend appropriate for a PhD student attracted a wide range of response, but 99% of respondents thought that the minimum should be £8.5K, with 27% recommending a stipend of at least £10K.

Deterrents to doing a PhD.

The majority of respondents (88%) thought that the current stipend was too low to attract the highest quality students, in addition to poor prospects of rewards in their long-term career.

How many PhDs are actually needed?

A (cautious) 'yes' was given to the suggestion in the survey that there was room to restrict the numbers of students doing a PhD in order to increase the stipend such that the brightest students remained in science.

There was a general statement that the quality of students was lower than that seen ten years ago. It was pointed out, however, that all the surveys conducted in the last 20 years have reported similar findings. Therefore it must mean that there is either a serious problem in the decline of student quality, or that the perceived "golden age" of bright and able students never actually existed. The definition of quality is unclear, students are probably just as intelligent as they ever have been, but may well be starting with a lower level of laboratory skills.

40% of institutions found it easy to fill PhD places

55% found it very difficult

5% left PhD places unfilled

81% of respondents claimed dissatisfaction with the current status of the PhD system.

LIKELY RECOMMENDATIONS FROM THE UK LIFE SCIENCES COMMITTEE'S WORKING PARTY ON

"POSTGRADUATE TRAINING IN THE LIFE SCIENCES"

1. For scientists, the PhD is not an add-on, option or luxury. It is an inherent component of the career structure, as are the training years for accountancy, law or engineering.

2. The Ph.D. students trained by the Research Councils should be the best. They should be trained only in centres of outstanding excellence. The Research Council's aim must be to underpin the UK's world-class research base with a comparable system for attracting and training the next generation.

3. To hold the most creative minds in science requires long-term career prospects broadly comparable with those in other professions. At the moment this does not apply in the universities and related research institutes. Sir Michael Bett's report shows salaries are adrift by 25% and this is worsened by a career structure which invariably involves a post-doctoral period before a long-term career can be established. Our own data from the pharmaceutical sector suggests the salary gap may be 50%. This situation must affect long-term the quality of PhD students but whilst it is often perceived that quality has diminished, the data do not support such a view and it remains remarkably high. Industry continues to raise issues concerning PhD training.

4. There is no universal agreement across the life science community as to the length of Ph.D. training. 34% favour a move to a one-year MRes. degree followed by a three-year Ph.D.; 42% seek a four-year PhD that includes laboratory rotations and increased training in various skills; 17% are content with the present three-year Ph.D. Note though that 76% are dissatisfied with the current system and, below, **we recommend a way forward that offers a range of solutions tailored to individual students and subject areas.** In contrast with the physical sciences there is little support (7%) for an expanded undergraduate degree.

5. Government policy has radically altered the financial support of undergraduates. In contrast, the Ph.D. support systems have not evolved. Undergraduates graduating in 2002, who have taken up the majority of the loan available, will have debts of at least £10,000. If they then undertake a PhD and stay in public sector research (university post-doctoral positions are by far the largest recruiter of life science PhDs), it will take until age 36 (15 years after graduation) to clear this debt. This compares with 9 years for an average individual who enters accountancy or an employer graduate-training programme.

6. The national median starting salary for graduates in 1998 was £17,500 (slightly more in the pharmaceutical companies). For the graduate this has to be compared with £6,500 tax-free (equivalent to a taxable salary of £8,000) to undertake a Ph.D. supported by most of the Research Councils. This situation simply cannot continue. The Wellcome Trust currently offers tax-free stipends of at least £11,000 p.a. (equivalent to a salary of £15,000). **We recommend that no student registered for a Ph.D. and funded by a Research Council should receive a tax-free stipend of less than £9,000 p.a.** Even this would place such students in the lowest decile of graduate starting salaries in 1998. This baseline should increase annually if satisfactory methods can be introduced to measure outstanding progress. **We also recommend that the laboratory support for the students (RTSG) be increased significantly.**

7. Overall, **we recommend the investment per student (stipend, fees and RTSG) be increased substantially even if this decreases significantly the number being supported by the Research Councils.**

8. To encompass our desire for greater diversity of support **we recommend the government consider replacing the present "quota" arrangements with a "Research Training Grant" system.** Universities and research institutes would bid for training grants in a particular area of research (e.g. bioinformatics, microbiology). The packages would cover tuition fees, stipend and RTSG. **They would allow for flexibility in both stipend and duration of training (subject to minimal standards). This would pass the responsibility to the universities who can assess local markets and conditions.** It would also allow them to create conditions whereby individual students could be trained for different periods (including a MRes.). For the Research Councils the advantages include a contractual relationship over training quality and an ability to focus resources in particular areas. For too long the Research Councils and Universities have been concerned with the numbers game only, and with filling quotas.

9. Finally, we recommend steps be taken to collect annually data on quality of intake, types of research, and longitudinal career outcomes so that proper analyses are possible in the future.

B.K.Follett (Chair of Committee); November 11, 1999.

Questions and discussion

Prof. H. Evans (Liverpool John Moores)

Q. Do you have data for the age profile of research students?

A. Data on age and gender distribution in research is being compiled at present

Prof. M. Griffin

Q. The data showed universities are the biggest employer of recent PhD graduates. Is this because industry (who would pay better) will not take our recent graduates as they are not at the required standard?

A. This may be true but it is not simply a matter of skills. Many PhD students do not necessarily seek jobs in industry. There is no sign that industry recruits Post-Doctorals, with several years of research experience, as an alternative to recent graduates.

It was pointed out that the UKLSC was emphasizing the length of training given, as opposed to the QAA, placing the emphasis on the outcomes following training.

A. If the training is structured such that the brightest people are attracted it will follow that the outcomes will also be improved.

Q. If there is no evidence that standards are declining what argument remains for raising the stipend?

A. If the stipend is raised it will put the academic career on a more even keel with non academic options, and will enable research to compete early for the brightest students. At present employers are starting to attract students by sponsoring events in Fresher's Week and so the very bright students do not always consider a PhD as a viable option.

It was pointed out (Dr Ruth, NERC) that research councils do not consider those PhD students who choose not to stay within research after graduation a failure. They have received valuable training for a number of other careers.

Dr. Sarah Ruth. (National Environmental Research Council, Swindon)

A Research Council view of the MRes.

NERC has embraced the MRes as a one-year postgraduate research training Programme and has extended the initial pilot established over all the research councils until 2001. NERC has funded five courses to date with nine students on each covering a range of environmental study areas.

NERC funds 360 new PhD studentships per annum and 245 MSc. places over 64 different courses. In addition to this 45 MRes places are funded on the five different courses mentioned above. These figures are reviewed every five years.

The MRes objective is to provide students with a thorough grounding in research skills and transferable skills. There is no preferred outcome as far as the research council is concerned - students may transfer from their course to immediate employment or further training towards a PhD.

The course is broken down as follows:

15-20% generic (transferable) skills

15-20% technical skills e.g. laboratory technique training and use of statistics
60% original research project

During the last review of the courses in 1998 it was established that:

- Training serves a valuable role
- Good rates of employment or further study, often with the industrial partners they may have worked with during the course of their research
- There was high enthusiasm amongst their potential supervisors with many positively seeking out the students for PhD places.
- There is a need to improve employer awareness about the MRes
- There is evidence of influence on other types of courses i.e. some elements of the MRes projects and transferable skills have been picked up in MSc courses, possibly leading to the MRes losing its identity
- There has been some convergence of the MSc and MRes
- In some cases the breadth of the MRes course has led to a lack of coherence, administration has not always been good and some students have felt that they are not integrated into what has become a very diverse course.

MRes best practice

- Strong induction to the Programme, perhaps with a joint fieldwork trip
- Clear group identity
- Clear documentation and assessment criteria (weighting of the MRes course is different to a MSc)
- Continuous reinforcement of generic and transferable skills during the course i.e. students have to continually design new projects and give presentations
- Statistics was essential, but was most appreciated if taught in a way that made it relevant to real problems
- Strong external links - students frequently have to contact companies and arrange their own research links
- Research group tagging so that students feel part of a "real" research group
- Applications for funding and follow-on work. Students have to write a grant proposal for a follow on project at the end of the course.
- Formal end of course activity such as a series of presentations.

Summary

The MRes is an important element in training

It has a strong positive influence on training at this level

A zero-based review of NERC support in 2000 will consider all MSc and MRes studentships

Broadly speaking NERC supports the model of a MRes followed by a three year PhD, but this needs to be considered in the context of the four-year undergraduate degree.

Professor Richard Balment (University of Manchester)

Graduate Schools and the MRes experience at Manchester

What can a graduate school do for postgraduate education?

Manchester has a federal structure of graduate schools. The three schools of Science and Engineering, Biological Sciences and Medicine, Dentistry and Nursing have merged to form the Graduate School in Science, Engineering and Medicine. Elsewhere in the university there are also graduate schools in Arts, Education and Social Studies, Economics and Legal Studies.

Heads of these graduate schools (Heads of Resource Centres) set targets for the graduate schools to deliver, such that the graduate school becomes central, rather than simply an 'add on' to the undergraduate study programme.

Roles of the graduate schools

- Develop policy in response to internal and external initiatives and demands

Employment skills

Research weighted MSc and MRes courses

Completion rates demands

- Identify and spread best practice

Ensure equity in the quality of training

Training of potential supervisors (workshops)

- Develop and provide generic training
- Define and review standards

Programme definition

Annual and five year reviews

- Provide support for staff and students

The first five years of the graduate school

- There was an approximately 50:50 split between Masters and PhD students
- QA control and enforcement structures were formed

There is now a central database and monitoring system

- Modularization of Masters programmes so that there is a common credit rating among courses

Students can now plan and put together their own tailor-made structured courses

- Supervisor training programmes initiated
- Generic skills training implemented by employment of a Specialist training officer paid for from the three graduate schools.
- Introduction of the MRes degree supported by BBSRC, EPSRC and NERC
- Personal Academic planner for each student that they keep with them for the duration of their course
- Best Practice has been defined for PhD training

Within four weeks they write the broad aims of their research and define first year objectives

This ensures that the student, supervisor and third party advisor all have this essential conversation to establish the aims and direction of the study

Progress can then be monitored

Completion rates have been enhanced as a result

- Taught elements of a PhD have been defined
- Induction of new students is improving such that they are more aware of the support services available to them. Student representation in the graduate school is improving. The School has provided a framework to tackle issues raised by the student population. A system of mentoring has been developed for PhD and MRes students, which has helped to improve the isolation felt by many students in research.
- The School has also enabled marketing efforts to be integrated and efforts combined. Resources and knowledge can both be pooled and identification of new markets to increase the postgraduate population has become easier.

Future challenges and opportunities

- Increase variation in the type of PhD support i.e. industrial case studentships, quota case studentships and help the academic community apply for such awards
- Increase variation in training packages available for industry sponsored and overseas students
- Emphasize the role of postgraduate training in continuing education and professional development
- Assess the implications of distance learning and work based learning
- Look at the increase in split site programmes and part time study programmes
- Look at the impact of the MRes on the PhD

The MRes experience

In June 1999

255 PhD students

19 MRes students

95 taught MSc students

Total = 369 students

Structure of training

60% lab. Research including three laboratory rotations

40% formal training components including transferable skills and specific research training modules, seminars, symposia and current opinions discussion

This template for training is applicable to all aspects of science training.

The course design is therefore student-centred in that they define their own aims and objectives and just use this template to tailor the course to their individual needs. There is a significant component of research that takes the form of three laboratory rotations, the third of which is the most lengthy and can be in a different department or in industry.

The first few days of the MRes course concentrates on personal and professional transferable skills and serves to bond the students in this initial intensive week. The next few weeks is taken up with learning basic research techniques.

There has been widespread industrial support and input for the MRes course and some industrially funded students have completed the courses. Out of the 103 students that have completed the MRes 42 have been Research Council funded and 13 have been funded by industry. Students that have completed the course have either gone on to do a PhD (28% at Manchester, 24% elsewhere) or have gone directly into alternative employment (48%). The latter are, perhaps, able to make a more informed career choice having completed a MRes.

Dr. Alan Taylor (University of Glasgow)

4 year PhDs and the Wellcome Trust Programme

A number of reviews have questioned the appropriateness of the three-year Ph.D. as typically funded in the UK. It is arguable how many PhDs still provide a training ground for a long-term career in academia. Of the students that graduated with a Ph.D. in 1995 8% have permanent academic jobs and just 25% have remained within the field of science.

Given that nearly 65% of students completing a PhD end up in an unrelated job it is obvious that transferable skills need to form an important part of the training offered by such a qualification. With the increased pressure of these skills being required under the present three-year system, it would make it harder for students to finish in the required time. At present, the selection of students for a particular PhD is rather cursory. Not many PhDs are available in certain areas and selection is often made on the basis of a brief interview and a short tour of the lab - an insufficient opportunity upon which a person's future career is based.

A 1+3 year Programme has been set up at Glasgow University with funding from the Wellcome Trust around the subject of "Molecular Function in Disease." Four departments contribute to the course with fairly tight constraints on the course content being set by Wellcome.

Aims for the first year

- To learn basic laboratory techniques and administrative tools for research
- Obtain a wide and detailed knowledge of the chosen research field
- To develop specialized research techniques
- To gain generic skills (e.g. report writing, paper writing and presentation skills)

Structure of the first year

1. The induction course in October teaches basic skills of good laboratory practice, radiation protection and communication skills. The students are also part of a joint graduate Programme that teaches skills of IT and library use etc. There are also occasional seminar programmes throughout the year to reinforce the skills learned in the opening stages of the course.

2. Teaching and training modules include

Current techniques in the field

Organismal biology

Molecular engineering

Synthetic and biophysical chemistry

Techniques for proteins, genes and cells.

3. Laboratory placements are across three different topics and take up 60% of the total first year time. Before they start work in a laboratory, students are required to write a project proposal and fill in a BBSRC application form having done the appropriate costings. The feedback from the students following this exercise has been positive and has resulted in well-structured projects that are written up in the form of a scientific paper.

4. Undergraduate teaching modules are an optional extra and are really only included in order to improve the background of the student in weak areas and are not part of the assessed course. Not all of the students starting the Wellcome PhDs are biologists and the undergraduate programme allows them to move into biological research.

5. A journal club has been set up which gives a forum for all four years to meet up at regular intervals and exchange ideas.

Each student has both a mentor and a supervisor that allows feedback and performance to be assessed throughout the year. Most of the assessment comes from the laboratory placements and covers skills, dedication, paper writing and the initial grant proposal.

The scheme has been running since 1996 so the first group of students will complete in 2000. The signs that the completion rate has been improved are encouraging, but it has to be remembered that this group of students was initially selected as being very bright.

Students have given positive feedback regarding the quality of the course and there are 10 applicants for each available place. The £11.5K stipend also holds a certain attraction over

the standard PhD! Students do not doubt that their choice was the right one and like the input they have into designing their own PhD, rather than being forced to take what was on offer. Students are able to choose their own supervisors that can potentially cause problems as many students may all select the same person. The scheme has also had the additional benefit of developing a lot of cross-disciplinary collaboration between departments that contribute to the degree and has helped communication within the institute in this way.

Summary

The 1+3 year degree has been shown to be of enormous benefit although it is recognized that this may not be ideal for every student. The question remains of how this type of degree will fit in with the taught MSc. and four-year undergraduate degrees. One must also ask how well these last two really prepare students for a Ph.D.

Questions and discussion

Dr. H. Evans (Liverpool John Moores)

Q. What would happen if a student decided not to continue to do a PhD at the end of the first year?

A. A MRes would be awarded.

Prof. P. Brain (Swansea)

Q. Students accepted onto this course are exceptionally good, so how can you tell if the extra year improves their performance?

A. This is a valid point and there is no proof. All students starting a PhD have to give a talk explaining what they are going to do - there is a big contrast between the Wellcome students and those starting a conventional three year PhD.

Dr. S. Matthews (IOB)

Q. Is the MRes an expensive way of training students for a career outside science?

A. The research councils do not see those students who do not go on to do a PhD as a failure.

Prof. S. Reynolds (Bath)

Q. There is a small number of four-year undergraduate degrees that claim to deliver the same product as the end of the first year of a four-year PhD. It must be cheaper to deliver the undergraduate programme than the Wellcome programme.

A. This may be true, but although the theory content of both routes is the same, it is questionable if the practical content is the same.

General Discussion

Prof. P. Brain (Swansea)

Q. Does the MRes have an influence on student debt? Might this prevent many people from doing a MRes prior to a Ph.D.?

A. (Prof. R. Balment). People do a MRes for a number of reasons.

They recognize they do not have the skills from their undergraduate degree

They are not sure whether to do a PhD

They want to do a PhD but lack self confidence

Some extremely bright students want to do research in a very specific area and use the MRes as a chance to network and choose the right lab.

MRes can re-skill people from industry.

Prof.C. Lichtenstein (QMW)

Q. Who does the teaching for postgraduate courses?

A. (Dr. A. Taylor Glasgow) Staff.

Q. If staff do more postgraduate teaching, are more resources necessary to cover the undergraduate courses?

A. Colleagues do feel the pressure of the extra teaching required for postgraduates, but most prefer to teach at this level rather than do undergraduate courses.

Q. Would the MRes be viable with normal funding?

A. If Wellcome hadn't pump-primed the MRes, the course would not have been possible. It would not be possible to implement the necessary transferable skills without external funding, but it has been possible for the university to help the research council to formulate ideas and increase the dialogue between them.

Prof. C. Catchpole (Royal Holloway)

Comment. Transferable skills are now taught during undergraduate courses and Masters courses so surely much of it must become repetitive by the time it is taught at PhD level.

Prof. W. Montgomery (Queens Belfast)

Comment. Practical honours projects are decreasing in length as the teaching of IT skills increases so that students are increasingly less able to hit a PhD running. One used to expect that a new student would design their own project, but three years isn't long enough for this to continue to be possible. A 1+3 year PhD might solve the deficits of the current system, but the problem then arises of how to fund the extra year. Might it be possible to top-slice all postgraduate projects to pay for MRes laboratory time?

