

LONDON MATHEMATICAL SOCIETY

THE FUTURE OF HIGHER EDUCATION Response to Consultation on White Paper

Introduction

The London Mathematical Society welcomes the recognition in the White Paper of the value to the nation of its universities and other higher education institutions, and of their success in teaching, research, and innovation. The Society also welcomes the recognition of the pressures under which higher education is operating, and the broad thrust of the strategy aimed at helping universities to meet these challenges. However we do have concerns about some of the specific measures proposed, because of their potentially damaging effect on our discipline.

Erosion of the national mathematics base

A major concern of the Society is the erosion of the national mathematics base. We believe that the changes proposed in both research and teaching funding could lead to further erosion.

The Roberts Review has emphasised the need for an increased flow of people with strong skills in science, technology, engineering and mathematics; and the Government, in its response, has committed itself to a policy of achieving this. The White Paper makes proposals on research training which address this matter. These alone are not sufficient. What is lacking is a national strategy to ensure that these subjects (and in particular mathematics, which underpins them all) are widely available at first-degree and at masters level. Such a strategy, we suggest, must recognise that to achieve the Government's objectives of increasing the flow of these skilled people, and of providing fair access to these disciplines, there is a need for a visible mathematical presence in every sort of higher educational institution, and in all geographical areas. To leave the matter to the vagaries of student choice, and exposed to the effects of individual universities' funding regimes, will lead to a further decline.

Research funding

The White Paper proposals on research funding seem to us not to recognise the ways in which research activity in different subjects is structured. The forthcoming International Review in Mathematics should provide evidence of what is best for the continued success of mathematics research in the UK. The "big science" model which informs the White Paper is not necessarily the most efficient or most effective way for all subjects, particularly those which are not bound by the need for large-scale laboratory (or library) provision. The idea of a critical mass is irrelevant to much of mathematics. Moreover, successful collaboration in many areas is conducted electronically, in open and fluid groupings. Despite limited research council funding in some areas, excellent research is done. The key resource for successful mathematics research is staff time; it is important that funding (and other) arrangements recognise this.

The proposed reduction in research funding for departments rated 4 we believe to be misguided. Such departments are producing work of world-class standard; in practice many could have been 5s if they had cut numbers returned. The overall effect will be that a significant fraction of world-class work will cease to be properly supported. To rely on a small number of centres will prove particularly inimical to any desire to maintain adequate maths teaching over a broad front.

Research training and career progression

We are concerned that moves to implement for PhD students a compulsory period of training in transferable skills each year may reduce the international 'value' of a PhD. Often the important skills, and those which are listed in the Hefce consultation, are actually discipline-specific ones.

The welcome proposals for enhanced remuneration for PhD students and research assistants draw attention to the depressed state of the main pay scales for university staff; unless these are enhanced it is unlikely that many postdoctoral workers will be encouraged to remain in the higher education sector.

Proposals on career progression for contract researchers seem to us not to recognise the (appropriately) different career patterns in different subjects. We are concerned that legislation designed to provide fair treatment for contract researchers in “big science” will actually damage career prospects in subjects (such as mathematics) where there are very few such posts, and permanent posts are lecturerships carrying a mix of duties. In mathematics there is a lack of suitable posts providing a bridge from the PhD to these permanent posts: what is needed is a supply of open (rather than project based) research fellowships. Too prescriptive rules on career progression will inhibit institutions from providing as many research posts; and competition for lecturerships will be less open—with negative effects on overall quality.

University teachers

Although supportive of the drive to sustain and develop high-quality teaching the Society is not convinced that these aims will be achieved through the mechanisms proposed. In particular we think the proposal for a national teaching quality academy is misguided, as there is ample evidence that the most effective mechanisms for staff development and support will continue to be the subject-specific ones such as professional societies, the LTSN, and the proposed National Centre for Excellence in Mathematics Teaching. The opportunity should be taken to learn from what has happened in schools; in particular, training schemes for university teachers must start with a recognition of the subject-specific nature of what is needed.

We are also concerned with the extra costs (both in time and in money) of the introduction of a requirement that all new teaching staff should obtain *formal* teaching qualifications. It would surely be right to analyse carefully the costs and benefits of such proposals; and to investigate what is done in other countries. In this respect it is important that the final proposals take account of the international market in academic jobs; established academics are unlikely to be willing to move to a regime which forces them into two years “training”.

We are similarly concerned at the likely impact of the proposals on external examiners. External examiners are usually senior academics with a wide experience and (in mathematics) strong subject-specific skills. They do a very time-consuming job with great professionalism. No evidence is adduced that they stand in need of further training; indeed the suggestion that they do is almost insulting. Compulsory training, with an emphasis on the bureaucratic aspects of the job, will result in a definite decline in the calibre of those appointed. In the longer term this will have a negative impact on the overall quality of degree programmes.

Good mathematics teaching

Whilst almost all university mathematicians are drawn into higher education by their desire to research more deeply into a particular branch of the subject, it is our conviction that the most valuable academics are those who attach equal importance to their teaching and research responsibilities. These are generally the people who make the best teachers: they are aware of the difficulties a student faces as they themselves are constantly confronted by new mathematical challenges, and they have the background knowledge to explain how a particular topic fits into a broader framework. This is why research-based universities are so successful at teaching.

The Society is concerned at the impact on the quality of a typical mathematical student’s experience of the proposals to segregate research into a small number of universities. The White Paper argues that “not every teacher needs to be engaged in ‘research’ . . . but ought to be expected to engage in scholarship to inform their work as teachers.” We believe that in the case of university mathematics this argument is weak, and that it is essential that a majority of the teachers should be actively practising mathematics. A crucial part of a mathematical education, particularly at degree level, is doing mathematics, solving problems; and not just absorbing information about mathematics or practising routine drills. Students need the support—frequently on an individual basis—of teachers who are themselves actively engaged in the same struggle. This need is not confined to students at “a small number of universities”; such supportive and informed teaching should be widely available.

In the longer term, if mathematics research is to be concentrated in a handful of centres, then the remaining institutions will find it impossible to recruit lecturers of the required calibre. Again the

experience from schools needs to be heeded: schools without A-level streams have found it impossible to attract well-qualified mathematics teachers.

Effective mathematics teaching is inescapably labour intensive. Modern technology provides many valuable aids to the learner, but it is not a substitute for the individual support and intervention most students need. Understanding a difficult mathematical concept for the first time is often only achieved after time-consuming one-on-one explanations from an expert.

Funding teaching

The Society is concerned that funding ratios do not reflect the costs, particularly in staff time, of mathematics teaching in universities. We have drawn attention several times in this response to the needs of those learning mathematics to have regular access to professionals with time to give support. Such support is necessary not just for those studying single-honours mathematics, but also for those studying the subjects developed in a serious mathematical framework. Learning in many science subjects is supported by laboratory work; in mathematics the corresponding support is in labour intensive problems classes and the like. We suggest that the time has come to re-examine carefully the basis of the subject differentials.

We are in agreement with the need to provide funds in support of students from disadvantaged backgrounds. However, we do not think that the Government's desirable objectives can be achieved without additional funds for teaching. Reduction of core teaching funding to provide such support has undesirable and damaging side-effects. For instance, such students, to a greater extent than others, need supportive (and costly) subject teaching; meeting this should be given a greater priority than providing "generic" support. Moreover, moving resources in the way proposed has an effect on shifting funds between subjects on the basis of their current fraction of weak students; we believe that such a movement would reduce support for mathematics students, and ultimately frustrate the aim of increasing the participation of students in mathematically rich disciplines.

Fair access

The Society fully supports the aim of fair access to higher education. Mathematical talent is found in people of all backgrounds, and must be recognised and fostered. We welcome the recognition that the most important step in improving access is the reform of secondary and further education. In the case of cumulative disciplines (such as mathematics) this is particularly true.

The Society, along with other parts of the mathematics community, attaches enormous importance to the universal provision of a re-vitalised schools mathematics curriculum, and to finding means whereby more qualified mathematics graduates can be attracted into the teaching profession; such steps will allow students from all backgrounds to have access to the wide range of subjects (and careers) to which mathematics is the key.

We support strongly schemes to encourage outreach from university mathematics departments to schools. Such schemes in themselves can only have limited effects. We are disappointed not to see more new and effective proposals for measures to raise at earlier educational stages the awareness and aspirations of children, particularly those from backgrounds under-represented in higher education.

Important as such steps are at school and college level, it is crucial that mathematics courses (and courses with a substantial mathematical element) are widely available throughout higher education, taught by working mathematicians who have sufficient resources (especially time) to allow them to support their students properly.