

The Post-14 Mathematics Inquiry

A response from The Council for Industry and Higher Education (CIHE)

Introduction

If the United Kingdom is to compete in a global marketplace it must have a strong supply of people at all ages with good mathematical knowledge and the appropriate skills to meet the diverse needs of a wide range of employers. CIHE is concerned to note that maths intensive courses at universities have been reduced and the supply of appropriately qualified maths teachers is in decline. CIHE therefore welcomes the Post-14 Mathematics Inquiry and looks forward to receiving the published recommendations in June 2003.

User Requirements

Each stage of the learning process must be addressed to ensure that maths development is properly monitored and assessed in order that individuals as far as possible have achieved a nationally benchmarked level of maths capability. Employers do not look for that common baseline to be very high. Too high a level could become too restrictive. But the baseline needs to carry conviction. Many employers have now lost faith with the GCSE in maths (only 51% get an A-C grade anyhow) and are using commercially produced tests instead. Restoring credibility in the GCSE must be a priority.

If there are subject specific needs, then they will have to be addressed, but the role of employers is also important. Employers should not expect the education system to have enabled their employees to acquire all the proficiency in maths required in their work. Employers need to be trained to properly assess the needs of their employees and to be prepared to make available appropriate training. Equally, a suitable range of additional training needs to be available in further education colleges and from private training providers and there is some doubt as to whether this is indeed available.

The Curriculum

The basic maths curriculum indeed lacks excitement and relevance and we wonder how many young people are put off by the numeracy strategy in primary schools.

HE institutions should not have to provide students with a common core if the national curriculum has been followed. They will however have to upgrade the capabilities of those people who have studied maths as a subsidiary option. E-learning and “artificial intelligence” options might be provided on a national basis. Such learning might also incorporate business related case studies and simulations to help bring the curriculum alive and refresh it with current real life concerns.

Perhaps a parallel approach to that taken in science is needed. There might be additional vocational and “hybrid” options at GCSE with a focus on the fundamentals, their application in real life as well as basic understanding of mathematical concepts and their relevance. The programmes run by the Royal Academy of Engineering (such as Education Engineering Scheme) involving 6th formers working on real engineering projects with employers and as project leaders offer a model. This framework might be

adapted for maths projects. Projects might cover banking/mortgage or supply/demand calls on the national electricity grid around popular TV programmes (such as football cup finals).

For those studying maths in higher education, a work placement or work-based project could be an integral part of the course. Modern language students spend time in the relevant foreign country and a similar philosophy should be applied more widely.

Teaching is currently over influenced by the pursuit of qualifications at all levels. The culture of testing and of schools being judged on the results of those tests permeates the education system. As Professor John Holman of the Science Education Centre at York University (whose work is funded by one of our member companies) has said:

“We have to face the awkward fact that the science we currently teach to the many is only practised by the few. The majority of students will go on to be citizens who need scientific literacy. At the moment the needs of those who want to be science specialists tend to dominate what is provided for everybody.”

At post-14 those students with recognised higher capability and skills in maths should be encouraged to pursue higher study in the discipline. This will entail not only creative and inspirational teaching but insight into how the application of the skills learned can be applied in the world of employment. Teachers and employers should work together to enlighten students on the pathways that maths education can open up for them and on the financial rewards that the study of maths produces. Our report *The Financial Returns to Undergraduates: a summary of recent evidence* notes amongst other things that:

“The returns to an undergraduate degree are highly dependent on the subject studied. For men, the average hourly earnings premia to Mathematics, Engineering and Economics degrees were 25.7, 21.9 and 26.8 percent respectively relative to someone in possession of 2 or more GCE “A” levels.” For women the premia for those with Maths and Economics were 43.6 and 41.2 percent respectively. On other measures such as early integration into the labour market and the likelihood of more continuous employment, those with Maths degrees also score well.

These premia and employment characteristics need to be better communicated, including to younger female students who are underrepresented in such subjects and who stand to benefit substantially. The range of jobs that use people with Maths skills could also be better assembled and communicated.

Qualifications and Assessment

A framework is needed where different courses and qualifications are equally respected rather than being placed in a hierarchy. There needs to be parity between the academic/vocational routes and clear pathways for young people to move between the two routes. A national qualifications framework is urgently needed with clear progression routes, agreed credit frameworks and clear relationships to different needs. Currently

some employers doubt if there are clear progression routes between Key Stages 2 and 3 let alone for older students. The work-based routes are particularly unclear.

Career guidance in schools is haphazard and generally ill-informed about possible career routes. Some good marketing and case study/role models for young people would help them visualise and better plan their future. Closer involvement of heads, teachers and industry with short secondments and opportunities for teachers to work in industry could help them invigorate the learning experience.

There should be options for measuring attainment other than qualifications that would be acceptable to employers. But they need to be clear and with agreed criteria. Records of achievement, Progress Files and reflective work where the contextualised learning can be articulated offer one example. The achievements of students while on placement against defined targets offer a related measure of achievement.

CIHE

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