

## Mathematics and Skill Enhancement

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**ABSTRACT:** In this paper the role of mathematics to enhance skill in graduates is elaborated. The different parameters to be incorporated in the syllabi to make the curriculum skill oriented are dealt with in detail like the personal development plans, preparation of CV's, group discussions, etc. The students should be prepared for employment with training in modern work places. Skills such as team working, business awareness and communication skills should be an integral part of the curriculum.

The attractions of studying a mathematics degree is that it leaves career options fairly open in varied fields.

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### I. INTRODUCTION:

All stake holders in Higher Education are increasingly aware of the importance attached to the additional skills students should be gaining at College/ University, over and above their course-specific skills. It is expected that all institutions of higher learning should publish Key Information Sets for each of their courses on their institutional website, 'providing prospective students with information about the Higher Education experience that we know they find useful, in places we know they look for it. The data will include student satisfaction metrics, learning and teaching activities and assessment methods, study hours, course accreditation, accommodation costs and graduate employment with salary outcomes.

In what is certain to be a very competitive student recruitment 'market place' there will be considerable importance attached by each institution and by each course to presenting a successful profile by each of these measures. This is especially true at a time of high levels of graduate unemployment. Almost half of all recent graduates believe their education did not adequately equip them for the world of work.

The stakeholder groups have expressed views in support of these principles as:

1. All institutions are expected to demonstrate how their institution prepares its students for employment, including through training in modern work place. Skills such as team working, business awareness, and communication ought to be incorporated.
2. Institutions should develop proposals to integrate a flexible element of professional experience into all higher education courses. This applies to postgraduate courses as well as undergraduate courses.
3. Institutions should increase resources for, and promote the use of, personal development

plans, and provide optional modules/classes that consider how the skills and knowledge are developed.

4. There should be a clear institution-wide employability strategy with a high quality, well-structured work experience programme.
5. The importance of work experience—especially a placement year should also be highlighted. A fixed number of graduate vacancies be filled by applicants who have already worked for their new employer as an undergraduate in experience programme.
6. All institutions should publish an employability statement. That is a short summary of what universities and colleges offer to their students to support their employability and their transition into employment and beyond, and is intended to help prospective students make informed choices for entry.

The Mathematics community has implicitly identified the importance of the skills element of the curriculum. It often comes as a surprise to potential applicants – when it is mentioned during, for example, an open day presentation – that there is no Higher Education equivalent to the National Curriculum. However, there is a general expectation about standards for the award of qualifications at a given level in terms of the attributes and capabilities that those possessing qualifications should have demonstrated. Reflecting the diversity of provision, to be found in the discipline, very little is said about subject content.

General skill development, however, is prominent. The students should possess general study skills, particularly including the ability to learn independently, using a variety of media that might include books, learned journals, the internet and so on. They should also be able to work

independently with patience and persistence, pursuing the solution of a problem to its conclusion. The general skills of time management and organisation be developed. They should be adaptable, in particular displaying readiness to address new problems from new areas capable of transferring knowledge from one context to another, to assess problems logically and to approach them analytically. They should have highly developed skills of numeracy, including being thoroughly comfortable with numerate concepts and arguments in all stages of work. The general IT skills, such as word processing, the ability to use the internet and the ability to obtain information be developed. They must be capable of always exercising these skills in a responsible way and taking care that sources are referred to appropriately. The skill of general communication, typically including the ability to work in teams, to contribute to discussions, to write coherently and to communicate results clearly be exploited to the fullest.

It is mostly found that students studying Mathematics perceive a problem in terms of their development of personal skills – at least, in relation to their own expectations. There is a need to tackle the issue. Should we as a community be supporting each other in developing new approaches to skill development within Mathematics programmes, and if so, how?

There are significant barriers involved when seeking to modify Mathematics programmes to encourage the development of graduate skills. One is fundamentally philosophical, as some will wish to retain the pure, theoretical nature of their courses. Another is the practical difficulty of finding space for graduate skill development in a crowded curriculum. This latter problem can be addressed – at least in part – through different approaches toward learning, teaching and assessment that allow skill development to take place alongside the development of the mathematical skills, and by encouraging students to take part in extra-curricular activities. Central to this is the need to increase student awareness of the wider purpose of each activity in developing their skills, and the value of doing so. In this regard, it is very important that students are able to recognise the part each activity plays in helping them towards the attributes expected of a graduate from their course.

If so, they will be better able to see the benefit of the curricular strategies adopted, and hence better able to articulate their skill development when required. This can be achieved by applying different strategies.

One convenient skills categorisation, reflecting the key areas identified as ‘graduate skills’ applies the following groupings:

1. Work-based learning and/or work-related learning.
2. Reflection and action-planning, including Personal Development Planning (PDP) and work portfolios.
3. Career Management Skills (CMS).
4. Employability skills (those not covered above, such as skills in team working, communication, leadership, autonomy and self-awareness).

One of the attractions of studying a mathematics degree is that it leaves career options fairly open. However the students need effective support and advice throughout their programme to help them to find rewarding and interesting careers when they graduate. One of the main messages to convey is that, when it comes to career planning, it pays to start early. In the first year, students should develop their CVs and find out about their career options. There are opportunities for gaining useful experience in summer as well as winter breaks by joining financial institutions. During their second year, students should be encouraged to apply for internships and other work experience. Employers are increasingly using internships as a recruitment tool and even if a student is not offered a job with the same company, the experience will strengthen their CV. Internships are competitive but, even if unsuccessful, a student will benefit from the experience of filling in application forms and focusing on their strengths and weaknesses.

Applications to graduate employment schemes start early and students need to be well-prepared by the start of their final year. However students should be aware that there are other options available, not just with large/reputed companies. Small and medium sized enterprises will consider students with 2nd or 3rd class degrees if they have other qualities and skills to offer.

To help students with career management a series of maths specific careers events should be held in collaboration with the employers including banks, actuarial and insurance firms, the civil service, engineering, energy and retail companies with a chance to talk to company representatives. Themed panel sessions where students could question experts about careers in finance, technology and teaching be planned. Careers advisors should be invited to give practical advice on CVs and applications.

An Employability Skills guide should be made available to the students to give practical advice on developing skills by choosing particular course options and participating in useful extra-curricular activities. The guide should suggest a ‘career timeline’ so that students can plan their

career management from the start of their programme.

The challenge is to make sure that all students are actively engaged in planning their career or further study after graduating. We must intend to integrate career planning and skills development into our tutoring system. Academics should not be expected to offer careers advice but should know where to direct a student for help with career planning and skills development.