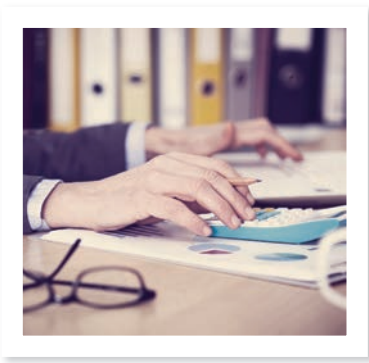


MATHEMATICS, IT AND COMPUTING OVERVIEW

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The data from HESA's Destinations of Leavers from Higher Education (DLHE) survey 2014/15 shows two subjects with a diverse range of destinations for UK-domiciled, first degree graduates:

- IT and computing is a vocationally-oriented discipline and this is reflected in the fact that almost two-thirds (65.2%) of graduates went into full-time work in the UK following graduation compared to just under half (48.9%) of maths graduates.
- Maths graduates are much more likely to pursue further study (22.1%) than those from IT and computing (7.3%).
- Both disciplines have a higher unemployment rate (maths 7.2%, and IT and computing 9.9%) compared with all graduates (5.7%).

This article focuses on what maths and IT and computing graduates are doing after their degree, and what they can do while at university to develop their employability.

Mathematics

Maths graduates who enter employment in the UK primarily work in business, HR and finance professions (41.8%). They tend to take on roles that use their analytical and numeracy skills, such as finance and investment analysis/advice or chartered and certified accountancy. The next most likely employment destinations are in IT and education.

Maths graduates are much more likely to go onto further study (22.1%) than all graduates (13.1%). Almost a third of those in further study choose to study a postgraduate qualification in education. This is not surprising given the higher paying bursaries available to maths graduates who start a PGCE. The highest proportion of graduates choosing further study opt for a Masters (36.2%), with courses ranging from applied

mathematics to robotics. The salaries of maths graduates in full time work in the UK range from £18,000 to £29,000.

The Wakeham Review

The Wakeham Review¹ of STEM Degree Provision and Graduate Employability finds that maths graduates have a lower than average progression rate into professional-level jobs. In addition, the report identifies a number of themes cutting across STEM graduate employability, including:

- The importance of graduates gaining work experience. Research from the UK Commission for Employment and Skills' (UKCES) Employer Perspectives Survey states that relevant work experience is rated by two-thirds of recruiting employers (66%) as being a critical or significant criterion that they looked for in candidates.
- The value that employers place on 'work ready skills' and their perception that many graduates do not possess these skills. These skills, also known as 'soft skills', can include the ability to give presentations, commercial awareness, adaptability and a commitment to continuing professional development. These 'soft skills' are a foundation of what employers expect from graduates.
- Some employers have found that some graduates lacked the necessary resilience expected of them. They stated that having a graduate making mistakes in a new role is not in itself problematic. Indeed, they emphasised that in the workplace graduates need to be able to learn from failure and adapt their approach to ensure future success – but some graduates seemed unable to take disappointment on the chin.
- Graduates have a lack of awareness and understanding about how the skills they have gained during their degree relate to the current jobs market.

IT and Computing

The DLHE survey suggests a 'two tier' labour market within IT for graduates, with some doing extremely well but with others struggling – 65.2% are in full time employment in the UK while 9.9% are unemployed. Due to the vocational nature of IT and computing courses, most graduates choose to go directly into employment in the UK mainly in the information technology professions (60.8%). The most common jobs

for graduates are as programmers, software developers or web designers. Salaries for graduates range from £18,000 to £30,000.

In each of the last six years, more students have begun computer sciences courses than physics, chemistry and maths combined.

The Shadbolt Review

The Shadbolt Review² addresses the issue of unemployment among computer science graduates. The DLHE data shows unemployment at 10%, which is much higher compared with all graduates. The overall picture, however, is more complicated as computer science students who are in employment are more likely to be in graduate level work and well paid.

Those who take a sandwich course enjoy much lower levels of unemployment (6%) than those who don't (15%). Graduates from sandwich courses are twice as likely to be earning more than £20,000 compared with those who completed a standard degree.

Of those computer science graduates who are employed, one quarter of them are in London while the others are mainly located in the South East, East Midlands, Manchester and Leeds.

The UKCES report³ that reviewed the requirement for high-level STEM skills (2015) found that the top three industries for IT professionals were:

- information and communication (36%);
- professional services (17%);
- financial services (9%).

What skills do employers want from IT graduates?

While many employers find that computer science graduates are well prepared for work, there remains a bloc of opinion that more could be done to develop graduates' skills and work readiness. As part of the Shadbolt review, employers were asked what skills IT graduates should possess to best meet their needs. The most common answers were:

- computer science specific skills, e.g. programming languages;
- soft skills, including communication;
- project management skills.

Some employers reject the need for graduates to know particular programming languages, arguing that the key thing that they look for is the ability to learn and select what is relevant based upon the task rather than simply to know the latest language.

Future trends

The UKCES Sector Insights report (2015) anticipates the following trends:

- the growing importance of cyber security;
- mobile and cloud computing;
- new applications of social media;
- collaborative platforms.

What careers are available to maths, IT and computing graduates?

There are a wide range of careers open to maths, IT and computing graduates. While it is good to be able to use the skills gained from your degree, it is important that graduates don't feel constrained by it when considering possible careers. For example, some students feel that if they complete a maths degree then they must go on to a 'maths-based career' such as accountancy or auditing. This isn't the case. It's important that graduates consider their strengths and what they are passionate about before considering their career options. Their university careers team can help them with this.

The evidence from the Shadbolt Review suggests that many students are unaware of the range of careers and types of employer that make up the labour market, often only applying to the high profile sectors and employers. It is worth students looking into a range of careers and employers to see which best matches with their skills and values. The best way to start doing this is by attending employer events at university and using the careers service.

The value of work experience

The evidence from both the Shadbolt and the Wakeham reviews suggests that maths/IT students would be well advised to plan what work experience they will be gaining during their university studies.

This evidence is further supported by the longitudinal study into the value of work experience, Futuretrack⁴. The two main objectives of this project were:

- to examine factors associated with students participation in paid and unpaid work;
- to study the effect of different forms of work experience on their development of skills and progress into the labour market following HE.

The results show that the transitions made by students into the labour market are influenced by the work experience they undertake while studying. In particular, respondents who had undertaken no work experience during study were less likely to have made a successful transition into the labour market than those who had undertaken some form of work experience. Most crucially, respondents who had undertaken both work-related learning and paid work had notably lower odds of unemployment and higher odds of self-confidence in comparison to respondents who had undertaken no work.

This is supported by the findings of The Graduate Market in 2015 (the High Fliers report)⁵:

'Almost half of the recruiters who took part in the research repeated their warnings from previous years – that graduates who have no previous work experience at all are unlikely to be successful during the selection process and have little or no chance of receiving a job offer for their organisations' graduate programmes.'

Develop a 'portfolio of experience'

The evidence from the Futuretrack study confirms the value of gaining experience. Schemes such as 'a Year in Industry' as part of your degree can be valuable, but other forms of work such as volunteering or a part-time job also have value. It's important that students develop a 'portfolio of experience' during university.

How to find work experience

According to Futuretrack, the most common way for graduates to find paid work is either through previously having worked for an employer or through applications to companies, either directly or in response to a job advert. Fifteen per cent of students did not undertake paid work while studying.

This suggests that in order for graduates to maximise their chances of gaining experience it helps if they:

- Are pro-active — opportunities are out there being open-minded and optimistic is important. Employers respond well to initiative.
- Use a variety of strategies — in addition to applying for advertised placements, students should also use their social network (friends, family etc.) and look at other ways to gain experience. Investigating different opportunities at the same time and then weighing them up is an effective way of making decisions about the future.
- Are resilient and persevere — to develop a 'portfolio of experience' students need to stick at it and not give up when setbacks come their way. They should be encouraged to have confidence in their ability.

How can students develop employability skills during their degree?

The key message from the evidence presented here is to undertake work experience. Students may decide to look for a course that offers a year in industry or for work placements during holiday periods. Students should follow the tips discussed in this article to develop a 'portfolio of experience'. They can do this by:

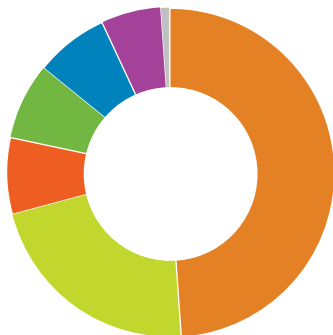
- developing the 'soft skills' that employers need through their studies, part time work or volunteering;
- planning their next steps carefully. Students need to be pro-active in their career development by gaining experience and taking part in employability sessions.
- reviewing their own resilience and considering a plan of how they could develop this during their degree. Being prepared to learn from failure, and to use it to help to develop themselves;
- researching into careers and organisations that interest them. They shouldn't be constrained by jobs that relate directly to their degree and should use their time at university to research careers and build a network;
- engaging with their careers service, taking part in workshops and talking one-to-one with their careers team at university.

These actions will put them in a stronger position to articulate their skills to employers, and help them to move into a career which best meets their needs.

See references & resources on page 50

MATHEMATICS GRADUATES FROM 2015

SURVEY RESPONSE: 82.3% | FEMALE: 1,970 | MALE: 2,990 | TOTAL RESPONSES: 4,965 | ALL GRADUATES: 6,030



OUTCOMES SIX MONTHS AFTER GRADUATION

Working full time in the UK	48.9%
In further study, training or research	22.1%
Working part time in the UK	7.5%
Working and studying	7.4%
Unemployed, including those due to start work	7.2%
Other	5.7%
Working overseas	1.1%

TYPE OF COURSE FOR THOSE IN FURTHER STUDY

Masters (e.g. MA, MSc) 36.2%
 Postgraduate qualification in education 30.4%
 Doctorate (e.g. PhD, DPhil, MPhil) 23.4%
 Other postgraduate diplomas 5.8%
 Other study, training or research 2.6%
 Professional qualification 1.5%
 Total number of graduates in further study 1,095

EXAMPLES OF COURSES STUDIED

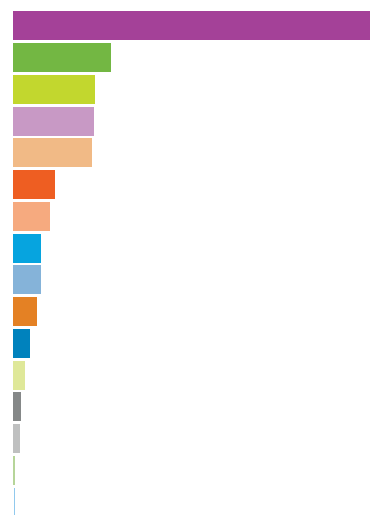
MSc Statistics
 MSc Artificial Surveillance
 MSc Quantity Surveying
 MPhil Data Science
 PhD Mathematics
 PhD Applied Mathematics
 PGCE Secondary Maths
 TEFL (Teaching English as a Foreign Language)

TYPE OF WORK FOR THOSE IN EMPLOYMENT

Graduates who were in employment either full time, part time or working and studying in the UK

FEMALE: 1,300 | MALE: 1,865 | TOTAL IN EMPLOYMENT IN THE UK: 3,165

Business, HR and finance professionals	41.8%
Information technology (IT) professionals	12.3%
Education professionals	10.2%
Clerical, secretarial and numerical clerks	8.1%
Retail, catering, waiting and bar staff	7.9%
Other occupations	3.6%
Marketing, PR and sales professionals	3.6%
Managers	2.8%
Other professionals, associate professionals and technicians	2.8%
Childcare, health and education occupations	2.2%
Engineering and building professionals	1.9%
Legal, social and welfare professionals	0.8%
Science professionals	0.8%
Arts, design and media professionals	0.8%
Health professionals	0.3%
Unknown occupations	0.1%

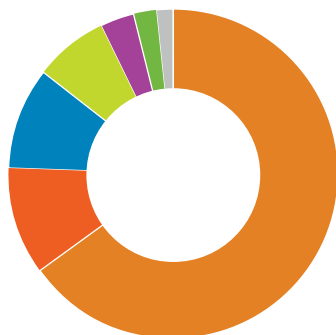


EXAMPLES OF 2015 MATHEMATICS GRADUATE JOB TITLES AND EMPLOYERS (SIX MONTHS AFTER GRADUATION)

Graduate line manager - Royal Mail	Actuarial analyst - HSBC	Store assistant - Game
Teacher - Teach First	Trainee accountant - BDO	Sales advisor - Ted Baker
Research engineer - QinetiQ	Consultant - Deloitte	Waitress - Bella Italia
Traffic engineer - Transport for London	Statistician - NHS	Fishmonger/butcher - Tesco
Pedestrian modeller - Mott McDonald	Visitor host - Warner Bros studio tour	
Web designer - university	Maths graduate assistant - primary school	
	Medical records clerical assistant - NHS	
	Accountancy administrator - local police finance department	
	Intern - local church	

COMPUTER SCIENCE AND IT GRADUATES FROM 2015

SURVEY RESPONSE: 79.5% | FEMALE: 1,595 | MALE: 8,070 | TOTAL RESPONSES: 9,665 | ALL GRADUATES: 12,155



OUTCOMES SIX MONTHS AFTER GRADUATION

Working full time in the UK	65.2%
Working part time in the UK	10.5%
Unemployed, including those due to start work	9.9%
In further study, training or research	7.3%
Other	3.4%
Working and studying	2.3%
Working overseas	1.4%

TYPE OF COURSE FOR THOSE IN FURTHER STUDY

- Masters (e.g. MA, MSc) 56.4%
- Doctorate (e.g. PhD, DPhil, MPhil) 14.6%
- Postgraduate qualification in education 12.2%
- Other study, training or research 10.3%
- Other postgraduate diplomas 5.4%
- Professional qualification 1.1%
- Total number of graduates in further study 705

EXAMPLES OF COURSES STUDIED

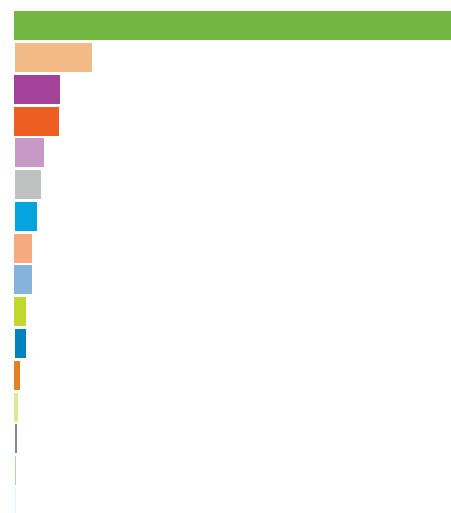
- MSc Computer Science
- MSc Advanced Computing
- MSc Information Technology Management
- PGCE Secondary Computer Science and Information Technology Education
- PGCE Further Education

TYPE OF WORK FOR THOSE IN EMPLOYMENT

Graduates who were in employment either full time, part time or working and studying in the UK

FEMALE: 1,225 | MALE: 6,305 | TOTAL IN EMPLOYMENT IN THE UK: 7,530

Information technology professionals	60.8%
Retail, catering, waiting and bar staff	9.4%
Business, HR and finance professionals	6.2%
Other occupations	5.5%
Clerical, secretarial and numerical clerk occupations	3.5%
Arts, design and media professionals	2.7%
Managers	2.7%
Marketing, PR and sales professionals	2.4%
Other professionals, associate professionals and technicians	2.2%
Education professionals	1.5%
Engineering and building professionals	1.2%
Childcare, health and education occupations	0.8%
Legal, social and welfare professionals	0.4%
Science professionals	0.3%
Health professionals	0.3%
Unknown occupations	0.2%



EXAMPLES OF 2015 COMPUTER SCIENCE AND IT GRADUATE JOB TITLES AND EMPLOYERS (SIX MONTHS AFTER GRADUATION)

- CEO of start-up company
- Team manager - Marks & Spencer
- Trainee manager - Wetherspoon's
- Ethical hacking lecturer - university
- Paralegal - solicitors firm
- Self-employed software designer - IT company
- Cyber security analyst - security company
- Junior developer - IT company
- Software engineer - Foreign Office
- Adviser - KPMG
- Self-employed musician
- Personal trainer - Virgin Active
- Dental nurse - Dentists
- HR administrator - NHS trust
- Custody officer assistant - police force
- Customer adviser - Sky
- Bar staff - golf club
- Security guard - magistrate's courts