Identifying the role of Further and Higher Education in cyber security skills development

This study explored the role of Further Education (FE) and Higher Education (HE) in the development of cyber security skills in England[1]. The background to the study is the increasing threat to the UK's cyber security but a growing shortage of cyber security professionals.

FE and HE offer a number of courses and modules related to cyber security. Within FE, courses at Levels 2 and 3 feature a few specialist courses but it is more common to take generalist IT courses, computer science or apprenticeships with a cyber security dimension as a building block instead. Mainly, this is because cyber security is not always offered at this level, so computer science is seen as a common pathway and it is more complex than a generalist IT course. At the HE level, students can undertake specialist cyber security courses as part of Bachelor's and Master's degrees (including degree apprenticeships) or courses that combine STEM or non-STEM subjects with cyber security.

There are different pathways through FE and HE into entry-level jobs in cyber security. For highly technical cyber security entry-level roles, employers seek graduates with a cyber security degree but recognise they often need to look at STEM, IT or other cyber security-related background to get the right skills. These skill sets are, however, in high demand from other sectors (e.g. financial services). A number of cyber security jobs are less technical in nature, which means there is an opportunity for recruits with other non-STEM backgrounds to enter the field. Universities and colleges provide a basic foundation of knowledge and skills in cyber security. However, employers recognise they need to train technical graduates to match the required skills for a cyber security entry-level role.

The involvement of employers in developing high quality courses at the FE and HE levels is beneficial because this allows students to develop links with industry and further develop their skills and experience. This involvement is particularly beneficial if HE institutions are certified by bodies such as the National Cyber Security Centre (NSCS) since this gives them added credibility in the eyes of job-seekers. In parallel to completing their studies, students are often engaged in extra-curricular activities outside their FE or HE establishments because this helps develop skills.

The research findings indicate that the gender imbalance among students on cyber security courses and modules is still a significant problem. Preconceived notions of what cyber security involves and a lack of information available continues to affect the number of female students applying for cyber security at FE and HE levels. There are nonetheless examples of successful measures being taken by FE and HE institutions, Government and industry to redress this imbalance but more needs to be done to rectify this.

Cyber security courses and educational building blocks[2]:

FE STUDENTS studying (2016/17):
47,417 in fields relating to ICT [3]
670 in cyber security

HE STUDENTS studying (2016/17):
79,905 in computer science[4]
5,827 in cyber security related fields[5]

630 (approximately)[2]
STUDENTS starting a cyber security apprenticeship (2016/17) at all levels

27% INCREASE in students taking a **CYBER SECURITY RELATED COURSE**[5] in the past three academic years (2014-2017)

14% INCREASE in students starting an **APPRENTICESHIP** in the Information and Communication Technologies sector from 2016/17 to 2017/18 at all levels[2]

Pathways to cyber security entry-level jobs through HE and FE[6]:

6 PATHWAYS identified involving FE and HE that can lead to an entry-level job in cyber security

3 APPRENTICESHIPS in cyber security[7]

BSC COMPUTER SCIENCE AND CYBER SECURITY the most common course undertaken by undergraduate and postgraduate students entering the cyber security field

Among students with a degree in a cyber security-related field in the past three academic years[5]:

OBTAINED AN ENTRY-LEVEL JOB IN:

CYBER SECURITY
26.3 %

IT
38.6 %

MANAGEMENT (in a cyber security related field)
9.1 %

ANOTHER FIELD (unrelated to cyber security)
25.0 %

FURTHER STUDY
1.0 %

Gender balance in cyber security[8]:

The gender imbalance exists in A level subjects that lead to a degree or course in cyber security.

18.1 % of all **FEMALE A Level STUDENTS** studied maths in 2017

0.4% of all **FEMALE A Level STUDENTS** studied computing in 2017

33.0% of all **MALE A Level STUDENTS** studied maths in the same year

4.5% of all **MALE A Level STUDENTS** studied computing in the same year
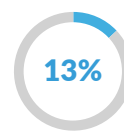
13%
Students taking a cyber security course in FE were female in 2016/17
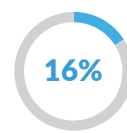
16%
Students taking a cyber security related course[5] in HE were female in 2016/17

2. Source: the Association of Colleges (AoC), the Higher Education Statistics Agency (HESA) and Department for Education, 2018, Apprenticeship and Levy Statistics.
3. Generalist IT, technology and computer science related courses.
4. For highly technical cyber security entry-level roles, employers generally seek graduates with a STEM or IT related background.
5. Cyber security related field include: (1) Generalist cyber security courses or computer science courses with a cyber security specialism; (2) Combining a technical (e.g. STEM subject) or (3) a non-technical (e.g. management) course with cyber security. Source: HESA.
6. Source: HESA.
7. Level 4 Cyber Intrusion Analyst, Level 4 Cyber Technologist. Level 6 Cyber Security Degree Apprenticeship.
8. Source: AoC, HESA and Department for Education, 2018, Revised A level and other 16-18 results in England, 2016-2017.