cogent

The Sector Skills Council for
Chemicals and Pharmaceuticals,
Nuclear, Oil and Gas, Petroleum
and Polymers

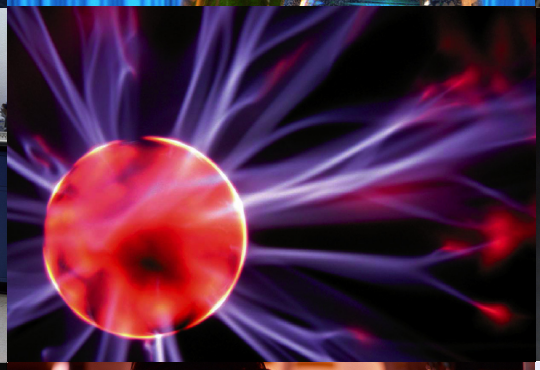
Assessment of Current Provision for the Cogent Sector - PART 1

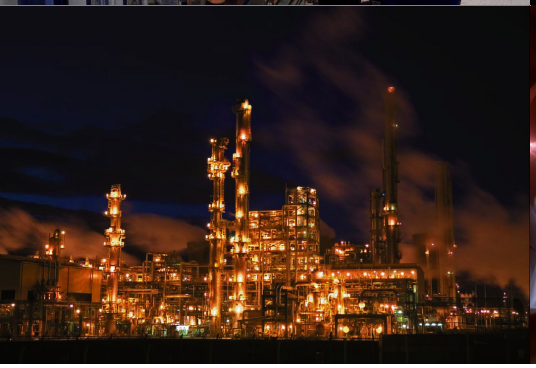
FINAL

Innovation — Competence — Productivity — Sustainability









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1. Executive Summary

N.B. – this report does not include assessment of provision for the upstream oil and gas industry, except where it is being referred to in general terms (such as HE provision) with no comment on quantification etc.

Additional data compiled since the report was produced is now available for the Oil & Gas sector, and is contained within the full Scottish SSA report and in the forthcoming English regional reports.

The industries covered by the Cogent footprint have access to a wealth of education and training provision, from National and Scottish Vocational Qualifications, through to Honours and Masters Degrees.

What the industries do not have, however, is a clearly defined pathway through the range of sector-specific and generic qualifications, to enable them to plan progression as both employers and employees. The sheer number of opportunities in some areas, such as higher education provision in Chemistry is not reflected in the potential articulation routes, such as N/SVQs, HNC, HND or foundation degrees. This has led to a lack of engagement between employers and providers, with the employer view of need not being clearly articulated (or uniformly expressed) to the providers. In turn, providers have addressed course content by expanding choices to reflect the perceived need of learners, with little input from industry.

There are, in contrast, a number of examples of successful co-operative developments between industry and provider, which has benefited all parties, not least the learners, who have entered or enhanced their role within industry by having the most appropriate range of skills and knowledge.

The key issues emerging from the assessment of provision fall into four broad categories: attracting people with the right skills, meeting the needs of current employees (upskilling and progression), sources of information on access and quality of provision, and issues related to decline in student numbers.

1. Attracting people with the right skills

The numbers of students entering further and higher education has increased substantially over the past 10 years. However this has not benefited the Cogent industries, as, despite the number of HE students rising by 19%, the number of students entering and completing HE courses specific to Cogent has been in decline.

The gender imbalance is also quite marked, with Higher Education Statistics from the HE Statistics Agency showing that, in 2003-4, 58% of HE students were female, but within the subject classifications related to Cogent, this fell to only 22%. When entering the industry, this gender split remains at the same proportion; therefore an increase in actual numbers studying may increase numbers of females entering the sector.

Career choices of graduates with the most relevant qualifications do not indicate a high level of interest in the sector. Indeed, only 6.5% of suitably

qualified graduates actually take up employment in the sector (as identified by Standard Industrial Classification (SIC) codes.

Employers reported a lack of practical skills with regards to those entering the industry. This was an issue both at school leaver and postgraduate level. Although employers value the level of academic knowledge gained at degree/postgraduate level, there is a perceived lack of ability to put that knowledge into practice when entering industry.

2. Meeting the needs of current employees

Of the training and qualifications currently available to current employees Foundation degrees have not been widely embraced within the Cogent footprint, with only three specific Fds currently developed and one in development. The numbers of employees embarking on this as a means of upskilling or career progression is very low, and the numbers completing is even lower. This is potentially a major missed opportunity for employers, to access a qualification designed to their specification and delivered locally to meet their expressed needs to upskill the current workforce and to influence graduate intake.

The same picture emerges from other vocationally specific routes, where N/SVQs have been developed in conjunction with employers, but have then failed to attract sufficient students to maintain associated training provision or awarding body support. There are exceptions to this, where candidate numbers (certificates issued) at level 2 have steadily increased. This does not, however manifest into a corresponding increase at level 3. Nor does it reflect the identified gaps in skills at levels 2 or 3, with qualified numbers being miniscule when compared to those employees requiring upskilling.

The needs of this same group could also be addressed by the availability of a mid-career apprenticeship model. As highlighted in the Skills Needs Assessment and reiterated in the workshops carried out as part of the Assessment of Current Provision, there is a move to raise the skills levels of operators from level 2 to level 3. There is therefore a need to create or adapt a framework to suit those who are already in employment. The current apprenticeship frameworks could provide good basis for this, but would require some adaptations. As they stand, apprenticeships do not account for prior experience and therefore an abbreviated version may be required, nor does the current model e.g. two years study and two years in employment, meet the needs of mid career entrants. If skills requirements for process operators do rise as predicted, demand for this type of qualification would be large at around 120,000 employees from the Cogent sector.

3. Sources of information on access and quality of provision

A recurring theme from employers is the lack of specialist industry specific knowledge and skills available through qualification routes. Employers instead buy in private training to address these skills needs. They favour this type of provision because of the flexibility in delivery methods and their ability to influence the content and tailor it to suit their exact needs. The issue surrounding private provision however, is the sheer bulk available, and the lack of guidance regarding the quality of it. There is also no system currently

in place that standardises achievement of a private training course across the sector, in terms of the ability of the employee following completion. The development of such a system would allow employers to readily access the provision they need, at the right quality, and in the right location. Benchmarking or kitemarking of provision would allow employers to select provision based on accurate evidence rather than historical reasons.

Employers also reported difficulties in understanding the types of qualifications that attract funding and felt that there was a need for a guide through these systems. A signposting system was requested, to allow easier engagement with providers and stakeholders.

4. Issues related to decline in student numbers

At HE level, the decrease in the numbers of students taking courses related to the Cogent industries has led to the closure of courses and entire departments. Since 1997 there have been 18 Physics departments and 28 Chemistry departments closed, with far more due to close. As a result the system only produces 2,000 Chemistry graduates a year as opposed to 5,000 in 1995. This is also a concern in relation to HNC and HND courses, which are now only available at a steadily declining number of establishments throughout the UK.

2 Provision – issues affecting the Cogent industries

2.1 Entering the sector

2.1.1 From schools

The Cogent sector depends on entry level qualifications related to Science, Engineering and Technology, as well as English, Maths etc. In general, the number of students choosing to study these subjects beyond compulsory levels is in decline. This is affecting the recruitment pool available to enter employment at operator level, and into apprenticeships.

The numbers moving into apprenticeships specific to Cogent are relatively small when compared to other sectors – for example only around 70 to 80 candidates per year pass through the Chemicals framework. The anticipated employer demand for current and future process and maintenance employees to be skilled to levels 2 and 3 provides a potential audience for these qualifications.

Although achievement of a level 2 qualification e.g. 5 GCSEs at grades A to C, is broadly acknowledged as an entry requirement to the sector, employers have reported that attainment of this still leaves applicants lacking for some of the skills expected of those who enter the industry. There has been a particular decline in the number of applicants with practical or 'hands on' skills, which are highly valued by employers – this may have been due to health and safety regulations. There is a need for some form of vocational element to be built into school level qualifications.

2.1.2 From Further and Higher Education

The range of opportunities available within some areas of education is narrow, with the decline in HNC and HND offerings (England and Wales at 10 HNCs and 14 HNDs, Scotland at 14 HNCs and 16 HNDs, and Northern Ireland having one HNC and one HND) being most noted by employers. The provision in Scotland reflects the relative strength of HNCs and HNDs as a route to both employment and further education. Only a limited number of foundation degrees have been developed to fill this emerging gap in England and Wales, leading to an overall need to develop or redevelop qualifications reflecting industry needs.

The opposite picture has emerged for undergraduate opportunities in chemistry and related subjects (around 400 Bachelors degrees throughout the U.K.). A trend towards "Chemistry with…" degrees has led to confusion among employers as to graduate skills and knowledge, with relevance to industry. There is no common standard of chemistry-related content recognised across the spectrum (employers don't know what they are getting). The increase in the number of offerings has not been matched by an expansion in student numbers – fewer students (in relation to overall student numbers) are studying an expanded number of courses.

However, the same is not true of provision for *specialist* areas:

> Polymers - only six institutions offer specific courses (one in Scotland, one in Northern Ireland, none in Wales), directly related to the polymer industry.

Petroleum - there is one provider each in England and Scotland, and currently none in Northern Ireland or Wales.

Oil and Gas – *under review*

Nuclear – there is no provision other than one offering specifying decommissioning studies. This reflects the needs of the industry, which recruits via more general degrees (such as Chemistry, Physics), utilising Masters and CPD to add the necessary knowledge and understanding of nuclear technology.

There is need to establish a common understanding on employer expectations, and to reflect this in vocational elements of further and higher education provision.

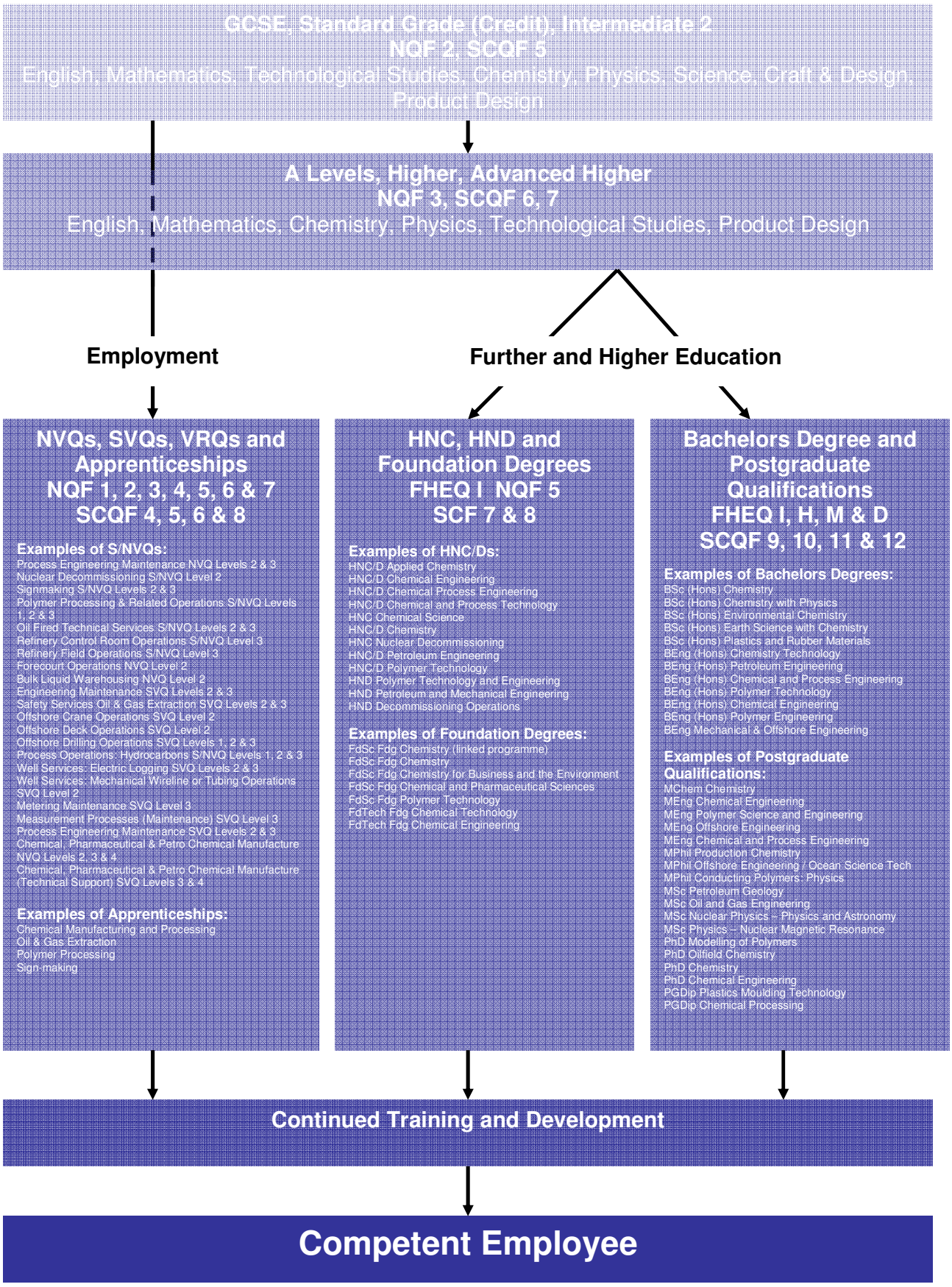
2.2 Progressing in the sector

A range of vocational qualifications has been designed in conjunction with industry, based on National Occupational Standards. Uptake of these in some cases has been extremely low (less than 10 candidates per year), raising questions concerning employer buy-in. In the longer term, this will affect Cogent's ability to update and refresh the related standards, and to ensure that the qualifications remain in the national frameworks.

The alternative accessible qualifications (such as HNCs) are reported to be valued by industry, however this is not reflected in uptake (for example, entry to HNCs in Chemical, Process and Energy Engineering has declined from an already low level of 15 per annum in 2002/03 to 10 in 2004/05). Foundation degrees, which can be a factor in decline of HNC and HND numbers, have not been accessed as a method of up-skilling employees – only three industry-specific Foundation degrees have been developed, with entry numbers similar to those of the HNCs and HNDs. The Foundation Degrees delivered out with industry (i.e. in colleges, with work-related element such as Fd Sc Chemistry) have higher entry rates, but have attrition levels of in the worst case, 80%.

Employer engagement in the design and delivery of foundation degrees presents an opportunity to have in place qualifications reflecting the reported need to up-skill employees to meet advances in technology. This is equally true of vocational qualifications, and the standards on which they are based.

Development and progression within the industries is also achieved through employers accessing private training provision. Employers value this type of provision because of the flexibility in delivery methods and their ability to tailor courses to suit their exact needs. However, there are large number of providers and courses on offer for each of the industries. This can make the selection of appropriate training difficult as there are currently no quality standards attached to this type of provision. There is also no system currently in place that standardises achievement of a private training course across the sector, in terms of the ability and competence of the employee following completion.


GCSE, Standard Grade (Credit), Intermediate 2
NQF 2, SCQF 5
English, Mathematics, Technological Studies, Chemistry, Physics, Science, Craft & Design, Product Design
A Levels, Higher, Advanced Higher
NQF 3, SCQF 6, 7
English, Mathematics, Chemistry, Physics, Technological Studies, Product Design
Employment
Further and Higher Education
NVQs, SVQs, VRQs and Apprenticeships
NQF 1, 2, 3, 4, 5, 6 & 7
SCQF 4, 5, 6 & 8
Examples of S/NVQs:
Process Engineering Maintenance NVQ Levels 2 & 3
Nuclear Decommissioning S/NVQ Level 2
Signmaking S/NVQ Levels 2 & 3
Polymer Processing & Related Operations S/NVQ Levels 1, 2 & 3
Oil Fired Technical Services S/NVQ Levels 2 & 3
Refinery Control Room Operations S/NVQ Level 3
Refinery Field Operations S/NVQ Level 3
Forecourt Operations NVQ Level 2
Bulk Liquid Warehousing NVQ Level 2
Engineering Maintenance SVQ Levels 2 & 3
Safety Services Oil & Gas Extraction SVQ Levels 2 & 3
Offshore Crane Operations SVQ Level 2
Offshore Deck Operations SVQ Level 2
Offshore Drilling Operations SVQ Levels 1, 2 & 3
Process Operations: Hydrocarbons S/NVQ Levels 1, 2 & 3
Well Services: Electric Logging SVQ Levels 2 & 3
Well Services: Mechanical Wireline or Tubing Operations SVQ Level 2
Metering Maintenance SVQ Level 3
Measurement Processes (Maintenance) SVQ Level 3
Process Engineering Maintenance SVQ Levels 2 & 3
Chemical, Pharmaceutical & Petro Chemical Manufacture NVQ Levels 2, 3 & 4
Chemical, Pharmaceutical & Petro Chemical Manufacture (Technical Support) SVQ Levels 3 & 4
Examples of Apprenticeships:
Chemical Manufacturing and Processing
Oil & Gas Extraction
Polymer Processing
Sign-making
HNC, HND and Foundation Degrees
FHEQ I NQF 5
SCF 7 & 8
Examples of HNC/Ds:
HNC/D Applied Chemistry
HNC/D Chemical Engineering
HNC/D Chemical Process Engineering
HNC/D Chemical and Process Technology
HNC Chemical Science
HNC/D Chemistry
HNC Nuclear Decommissioning
HNC/D Petroleum Engineering
HNC/D Polymer Technology
HND Polymer Technology and Engineering
HND Petroleum and Mechanical Engineering
HND Decommissioning Operations
Examples of Foundation Degrees:
FdSc Fdg Chemistry (linked programme)
FdSc Fdg Chemistry
FdSc Fdg Chemistry for Business and the Environment
FdSc Fdg Chemical and Pharmaceutical Sciences
FdSc Fdg Polymer Technology
FdTech Fdg Chemical Technology
FdTech Fdg Chemical Engineering
Bachelors Degree and Postgraduate Qualifications
FHEQ I, H, M & D
SCQF 9, 10, 11 & 12
Examples of Bachelors Degrees:
BSc (Hons) Chemistry
BSc (Hons) Chemistry with Physics
BSc (Hons) Environmental Chemistry
BSc (Hons) Earth Science with Chemistry
BSc (Hons) Plastics and Rubber Materials
BEng (Hons) Chemistry Technology
BEng (Hons) Petroleum Engineering
BEng (Hons) Chemical and Process Engineering
BEng (Hons) Polymer Technology
BEng (Hons) Chemical Engineering
BEng (Hons) Polymer Engineering
BEng Mechanical & Offshore Engineering
Examples of Postgraduate Qualifications:
MChem Chemistry
MEng Chemical Engineering
MEng Polymer Science and Engineering
MEng Offshore Engineering
MEng Chemical and Process Engineering
MPhil Production Chemistry
MPhil Offshore Engineering / Ocean Science Tech
MPhil Conducting Polymers- Physics
MSc Petroleum Geology
MSc Oil and Gas Engineering
MSc Nuclear Physics - Physics and Astronomy
MSc Physics – Nuclear Magnetic Resonance
PhD Modelling of Polymers
PhD Oilfield Chemistry
PhD Chemistry
PhD Chemical Engineering
PGDip Plastics Moulding Technology
PGDip Chemical Processing
Continued Training and Development
Competent Employee

4. Introduction

Phase 2 of the Sector Skills Agreement is concerned with reviewing the current training provision across all levels to measure its range, nature and employer relevance.

This was approached in three distinct phases, each aiming to gather information on a different aspect of the qualifications and training picture:

1. Identifying provision to capture the range of learning opportunities available within the Cogent footprint
2. Quantifying provision to understand the volume and composition of learners making use of the variety of learning opportunities available
3. Assessing provision to review the extent to which the current provision is capable of meeting employers' current and future skills needs

4.1 Identifying provision

An extensive desk research exercise was undertaken to gather together a comprehensive picture of the provision available. Key subject areas for our sector are Engineering, Sciences, Technology and Manufacturing. Two distinct types of provision emerged: those opportunities that led to a formally recognised national qualification; and those that did not. Many national sources of data were utilised to identify formal qualifications accredited within England, Northern Ireland, Wales and Scotland, including:

- Lists of qualifications approved for delivery for 14-19 and over 19 year olds under Sections 96 and 97 of the Learning and Skills Act 2000 (England, Northern Ireland and Wales)
- Lists of qualifications accredited onto the Scottish Credit and Qualification Framework from the Scottish Qualifications Authority (Scotland)
- Lists of qualifications available at FE colleges known to LearnDirect (UK-wide)
- Lists of qualifications available at HE institutions by application through UCAS (UK-wide)
- Lists of FE and work-based qualifications funded by the Learning and Skills Council (England).

Training provision not leading to a formally recognised national qualification was, by its nature, more difficult to identify in any coherent way. Searches were undertaken using Learn Direct, website browsing, and known providers as a starting point.

In the mapping of both types of provision several key pieces of data were sought in relation to each learning opportunity:

- Title of the training course/qualification
- Name of the provider/awarding body or institution
- Contact details for the provider/awarding body or institution
- Mode of study i.e. full time, part time, e-learning etc.
- Duration.

In relation to qualifications, a further inquiry was made as to the level the qualification assumes within either: the National Qualifications Framework (for England, Northern Ireland and Wales); the Scottish Credit and Qualifications Framework (for Scotland);

or the Framework for Higher Education Qualifications (For England, Northern Ireland and Wales).

4.2 Quantifying provision

Early on in the work it became apparent that there is simply too much relevant provision to consider gathering uptake information in respect of every learning opportunity in time to feed into this Assessment of Current Provision. Rather, this is seen as an important but ongoing exercise for Cogent to undertake as part of a longer term strategy to be a central source of information, advice and brokerage in relation to skills and training. A prioritised list of provision was therefore created, which highlighted 'key provision' in terms of specific relevance to and progression opportunities for the Cogent industries. This included:

- Further Education (FE)
- HE Under and Postgraduate qualifications
- Vocational qualifications including National and Scottish Vocational Qualifications and other Vocationally Related Qualifications
- Apprenticeships
- Training provision not leading to a nationally recognised qualification.

Several sources have been utilised to gather information about the number of learners achieving key types of provision. These included:

- Awarding bodies and institutions such as SQA, City & Guilds, PAA/VQSET, SASL, Edexcel, colleges and universities
- The Scottish Funding Council online query system (Scotland)
- The Learning and Skills Council (England)
- The Higher Education Statistics Agency (UK-wide)
- Training providers.

4.3 Assessing provision

This phase of activity was concerned with clarifying employers' views of the provision that is currently available to meet the skills needs of their workforces. Phases 1 and 2 of the Sector Skills Agreement were deliberately undertaken together to enable the primary research, specifically the 108 face to face interviews with employers, and 10 online questionnaires, conducted to include questions on both skills needs and usage/perceived value of training provision.

In addition, focus groups were arranged, attended by a range of employers from each of the sub-groupings of the Cogent footprint. A report detailing the outputs from these groups will be presented as a "stand alone" report, forming Appendix 18 of this report.

4.4 Introduction to the sector

According to the National Office of Statistics, Cogent SSC currently covers over 18,500 employers. This can be broken down in the following way:

4.4.1 Definition of the sector

The Cogent sector referred to in this report extends over four industry groupings:

Table 4.4.1a: Number of employers by Cogent industry

Industry	No. of Employers
Chemicals	3,900
Nuclear	* 200
Petroleum	7,000
Polymers	7,500
Cogent total	18,600

Source: Annual Business Inquiry (2004); * Nuclear Industry data

The polymers industry is the largest employer within the Cogent footprint and this industry also includes a significant volume of SME companies

All five industries share a common foundation – **ENGINEERING, SCIENCE AND TECHNOLOGY.**

4.4.2 Main areas of activity

Detailed below are the main activities within the Cogent footprint. A significant number of employers within the sector fall into activities that cannot be identified by Standard Industrial Classification Codes (SIC), or cannot legitimately assume to be a significant part of the operational description. This can interfere when conducting research and also when attempting to use national data sources to analyse sector skills issues.

Table 4.4.2a: Cogent footprint defined by activity and Standard Industrial Classification

Industry footprint definition by activity	Sic footprint definition
Chemical Manufacture	
Primary Chemicals	24.13 Manufacture of other inorganic basic chemicals 24.14 Manufacture of other organic basic chemicals
Industrial Chemicals	24.15 Manufacture of fertilizers and nitrogen compounds 24.16 Manufacture of plastics in primary forms 24.17 Manufacture of synthetic rubber in primary forms

Industry footprint definition by activity	Sic footprint definition
Speciality Chemicals	24.11 Manufacture of industrial gases 24.12 Manufacture of dyes and pigments 24.20 Manufacture of pesticides and other agro-chemical products 24.41 Manufacture of basic pharmaceutical products 24.61 Manufacture of explosives 24.62 Manufacture of glues and gelatine 24.63 Manufacture of essential oils 24.66 Manufacture of other chemical products n.e.c
Consumer Products	24.51 Manufacture of soap and detergents, cleaning and polishing reparations 24.52 Manufacture of cosmetics, perfumes and toilet preparations 24.64 Manufacture of photographic chemical material
Nuclear	
Nuclear Heat Generation and Fuel Handling	
Other Nuclear Materials Processes	23.30 Processing of nuclear fuel
Decommissioning of Nuclear Facilities	
Nuclear Waste Management	
Downstream Petroleum	
Stabilising, Refining and Manufacturing	23.10 Manufacture of coke oven products 23.20 Manufacture of refined petroleum products
Storage, Blending and Distribution	
Forecourt Retailing	50.50 Retail sale of automotive fuel
Heating Services	
Petroleum Equipment Manufacture	
Polymers	
Rubber Products Manufacturing	25.13 Manufacture of other rubber products
Plastics Processing	25.21 Manufacture of plastic plates, sheets, tubes and profiles 25.22 Manufacture of plastic packing goods 25.23 Manufacture of builders' ware of plastic 25.24 Manufacture of other plastic products
Signmaking	
Polymer Composites Manufacturing	

4.4.3 Size and Structure of the sector

The total number of employees within the sector using industry information sources is estimated as 817,000. The number using National Statistics is estimated as 467,800 (ABI 2004) for the purposes of this report both sets of figures have been included to highlight the differences between the workforce totals.

Table 4.4.3a: Cogent sector employment, industry and national statistics comparison

	Industry	ABI
Chemicals	170,000	175,450
Nuclear	56,000	13,600
Petroleum	120,000	61,050
Oil and Gas	*223,000*	*n/a*
Polymers	286,000	190,950
Cogent Total	632,000	441,050

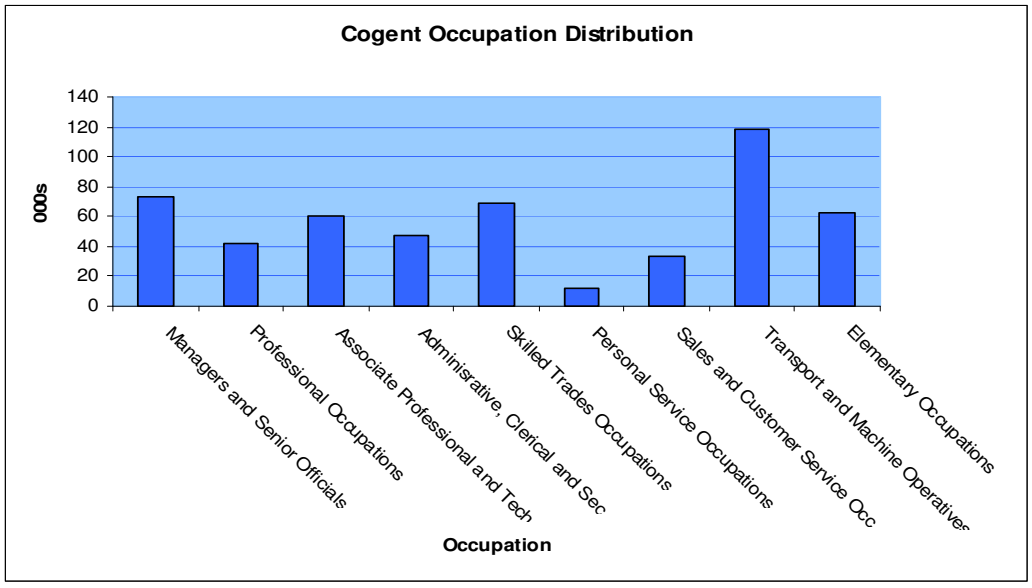
Sources: Annual Business Inquiry (2004); Chemicals Innovation & Growth Team (2002); Nuclear & Radiological Skills Study (2002); UKPIA Statistical Review (2005); Polymer Industry Workforce Development Plan (2002

Sector employees can be further categorised by job roles, the main roles being:

- Senior Officials
- Skilled Trades
- Professional Occupations
- Process Plant & Machinery Operators
- Elementary Occupations
- Administration & Secretariat
- Associate Professional & Technologist.

The largest proportion of the workforce is Process Plant and Machine Operatives. From the table below this proportion is clearly demonstrated, with almost 120,000 Operatives being identified within the workforce.

Figure 4.4.3a: Cogent sector employment by occupational group



*Working Futures 2 – 2005

A more detailed representation of these profiles by each industry is shown in the table below. The occupational structure of the industries are quite varied with a heavy dominance of professionals within the chemicals and nuclear industries. The seemingly low figure for proportion of workforce in management occupations within nuclear may be explained by an element of those in management positions may still be classified as professionals who are still involved in the technical aspects and operation of the industry while also being in management positions. The figures for the Petroleum industry will be heavily skewed by the workforce in forecourt operations as these workers represent a high volume of the overall employment. Chemicals and Polymers display a high proportion of the workforce in level 2 occupations – Process and Machine Operative.

Table 4.4.3b: Occupational profile of workforce by industry

	Chemical [a]	Nuclear [b]	Petroleum [a1]	Polymers [a]	UK Economy [a2]
	%	%	%	%	%
Managers & Senior Officials e.g Managers: Production, Maintenance, Site, R&D	22	4	23	16	15
Professionals e.g. Scientists: Chemists, Physicists, Geologists Engineers: Mechanical, Electrical, Electronic, Chemical, Design, Production, Process	16	38	16	4	12
Associate Professional & Technical e.g. Technicians: Laboratory, Electrical / Electronic, Maintenance, QA	17	13	20	7	14
Administration & Secretarial e.g. general administration & business support	9	11	11	9	13
Skilled Trades e.g. Electricians, Electrical fitters, Machine Setters / Setter Operators, Riggers	4	24	7	17	11
Sales and Customer Services e.g. Forecourt retail staff, Technical sales staff	2	0	2	2	8
Process, Plant & Machine Operatives e.g. Operators: Process, Plant, Field, Control Room, Panel Laboratory assistant, Forklift and Crane Drivers	16	5	14	33	8
Elementary Occupations e.g. Packers, Roustabouts, Security	13	5	6	10	12

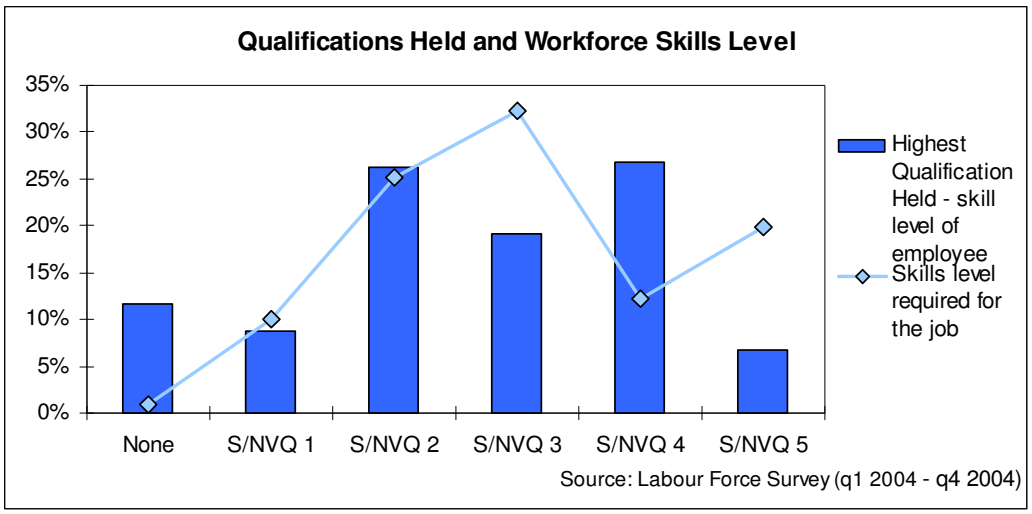
4.4.4 Current qualifications profile of the sector

In terms of qualifications held and qualifications required of the current workforce, figure 5.1a below provides an illustration. The comparison is made between the qualification profile (as a proxy for skills) shown as the blue columns, and the occupational skill level profile of the workforce – shown as the blue line.

It is striking that there is a higher proportion of the workforce qualified to level two than level three within the sector however, given the dominance of employment by volume in the polymer and chemical industries within the sector this is reflective of the overall employment.

There is a mismatch in between the level of qualifications held by the workforce and the skills level at which they are employed to operate, most notably at the elementary workforce level one, skilled workforce at level three and in managerial and senior official workforce at level five.

Figure 4.4.4a: Comparison of workforce operating level and qualifications held



The gap between the concentration of employment in senior positions within the sector and the qualifications held may be cause for concern. However it is considered that a proportion of those qualified to the level 4 (degree / N/SVQ level 4 and 5) may be operating in the level five skills area. Similarly, the gap between the volume of workers with no or level 1 qualifications and the number working at these occupational levels may hide some underlying trends.

These topics were the subject of further investigation by Cogent through interviews with employers. Findings from the consultation exercise show that the current drive in the Chemicals and polymer industries is towards upskilling the operational roles (from level 2 to level 3) confirming previous research detailed in the Chemicals Innovation and Growth Team report. This impact occurs as a result of strategies employed to remain competitive: producing higher value added / more sophisticated products and services; cross-skilling of the existing workforce to undertake a wider range of duties and; investment in more sophisticated (IT controlled) capital equipment. These require an upskilling of the workforce, particularly of operators at level two progressing to level three. Already there is a gap between those operating at level three and those holding relevant qualifications.

4.5 Employer spend on training

Given the variety of different training methods used across the sector it is difficult to quantify the overall sectoral spend on training, particularly when on the job training plays such a large part of the provision for the largest group of employees (process and machine operators). The National Employer Skills Survey (NESS) for England quantifies Cogent sector employers average spend per person as £230 per annum only slightly higher than the national average at £225. However these figures seem relatively low in comparison to Chartered Institute of Personnel and Development's Training and Development Survey figure of £739 in SMEs and £339 in large companies (economies of scale). The survey of Nuclear employers in 2005 found an average training spend of £623 per person per annum which is closer in line with the CIPD findings. It is considered that figures take only take account of the direct costs of training and do not incorporate costs relating to time away from the workplace.

5. Entry to the industry

There are many routes into the industries in the Cogent footprint, including direct from the schools system. This can be via an apprenticeship, or directly into operational roles in the workforce.

The drive towards increased productivity, and the actual processes used, leads to a dependence on more than just literacy and numeracy skills. The subjects from the school curriculum of particular relevance to employment include: Science and Mathematics, including Chemistry, Physics, Applied Science, Mathematics, as well as English and Technological subjects.

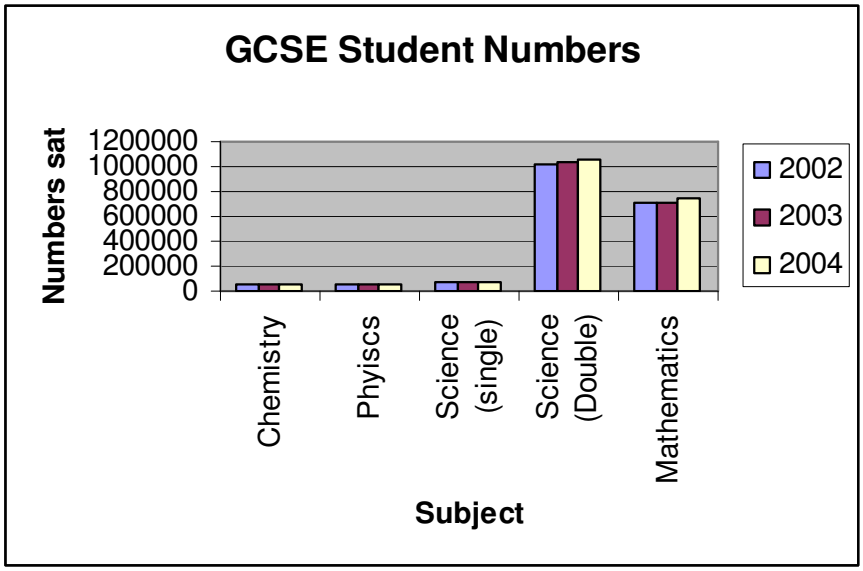
In addition, the industries look for general employability skills. The entry level qualifications for the apprenticeship frameworks are detailed at Appendix 1, and focus mainly on mixes of the above subjects.

5.1 Throughput trends and achievement for GCSE and Standard Grade

The throughput of students in each of these subject areas can be analysed for trends in both numbers studying and grade achieved.

In England, the numbers have increased slightly over the three years shown, which in percentage terms shows year-on-year rises of between 0.5% (Mathematics) and 5% (Physics).

Figure 5.1a: GCSE student numbers by subject



At the same time, the pass rates for A* to C have remained relatively static, with the exception of the Science Double Award:

Table 5.1a: Per cent of students achieving grades A to C at GCSE by subject*

Subject	2002	2003	2004
Chemistry	89%	88.8%	89.5%
Physics	88.5%	88.8%	89.9%

Subject	2002	2003	2004
Science (single)	20.7%	19.5%	20.1%
Science (double)	52.7%	53.8%	54.7%
Mathematics	51.3%	50.1%	51.7%

The picture in Scotland shows a differing trend for Standard Grade entries (the data from 2001 onwards diverges to include the introduction of the new Scottish framework. For completeness, both Standard Grades and national Qualifications at Intermediate have been used to generate the data tables).

Figure 5.1b: Standard grade student numbers by subject

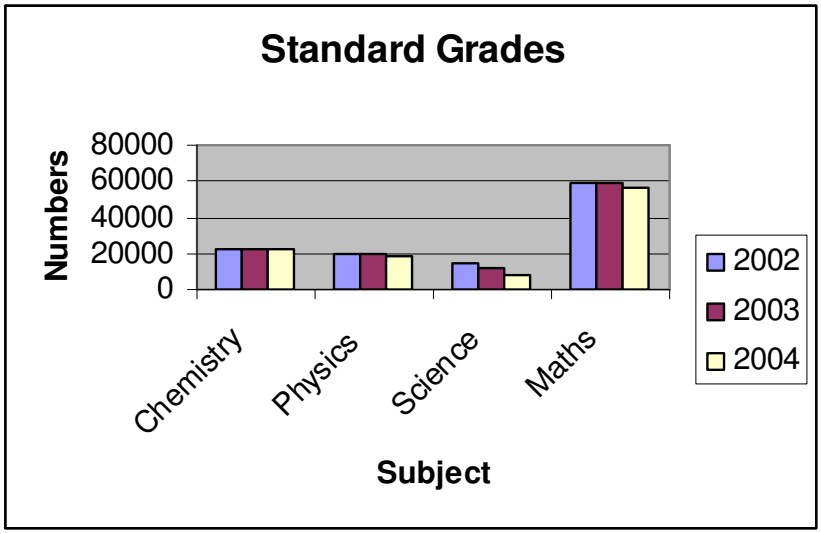
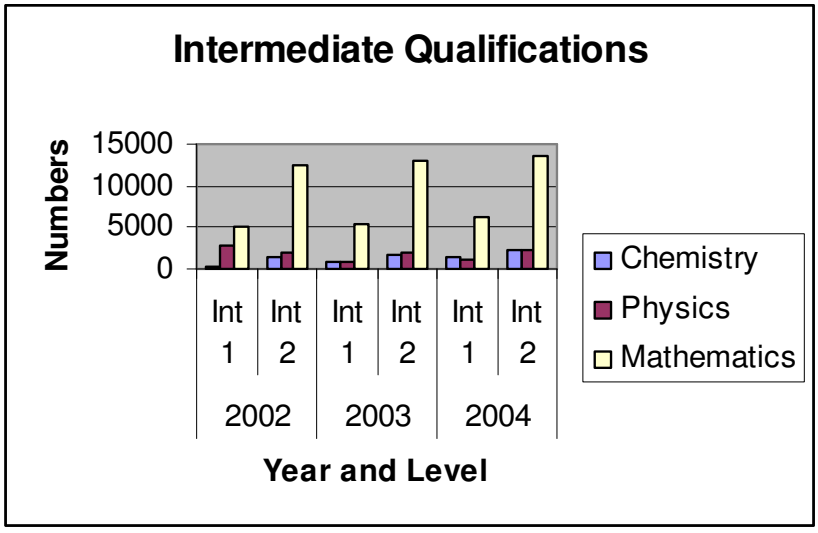


Figure 5.1c: Intermediate Qualifications students numbers by subject



The pass rates also vary slightly from the GCSE model:

Table 5.1b: Pass rates at Standard Grade and Intermediate level

SUBJECT	1997	1998	1999	2000	2001
Chemistry	85.77%	86.00%	83.90%	83.83%	82.69%
Physics	88.15%	88.01%	83.67%	86.02%	84.61%
Science	28.94%	30.68%	25.14&	26.32%	24.62%

SUBJECT	1997	1998	1999	2000	2001
Tech Studies	53.52%	56.40%	60.29%	63.97%	66.41%
Mathematics	51.74%	51.53%	52.93%	55.02%	53.91%

The change in the Scottish education system, with the introduction of the National Qualifications Framework in 2001 has presented employers with a new range of qualifications which are levelled as equivalent to Standard Grades – Access 3 Intermediate 1 and Intermediate 2 relating to Standard Grades at Foundation, General and Credit. In 2005, the entries for Mathematics Standard Grade (53,835) may be augmented by those entries at Intermediate 2 (15,163), however this number may include students already holding a Standard Grade.

The downward trend in entries in the preferred Standard Grade subject areas has continued, but there has been a rise in Intermediate 2 entries albeit from a low starting point.

Table 5.1c: Changes to the number of entries to Standard Grade and Intermediate, 2000 to 2004

Changes in qualification entries 2000-2004				
	Standard Grade		Intermediate 2	
	2004 number	% change from 2000	2004 number	% change from 2000
Mathematics	56,773	<4%	13,726	>6%
Chemistry	21,690	<4%	2,170	>35%
Physics	18,170	<5%	2,240	>8%
Science	8,322	<27%	-	n/a
Tech Studies	2,152	<4%	247	<27%

In effect, the total numbers studying these subjects has in most cases shown an overall increase, however the entry qualifications have not necessarily been updated to reflect the potential spread of qualifications matching entry requirements.

Due to the sector-wide dependence on the numbers studying and achieving good grades in the SET subjects, Cogent seeks to influence student participation in these subjects. Several actions have already been taken, as detailed in Section 11, however further action is required to safeguard future industry needs. Cogent has already taken steps to engage with Information, Advice and Guidance (IAG) work with mentoring provided by SEMTA, one of the Pathfinder SSCs of the Sector Skills Agreement process.

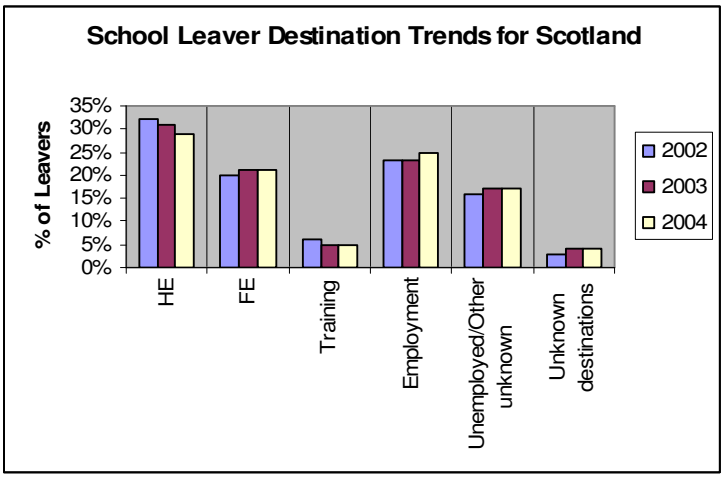
5.1.1 Destination of Scottish school leavers 2003-2004

Careers Scotland provides an annual report on the destination of School Leavers in Scotland the 2003-2004 was published in May 2005. The report provides details for the previous two years in order to put the current data into context.

The total number of School Leavers for 2002 was 56,562, 2003 was 58,038 and for 2004 was 57,409.

The graph below shows the percentage of School Leavers and their destination:

Figure 5.1.1a: Scottish school leaver destinations



Source: Careers Scotland

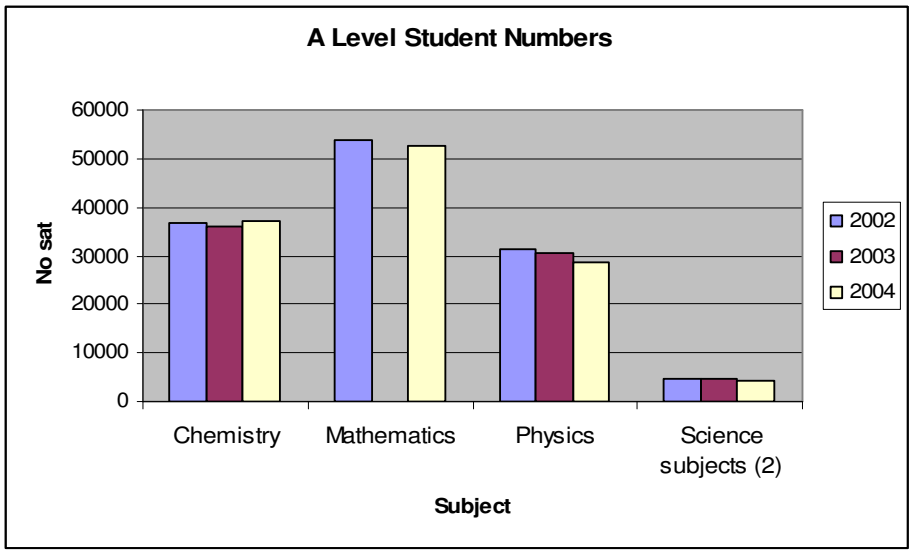
The main findings are that the number of young people entering higher education has dropped slightly by 2% to 29%. Those entering further education has remained the same at 21%. The proportion of leavers entering training out with employment remains at 5%.

The report also highlights that a higher proportion of females than males enter higher or further education, 57% and 44% respectively.

5.2 Throughput trends and achievement at A Level

The numbers of students studying Chemistry, Mathematics, Physics and Science Subjects at A Level are shown below. Figures for the number of students sitting each subject have seen relatively small changes. Mathematics and Physics have both seen a decrease.

Figure 5.2a: A Level student numbers by subject



Note: the data for the number of student sitting Mathematics in 2003 has not been included due to discrepancies in the numbers reported.

Source: Joint Council for General Qualifications – National Provisional A Level (Curriculum 200) GCE Results (All UK Candidates)

According to research carried out and reported by the BBC News, the number taking A-level Physics dropped by 34% between 1991 and 2004. The BBC also reported a decline of 16% in those taking Chemistry for the same period and the numbers studying mathematics dropped by 22%.

Pass rates for grades A to C, have also remained relatively static, with each subject achieving only a slight increase:

Table 5.2a: Per cent of students achieving A to C at A Level by subject, 2002 to 2004

Subject	2002	2003	2004
Chemistry	70.6%	71.6%	73%
Mathematics	71.3%	*	75.7%
Physics	65.5%	66.2%	67.9%
Science Subjects (2)	61.5%	60.6%	63.4%

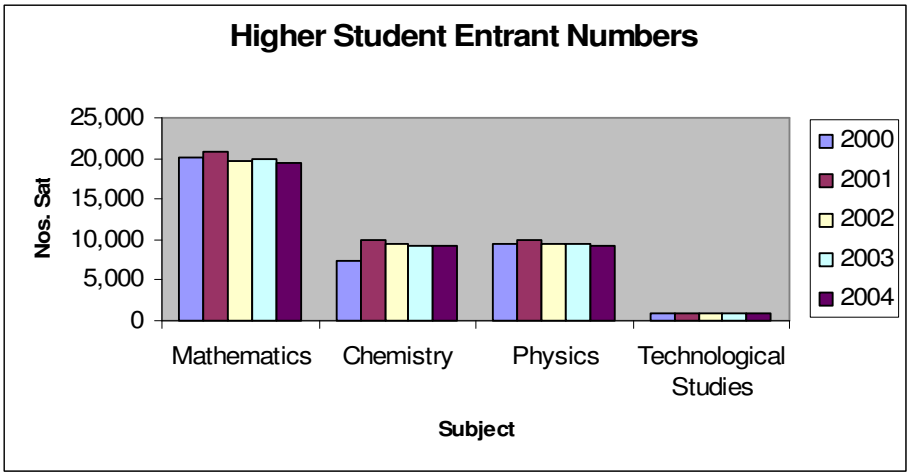
** data not included as there are discrepancies in the numbers reported*
Source: Joint Council for General Qualifications – National Provisional A Level (Curriculum 200) GCE Results (All UK Candidates)

5.3 Trends and achievements at Higher and Advanced Higher

In Scotland students in years S5 and S6 can undertake Higher or Advanced Higher certification. The Advanced Higher was introduced to the Scottish education system in 2001. SCQF indicate that the Higher is levelled at 6 and the Advanced Higher is levelled at 7 based on pass rates at grades A to C for both levels.

The graph below shows the number of students studying Mathematics, Chemistry, Physics and Technological Studies at Higher level. In 2002 there was a slight decrease in students undertaking Mathematics. In 2000; 7,479 students undertook Chemistry, the following years have seen an increase in the numbers studying this subject. For Physics and Technological Studies subjects; student numbers have remained relatively static.

Figure 5.3a: Higher student numbers by subject

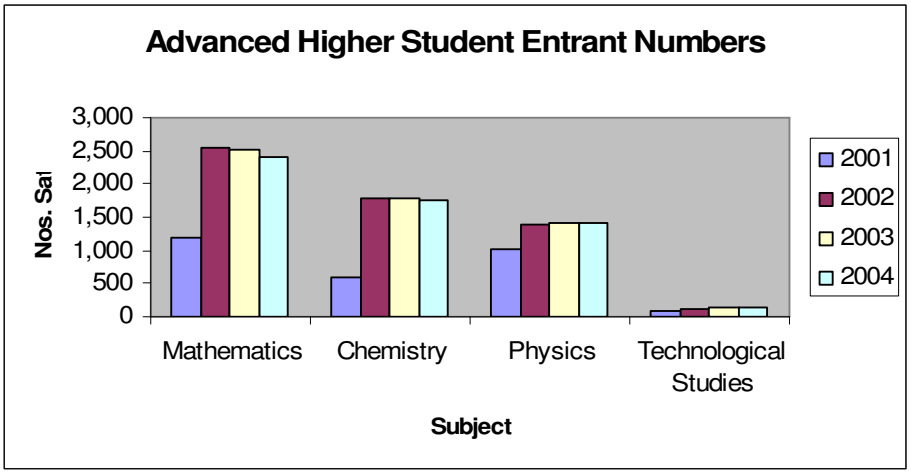


Source: SQA

The graph below shows the number of students studying Mathematics, Chemistry, Physics and Technological Studies at Advanced Higher level.

At this level Technological Studies has seen a slight year on year increase in student numbers. Comparing 2003 student numbers with 2004; Mathematics has decreased by 4%, Chemistry decreased by 1%, Physics has remained the same and Technological Studies has increased by 5%.

Figure 5.3b: Advanced Higher student numbers by subject



The two tables below show the percentage of students achieving a pass in Mathematics, Chemistry, Physics and Technological Studies at both Higher and Advanced Higher levels. Pass rates over the period shown have adjusted only by a few percent when comparing with the previous year's figure.

Table 5.3a: Per cent of students achieving a pass at Higher level, 2000 to 2004

	Higher Student Pass Rate				
SUBJECT	2000	2001	2002	2003	2004
Mathematics	71%	70%	66%	67%	68%
Chemistry	73%	73%	72%	73%	74%
Physics	71%	75%	73%	74%	74%
Technological Studies	75%	70%	69%	67%	71%

Table 5.3b: Per cent of students achieving a pass at Advanced Higher level, 2001 to 2004

	Advanced Higher Student Pass Rate			
SUBJECT	2001	2002	2003	2004
Mathematics	66%	58%	61%	68%
Chemistry	81%	77%	76%	74%
Physics	71%	77%	77%	75%
Technological Studies	72%	91%	82%	75%

5.4 The Welsh Baccalaureate

The Welsh Baccalaureate - or the Welsh Bac - is a new qualification, which recognises almost everything that young people do at school or college. It includes current, approved qualifications like A levels, GCSEs and NVQs and adds breadth and balance through a Core programme of activities. The pilot launched in September 2003; now involves 31 schools and colleges and will run until August 2007. It is funded by the Welsh Assembly Government. The pilot will be reviewed in 2006

The Welsh Bac is formed by two parts:

Core - consisting of four components i.e. Key Skills, Wales, Europe and the World, Work-related Education and Personal and Social Education.

Options - courses/programmes currently offered e.g. GCSE, VGCSE, AS/A levels, VCE (Vocational A levels), GNVQ, NVQ, BTEC.

Together, the Core and Options make up the Welsh Baccalaureate Diploma.
The Welsh Baccalaureate Diploma is nationally approved and currently offered at either Intermediate or Advanced level.

5.4.1 Intermediate and Advanced Diplomas

Students aiming for an intermediate diploma might be doing a one or two year course at school or college which will lead to a minimum requirement of qualification at Level 2 of the National Qualifications Framework. Examples of such qualifications would be GCSEs or Intermediate GNVQs.

Students aiming for an advanced diploma will normally be entering a two year course at school or college which will lead to a minimum requirement of qualification at Level 3 of the National Qualifications Framework. Examples of such qualifications would be A levels or an Advanced GNVQs.

5.4.2 Entry/Completion rates

The Intermediate Diploma has seen an increase in the number of candidates entering from 333 in 2004 to 404 in 2005. In 2005, 193 candidates completed the programme with 97 of these being awarded the Intermediate Diploma this compares to 102 candidates completing the programme in 2004 and 14 candidates having been awarded the Intermediate Diploma.

Advanced Diploma candidate entries for 2005 were 499, 304 of whom completed the programme of these, 233 candidates were awarded the Advanced Diploma.

6. Vocational Qualifications

6.1 National Vocational Qualifications (NVQs) and Scottish Vocational Qualifications (SVQs)

Cogent has a key role in designing the qualifications structure for N/SVQs by determining the demand for them from both employers and employees alike. N/SVQs are organised into five levels. Briefly these are:

- Level 1 - Foundation skills and occupations
- Level 2 - Operative or semi-skilled occupations
- Level 3 - Technician, craft skilled and supervisory occupations
- Level 4 - Technical and middle management occupations
- Level 5 - Chartered, professional and senior management occupations.

In addition, all vocational qualifications have advice on how assessment for the award is to be carried out. In England, Wales and Northern Ireland, the awards are called National Vocational Qualifications (NVQs). In Scotland they are called Scottish Vocational Qualifications (SVQs). There can be minor differences in the content of NVQs and SVQs sharing the same title and based on the same National Occupational Standards, since each is designed to reflect the needs of employers and employees in the country of delivery: however, for the Cogent N/SVQs, there has been no need for this divergence of content.

Vocational Qualifications are accessed through approved centres of Awarding Bodies (like PAA/VQSET, SASL, SQA and City and Guilds), with each Awarding Body complying with quality standards laid down by the relevant Accrediting Body (SQA in Scotland, QCA in England and Northern Ireland, and ACCAC in Wales).

Each of the N/SVQs listed has been based on National Occupational Standards designed and developed in full co-operation with industry partners, to ensure that the content is valid and reflects the jobs being carried out by the target population. The qualifications have, over the last five years, been rationalised to reflect the common skills base of employees at operational and technical levels across the chemicals, pharmaceuticals and refining industries. A core and options model was developed to allow the widest access opportunities for employees.

The National Occupational Standards are now subject to incremental review, to ensure that their currency is maintained, reflecting the needs of the changing shape of each industry. This is done by consulting with industry via a range of groups, such as the Chemskills network.

New standards have recently been developed to serve the needs of the nuclear industry, which, prior to the establishment of Cogent SSC, had no specific route into NOS development. These standards may progress into development of N/SVQs. The request from employers for new developments such as this reflects employer need and support for the NOS and N/SVQ system.

Cogent will continue to work with industry partners to develop new standards where required, and to rationalise standards where common ground in performance criteria is identified.

Cogent is currently carrying out the following pieces of NOS and N/SVQ related work:

Under review

It continues to be one of Cogent's key objectives to encourage the use of National Occupational Standards to improve skills supply within the sector, not only as a means of competence assurance, but as a valuable resource for future planning, recruitment, appraisal, and training needs analysis.

The table below lists the N/SVQs applicable to the Cogent sector and provides a breakdown across the last 3 years of the number of certificates issued against each N/SVQ.

Table 6.1a N/SVQs applicable to Cogent sector

N/SVQ	Awarding Body	2003	2004	2005	Total Nos Certificates Issued
Process Engineering Maintenance Level 2 – SVQ	PAA/VQSET, City and Guilds, SQA	0	2	23	**25**
Process Engineering Maintenance Level 3 – SVQ		6	6	22	**34**
Chemical, Pharmaceutical and Petro Chemical Manufacture Level 1 - SVQ	PAA/VQSET and City and Guilds	0	0	0	**0**
Chemical, Pharmaceutical and Petro Chemical Manufacture Level 2 - SVQ		0	0	0	**0**
Chemical, Pharmaceutical and Petro Chemical Manufacture Level 3 - SVQ		0	0	0	**0**
Chemical, Pharmaceutical and Petro Chemical Manufacture Level 4 - SVQ		0	0	0	**0**
Safety Services Oil and Gas Extraction Level 2 - SVQ					
Safety Services Oil and Gas Extraction Level 3 - SVQ					
Offshore Crane Operations Level 2- SVQ					
Offshore Deck Operations Level 2 – SVQ					
Processing Operations : Hydrocarbons Level 1 – S/NVQ					
Processing Operations : Hydrocarbons Level 2 – S/NVQ					
Processing Operations : Hydrocarbons Level 3 – S/NVQ					
Processing Operations : Hydrocarbons (Control Room) Level 3 - SVQ					
Well Services : Electric Logging Level 2 – SVQ					
Well Services : Electric Logging Level 3 – SVQ					
Well Services : Mechanical Wireline Level 2 – SVQ					
Well Services : Tubing Operations Level 2 – SVQ					
Offshore Drilling Operations Level 1 - SVQ					
Offshore Drilling Operations Level 2 -					

N/SVQ	Awarding Body	2003	2004	2005	Total Nos Certificates Issued
SVQ					
Offshore Drilling Operations Level 3 - SVQ					
Forecourt Operations Level 2 – NVQ	City and Guilds	0	0	0	**0**
Measurement Processes Level 3 – SVQ	SQA	0	0	1	**1**
Bulk Liquid Warehousing Level 2 (o*nly as NVQ now)*	SQA and City and Guilds	68	13	86	**167**
Refinery Control Room Operations Level 3 – S/NVQ	SQA and City and Guilds	0	3	12	**15**
Nuclear Technology Decommissioning Level 2 – S/NVQ	SQA and City and Guilds	41	13	33	**87**
Oil Fired Technical Services Level 2 – S/NVQ	City and Guilds	0	0	0	**0**
Oil Fired Technical Services Level 3 – S/NVQ		0	0	0	**0**
Polymer Processing and Related Operations Level 1 – S/NVQ	SASL	277	278	157	**712**
Polymer Processing and Related Operations Level 2 – S/NVQ		335	515	646	**1496**
Polymer Processing and Related Operations Level 3 – S/NVQ		28	29	13	**70**
Sign making Level 2 – S/NVQ	SASL/BSGA	101	93	111	**305**
Sign making Level 3 – S/NVQ		12	7	13	**32**

Source: Data supplied by SASL, SQA, City and Guilds
Note: Data excludes numbers from PAA/VQSET as this was not available at the time of reporting

An alternative route of entry into the sector can be via the undertaking of the Laboratory and Associated Technical Activities N/SVQ available at Levels 1 to 4. This qualification is awarded by City and Guilds and PAA/VQSET. However, it is difficult to determine the number of candidates entering the Cogent industries with this qualification as it can be a route of entry to other sectors.

Feedback from employers reflects a mixed view – those who are involved in NOS development and N/SVQ delivery are supportive of the system and value the qualifications, whereas others, who are not involved in design or delivery, do not appear to value them. Ongoing work with employers and employer groups is required, to ensure that the widest possible consultation is carried out for new developments or updates, to gain a sense of ownership from employers. Some of the N/SVQs have shown a steady throughput of employees, reflecting long-term buy-in and belief in the quality of the product.

6.2 Vocationally Related Qualifications (VRQs)

The table below shows the VRQs that are specific to the Cogent industries, and related to the technical aspects of the relevant apprenticeship frameworks in England. These qualifications did not appear within the data received form LSC covering learning opportunities funded by them within the period 2001/2002 to 2003/2004 because they are integral to the Modern Apprenticeship frameworks.

Table 6.2a VRQs applicable to the Cogent sector

Awarding Institution	Qualification Title	Qualification Type
Edexcel	BTEC National Certificate in Polymer Processing and Materials Technology (Level 3)	VRQ
Edexcel	BTEC National Diploma in Polymer Processing and Materials Technology (Level 3)	VRQ
City & Guilds	Certificate in Process Technology (Levels 2 & 3)	VRQ
SASL	Injection Moulding (Online) (Level 2)	VRQ
SASL	Certificate in Polymer Composite Wet Lay Up (Level 2)	VRQ
SASL	Certificate in Parison Blow Moulding (Level 2)	VRQ
SASL	Certificate in Preform Blow Moulding (Level 2)	VRQ
SASL	Certificate in Self Adhesive Signmaking (Level 2)	VRQ
SASL	Certificate in Signmaking (Level 3)	VRQ
PAA/VQSET	Certificate in Laboratory Technical Skills (Levels 1, 2 and 3)	VRQ
PAA/VQSET	Certificate in Petrol Forecourt Safety (Level 2)	VRQ

NOS have a key role to play as a reference for the development of vocationally related qualifications. Good practice dictates that awarding bodies looking to create a new VRQ in an area already covered by NOS make use of the standards of competence they contain.

7. Apprenticeships

Apprenticeships are work-based, paid training programmes designed for current and future employees aged 16 and over at the start of the Apprenticeship. Employers in the Cogent footprint have access to a range of tailor-made apprenticeships, the frameworks of which were designed and developed in consultation with industry. They offer an ideal training solution for employers, as apprentices are not only gaining vocational skills but also the employers' own values and work ethics.

7.1 Apprenticeship structures

There are two levels of Apprenticeship available in England and Wales:

- *Apprenticeship (formerly referred to as Foundation MA)* - this will usually take at least a year to complete. During that time, the apprentice will work towards an S/NVQ level 2 that incorporates Key Skills and in most cases a technical certificate.

- *Advanced Apprenticeship* - this will usually take at least two years to complete. During that time, the apprentice will work towards S/NVQ level 3 and a technical certificate also incorporating Key Skills.

One level of apprenticeship exists in Scotland:

- *Apprenticeship* – comprising of SVQ Level 3, core skills and additional components.
- *Skillseeker* – the programme available at SVQ Level 2 in Scotland, but without additional components, and is not therefore considered a match for the basic apprenticeship available elsewhere in the UK.

Table 7.1a: Core Skills (Scotland) and Key Skills (rest of U.K.)

Key Skills (England & Wales)	Core Skills (Scotland)
Communication	Communication
Numeracy	Numeracy
IT	IT
Working with others	Working with others
Problem solving	Problem solving
Improving learning performance	

The Core Skills in the Scottish frameworks are mainly embedded within the apprenticeship, whereas in England they are separately assessed elements.

Training can be delivered either in a college or in the actual workplace, or a combination of the two. Underpinning knowledge is normally delivered by colleges or specialist training organisations.

7.1.1 Cogent Apprenticeship Frameworks

There are three apprenticeship frameworks which have been developed specifically for the Cogent sector covered by this report:

- Chemical Manufacturing and Processing, with pathways leading to apprenticeships related to job roles in
    - Laboratory and Associated Technical Activities
    - Refinery Field Operations
    - Process Operations
    - Process Engineering Maintenance or
    - Process Manufacture
- Polymer Processing
- Sign-making.

In addition to this, a range of generic frameworks are also utilised, based on the OscEng Engineering standards, which were developed by a consortium led by SEMTA.

Details of numbers entering and exiting the sector- specific frameworks (derived from information supplied by LSC for England, and by Scottish Enterprise and Highlands and Islands Enterprise for Scotland) are detailed in Appendix 2.

The numbers taking part in these frameworks throughout the UK is relatively small, when compared to other sectors. At the design and development stage, it was emphasised by employers that, though valued as a training route, they would not lead to high throughput. This is reflected in our findings, with numbers passing through the Chemicals framework remaining a modest 70-80 candidates per year (it should be noted that this covers more than “Chemicals” as detailed above).

Recent findings on industry skill needs, as detailed in the Skills Need Assessment prepared as the first phase of the Sector Skills Agreement may lead to an increase in numbers. If, as reflected in these findings, the Chemical industry seeks to raise the skills levels of process operators from Level 2 to Level 3, the apprenticeship route may provide a ready made solution for new employees entering the industry. At present, the apprenticeship framework and funding regime does not encourage participation by adult entrants or those seeking to raise their skills level from within current employment – this area may require intervention, given that approximately 70% of the required workforce is already in employment, but a number require enhanced skills and knowledge to reflect the operating level of their jobs. The full content of the framework may be inappropriate, given due regard to prior learning and experience, therefore an abbreviated version may suffice.

The delivery mechanisms for the apprenticeships also do not reflect the needs of mid-career entrants currently in employment, therefore a more flexible model would have to be considered.

The potential numbers associated with such a programme would be large – the estimated number of process operators in the Cogent footprint is 120,000, with Stage 1 research findings showing that there is already a 13% difference between those skilled at Level 3 versus those required at that level. If the future requirements are as predicted, with a step change from Level 2 to 3, most of the 120,000 would require access to some sort of additional training and development.

The nuclear industry is estimated to be taking on over 300 apprentices pa. There is a growing demand for apprentices for the nuclear industry in England, Scotland and Wales. The potential need for a consistent framework addressing the needs of the nuclear industry has been identified, and Cogent is in the process of consulting with employers on the types of apprenticeships required now and in the future.

7.2 Apprenticeships in Scotland

The Chemical Manufacturing and Processing Apprenticeship intake remains consistent at approximately 50 trainees per year, with the majority of trainees being male. This raises concern, given the existing lack of representation of females in the workforce.

The Polymer Processing Apprenticeship intake is small in numbers, with trainees all male. Given the high number of polymer-related workplaces in Scotland, it appears that employers are ignoring the framework in their recruitment planning. This is not surprising, and reflects a UK wide trend of small companies.

In contrast, Engineering apprenticeships have healthy intake of around 800 candidates enrolling each year. A number of these apprentices will be placed in the Cogent footprint industries, and on completion of the apprenticeship may be employed as, for example, Mechanical Engineering Technicians, or Control and Instrument Technicians. Since the scope of these frameworks expands to cover a number of different industries, it is not possible to isolate the numbers of "Cogent apprentices"; however evidence from employers suggests that holders of such qualifications are difficult to recruit.

It would appear from the data supplied that a very high percentage of candidates (in excess of 95% in some cases) complete their apprenticeship.

There is a need to encourage females to apply for the apprenticeship programmes showing that a career in the Cogent industries is worthwhile. Improved careers advice and subject choices available at school may help to address this.

7.2.1 section deleted

7.2.2 Apprenticeships rankings

Statistics available from Scottish Enterprise and Highlands & Islands Enterprise as of 30th September 2005 shows the Top 30 Scottish Apprenticeships. The breakdown below is the summarised list for the two Enterprise areas showing the ranking, framework and number of apprentices in training at this time for the Cogent areas of interest.

7.2.2.1 Scottish Enterprise area

Ranking of Scottish Apprenticeship Frameworks applicable to our sector in the Scottish Enterprise area are given below.

*Table 7.2.2.1a: Ranking of Scottish Apprenticeship Frameworks in the Scottish Enterprise Area**

Ranking	Framework	Apprentices in training
6	Engineering	2119
28	Chemical Manufacturing	94

***** These figures are provided by Scottish Enterprise.

7.2.2.2 Highlands & Islands Enterprise area

Ranking of Scottish Apprenticeship Frameworks applicable to our sector Highlands and Islands Enterprise area are given below.

Table 7.2.2.2a: Ranking of the Scottish Enterprise Frameworks in the Highlands and Islands area

Ranking	Framework	Apprentices in training
3	Engineering	216
20	Marine Engineering	18

Figures represent the number of apprentices currently in training in the Scottish Enterprise and Highlands and Islands Enterprise areas that are being funded through public route. Privately funded apprentices are not included.

7.3 Apprenticeships in England & Wales

Apprenticeship data for England has been provided using data from the LSC. This is shown for each framework at Appendix 2. The LSC data shown is provided on an academic year basis over a three year period. However, the completions data graphs for the year 2004-05 are only up to April 2005 – 9 month period.

The Chemical Manufacturing and Processing Apprenticeship and Advanced Apprenticeship registrations across the three years show on average 60 registrations per year for the Advanced Apprenticeship. Registrations for the Apprenticeship are lower than for the Advanced Apprenticeship framework, with the average being 21 registrations per year.

The LSC combines the data for the Polymer and Sign-making frameworks under one category (ie not recorded separately). The data provided shows clear evidence that there has been a significant increase in numbers registering for the Apprenticeship for Polymer and Sign-making across the three years. This may be due to the fact that LSC funding is more readily available at L1 and L2.

The Engineering Apprenticeship and Advanced Apprenticeship frameworks both had just fewer than 6,000 registrations in 2002-03. The Apprenticeship framework saw an increase of 609 registrations in the following year, and the Advanced Apprenticeship registration increased by 1,033 candidates. However, registrations for year 2004-05 have decreased by 1,510 for the Apprenticeship and 2,836 for the Advanced Apprenticeship.

The Engineering Apprenticeship has seen a year on year increase in the number of candidates completing the framework. The Advanced Apprenticeship shows in excess of 3,000 candidates completing the framework in years 2002-03 and 2004-05. It should be noted that completion refers to the completion of all aspects of the framework, and takes no account of those who have missed one element, such as key skills.

7.3.1 Apprenticeships in Wales

The data provided in the table below has been provided in-house by Cogent and this data is produced by calendar year. The table gives details of the numbers completing the framework.

Table 7.3.1a: Numbers completing apprenticeships in Wales, 2002 to 2005

Year	2002			2003			2004			2005		
	Total	Gender		Total	Gender		Total	Gender		Total	Gender	
		M	F		M	F		M	F		M	F
Chemical Manufacturing & Processing	**1**	1	0	**1**	1	0	**4**	3	1	**0**	0	0
Polymer Processing	**0**	0	0	**0**	0	0	**2**	2	0	**0**	0	0
Signmaking	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0

It would appear there is little uptake of Apprenticeships applicable to the Cogent sector in Wales and like other countries in the UK there is a need to encourage females to apply for these programmes.

8. Further and Higher Education

8.1 FE and HE provision in England and Wales

There are 346 universities and colleges within England and Wales listed on the UCAS website, 21 of which are situated in Wales. The tables below show the qualifications available within these establishments, which offer a specific route into careers within the industries covered by the Cogent footprint.

8.1.1 HNCs and HNDs in England and Wales

Table 8.1.1a: HNCs in England and Wales

Awarding Institution	Qualification Title	Qualification Type
Cornwall College	Chemistry	HNC
Edexcel	Applied Chemistry	HNC
Hull College	Chemical Process Engineering	HNC
London Metropolitan University	Polymer Engineering	HNC
Manchester Metropolitan University	Polymer Technology	HNC
North Trafford College	Chemical Process Engineering	HNC
Northumbria University	Science (Chemistry)	HNC
Thames Valley University	Chemical Science	HNC
University of Teesside	Chemical Engineering Chemical Process Engineering	HNC HNC

Table 8.1.1b: HNDs in England and Wales

Awarding Institution	Qualification Title	Qualification Type
Cornwall College	Chemistry	HND
Edexcel	Applied Chemistry	HND
Leicester College	Pharmaceutical Chemistry	HND
London Metropolitan University	Polymer Science and Engineering	HND
London South Bank University	Chemical Engineering	HND
Reading College and School of Arts and Design	Chemistry	HND
The Manchester Metropolitan University	Chemistry Pharmaceutical Chemistry	HND HND
The University of Huddersfield	Chemistry	HND
University of Central Lancashire	Chemistry	HND
University of Huddersfield	Chemistry with Forensic Science Pharmaceutical Chemistry	HND HND
University of Teesside	Chemical Engineering	HND
Wirral Metropolitan College	Applied Chemistry	HND

All of the 10 HNCs and 13 of the 14 HNDs covering the Cogent industries are concerned with some form of Chemical/Chemistry related study. Evidence derived from employer consultation shows that HNCs and HNDs are valued both as entry qualifications and as vehicles for increasing skills and knowledge of current employees. Some concern was expressed over the currency of content of some

offerings, but overall support was clear for this type of provision. However, from the research carried out to inform this report, it has become apparent that the number of establishments offering these types of qualifications has been dwindling, with some establishments reporting these HNC/HNDs being withdrawn from their prospectus over the past year due to lack of numbers.

8.1.2 HE provision: Bachelors degrees

There are a total of 44 institutions offering Bachelors Degrees relevant to the Cogent footprint (see Appendix 3 for full listing). Of these, 43 offer degrees that involve some form of Chemicals/Chemistry study. In fact, the only institution that does not offer any form of Chemicals study is Queen Mary University in London.

In relation to Polymers there are four institutions offering degrees, including:

- The University of Leeds;
- London Metropolitan University;
- Manchester Metropolitan University and
- Queen Mary University of London.

Petroleum industry has one provider offering industry specific degrees:

- The London South Bank University (Petroleum)

The number of degrees on offer amount to 363, ranging from single subject (e.g. Chemistry, Chemical Engineering, Analytical Chemistry) through to diverse secondary subjects (e.g. Chemistry with Music, Chemistry with Human Resource Management). It is envisaged that those seeking employment in scientific posts within industry would choose the former rather than the latter, whilst those adopting the latter route may still seek employment, but in a different range of roles.

8.1.3 Postgraduate qualifications

There are a total of 40 institutions offering postgraduate qualifications specific to the Cogent industries (see Appendix 4 for full listing). Of these, 36 offer qualifications that involve some form of Chemicals/Chemistry study. In fact, the only institutions that do not offer any form of Chemicals qualifications are Cranfield University, North East Wales Institute of Higher Education, the University of Kent and the University of Liverpool.

In relation to Polymers there are six institutions offering postgraduate qualifications, including: North East Wales Institute of Higher Education, the University of Sheffield; Cambridge University, London Metropolitan University, Loughborough University and the University of Wales Swansea.

Nuclear (and radiation) specific qualifications are offered at five institutions. These are the Universities of Birmingham, Kent, Liverpool, Manchester and Surrey. Several universities offer more general engineering courses with very specific nuclear focussed modules these include the Universities of Cambridge, Hull, Lancaster, London (Imperial College) and Manchester.

Petroleum has only one provider offering industry specific qualifications, the University of Sheffield.

It is not surprising to see the wealth of provision available within Higher Education in relation to Chemicals. Much of the provision here would be equally relevant to people progressing into Petroleum and other areas of the Cogent footprint, particularly those qualifications concerned with Process Engineering. Indeed, whilst the institutions offering HE qualifications around Petroleum, Polymer and Nuclear typically offer only one or two relevant qualifications, those offering Chemicals qualifications have on average 8 opportunities on offer. However, of the 356 [1] undergraduate Chemicals degrees available throughout England and Wales, 43% are offered by just five universities, including:

- Aston University
- Keele University
- The University of Leeds
- Manchester Metropolitan University
- The University of Sunderland

This proliferation of Chemicals/Chemistry degrees implies little about the quality of the learning being provided and the perceived value of these amongst employers. Evidence from employers would suggest a growing disillusionment with Chemical graduates and a lack of understanding as to the skills/knowledge they can reasonably expect them to possess. This is supported by the abundance of dual honours Chemistry degrees offered alongside subjects such as music, sociology, philosophy, gender studies, and photography where the value to the individual and any employer, as well as the relative coverage of Chemistry, must surely be in question. In contrast the relatively small number of both under and postgraduate qualifications within the other industrial areas implies the identification of a real business market on the part of the universities concerned, and therefore a more considered approach to the value of the content to the individual and any prospective employers.

A positive characteristic of the Chemical/Chemistry related under and postgraduate provision appears to be the emphasis that is placed on industrial experience. Although similar degree qualifications were only counted once, many of the universities offered each qualification alongside a period of time in industry, either in the UK or abroad. Based on the feedback from face to face interviews this is likely to be a welcome opportunity for potential recruits to develop the essential real-work experience so sought after by employers.

[1] This is an approximate number; the true figure is likely to be much larger as many of the universities offer the same degree courses in more than one mode of delivery to include full time over three years, or a longer duration with a period of industrial experience in the UK or abroad.

8.2 FE and HE provision in Scotland

There are a total of 45 Further Education colleges in Scotland delivering a range of provision, including National Qualifications, SVQs, Scottish Group Awards, Professional Development Awards, Professional Qualifications, and in some subject areas Preparation to HNC programmes are available leading to Higher Education qualifications i.e. HNC and HND.

Higher Educational Institutions in Scotland are funded by the Scottish Higher Education Funding Council (now retitled the Scottish Funding Council to reflect its changing remit). Allocated funding for the academic year 2004-05 was approximately £799 million; this total increased in 2005-06 to approximately £823 million (SHEFC Main Grant Letter).

8.2.1 HNCs and HNDs in Scotland

Table 8.2.1a HNCs in Scotland

College / Provider	Qualification Title	Qualification Type
Aberdeen College	Process Engineering Chemical Engineering Mechanical Engineering Electrical Engineering Instrumentation Engineering	HNC HNC HNC HNC HNC
Adam Smith College, Kirkcaldy	Chemistry Petroleum Engineering	HNC HNC
Falkirk College	Chemical & Process Technology Chemical Engineering	HNC HNC
Jewel & Esk Valley College, Edinburgh	Process Control	HNC
North Highland College, Thurso	Chemistry Nuclear Decommissioning	HNC HNC
Napier University, Edinburgh	Polymer Technology	HNC
A-1 Technical Training, Glasgow	Chemical Process Engineering	HNC

Table 8.2.1b HNDs in Scotland

College / Provider	Qualification Title	Qualification Type
Aberdeen College	Chemical Engineering Process Engineering Mechanical Engineering Electrical Engineering Instrumentation Engineering	HND HND HND HND HND
Adam Smith College, Kirkcaldy	Chemistry Petroleum Engineering Petroleum and Mechanical Engineering	HND HND HND
Falkirk College	Chemistry Chemical & Process Technology Chemical Technology with Forensic Chemistry	HND HND HND
North Highland College, Thurso	Decommissioning Operations	HND
Napier University, Edinburgh	Polymer Technology	HND
A-1 Technical Training, Glasgow	Chemical Process Engineering	HND

The two tables above show the HNC/D qualifications that are key to the Cogent industries and the establishments offering them.

North Highland College, Thurso, which is relatively near to the Nuclear site at Dounreay, located in the North of Scotland offers HNC and HND Decommissioning qualifications. Decommissioning at Dounreay will increase the demand for engineering specialists.

In Central Scotland the Cogent sector has a Petroleum refinery; HNC and HND in Petroleum Engineering are offered at Adam Smith College, Kirkcaldy. This is also where a cluster of polymer and chemical companies are located. Napier University, Edinburgh offers HNC and HND in Polymer Technology. The HNC and HNDs offered with either chemistry or chemical study are offered at colleges based in Aberdeen, Kirkcaldy, Falkirk and Thurso. Chemical Process Engineering is offered by an approved provider in Glasgow to be undertaken via open/distance learning.

Table 8.2.1c: Number of Entries to HNC/HNS in Scotland

Course	Qualification Level	2000/01	2001/02	2002/03	2003/04	2004/05
Chemical Engineering	HNC	26	15	25	12	18
Chemical Process Engineering	HNC	35	46	27	21	54
Chemical Sciences	HNC	6	5	7	1	2
Chemical and Process Technology	HNC	10	8	28	8	15
Chemical and Process Technology	HND	.	35	11	9	6
Nuclear Decommissioning	HNC	.	.	.	5	11
Petroleum Engineering	HND	.	.	.	2	3

Data supplied by SQA

The information supplied by SQA in the above table gives the number of candidate entries each year for those undertaking HNC/Ds applicable to the Cogent sector. Looking at the figures for 2004/05 each qualification has increased the number of entrants from the previous year with the exception of the HND in Chemical and Process Technology.

At HE level, there are a total of 21 Universities in Scotland, including the Open University delivering a range degree courses.

Recent initiatives, such as the launch in 2005 of ScotCHEM (an initiative to enhance chemistry research via collaboration among chemistry departments) will strengthen the ability of Scottish Universities to compete globally.

8.2.2 Bachelors degree

Eight Scottish higher education institutions offer degrees with some form of Chemical/Chemistry study. Engineering degrees that are specific to the Cogent sector are available at seven institutions but overall in Scotland Engineering degrees which are not industry specific are available at 14 institutions (full listing is available at Appendix 5).

In relation to Polymers, Napier University, Edinburgh offers a degree specific to this industry (Polymer Engineering). Similarly, Aberdeen University is the only institution to offer a degree in Geology and Petroleum Geology. For the Nuclear industry the UHI Millennium Institute, Inverness offers engineering degrees in Mechanical and Electrical Engineering with Decommissioning Studies.

8.2.3 Postgraduate qualifications – Masters degree

There are a total of nine institutions in Scotland offering master degree qualifications (see Appendix 6 for full listing). For the chemical industry Aberdeen, Edinburgh, Glasgow, Heriot-Watt, St Andrews and Strathclyde universities offer some form of chemical/chemistry study.

In relation to the Polymer industry both Heriot-Watt and Napier universities based around Edinburgh offer master degrees applicable to this industry. The Polymer industry in Scotland is based significantly around Central Scotland.

For the Nuclear industry only Glasgow University offer a specific master degree qualification. The Nuclear industry has operations based in the West of Scotland.

For the Oil and Gas and Petroleum industries master degrees are available at Aberdeen, Dundee, Edinburgh, Heriot-Watt and Robert Gordon universities. Aberdeen in the North-East of Scotland is seen as the oil and gas capital. The only Scottish based Petroleum Refinery is sited in Grangemouth.

Engineering master degree qualifications that are not Cogent industry specific are available at nine Scottish institutions.

8.2.4 Postgraduate qualifications – PgDip, PgCert, PhD

There are a total of eight institutions in Scotland offering postgraduate qualifications (See Appendix 7 for full listing). For the Chemical industry Heriot-Watt, St Andrews and Strathclyde universities offer some form of chemical/chemistry study.

In relation to the Polymer industry both Heriot-Watt and Napier universities based around Edinburgh offer postgraduate qualifications applicable to this industry.

For the Nuclear industry only Glasgow University offer a specific postgraduate qualification.

For the Oil and Gas and Petroleum industries postgraduate qualifications are available at Dundee, Edinburgh, Heriot-Watt and Robert Gordon universities.

Engineering postgraduate qualifications that are not Cogent industry specific are available at four Scottish institutions.

8.3 FE and HE provision in Northern Ireland

There are a total of 16 Further Education colleges in Northern Ireland**.** The Skills Strategy for N Ireland - a programme for implementation published by DELNI in February 2006 - states that one of the key aims of the strategy is 'Improving the quality and relevance of education and training' for FE. This will include the re-organisation of the 16 FE colleges to merge and form six new larger regional colleges by August 2007.

The tables below show that only Bangor College offers a course specific to the industries covered by Cogent.

Table 8.3a HNCs applicable to the Cogent sector - Northern Ireland

Awarding Institution	Qualification Title	Qualification Type
Bangor College	Applied Biology with Chemistry	HNC

Table 8.3b: HNDs applicable to the Cogent sector – Northern Ireland

Awarding Institution	Qualification Title	Qualification Type
Bangor College	Applied Biology with Chemistry	HND

Table 8.3c: Bachelors degrees – Northern Ireland

Awarding Institution	Qualification Title	Qualification Type
Queens University	Chemical Engineering	BEng Hon
	Chemical with Polymer Engineering	BEng Hon
	Chemistry	BSc Hon
	Chemistry with a Year in industry	BSc Hon
	Chemistry with Extended Studies in Europe	BSc Hon
	Physics	BSc Hon

Table 8.3d: Postgraduate qualifications – Northern Ireland

Awarding Institution	Qualification Title	Qualification Type
Queens University	Bio Fluid Mechanics and Polymer Processing Flows	MPhil
	Bio Fluid Mechanics and Polymer Processing Flows	PhD
	Chemical Engineering	MEng Hon
	Chemical with Polymer Engineering	MEng Hon
	Chemistry	MSci Hon
	Chemistry	MPhil
	Chemistry	PhD
	Physics	MSci Hon
	Polymer Engineering	PgDip
	Polymer Engineering	MSc
	Polymer Processing	MPhil
	Polymer Processing	PhD

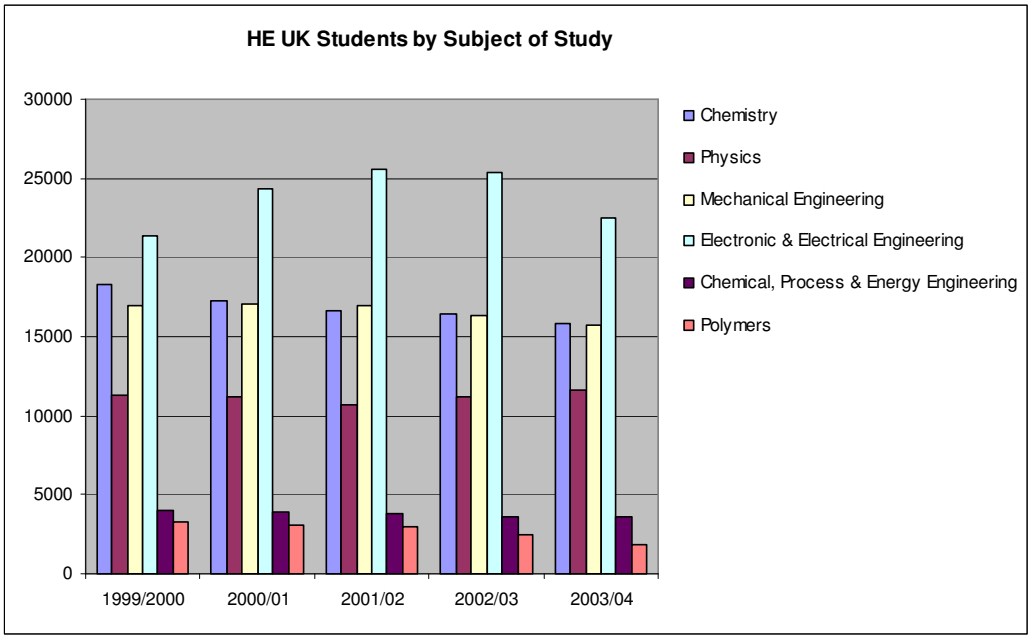
At HE level, Queens University offer degrees in chemical engineering, polymer engineering, chemistry and physics which are particularly relevant to the Cogent sector. The courses offered by Queens University are a good example of best practice as the university works closely with industry to ensure the content and delivery of the subjects are both relevant and valued by employers.

Throughout the UK, entrants to the Cogent sector often come from the more generic engineering routes, having qualified in subjects such as Mechanical Engineering, Electrical and/or Electronic Engineering or Geology. More universities offer these types of courses rather than those that are tailored to careers within the Cogent industries.

8.4 Analysis of data covering current students numbers on under and postgraduate courses

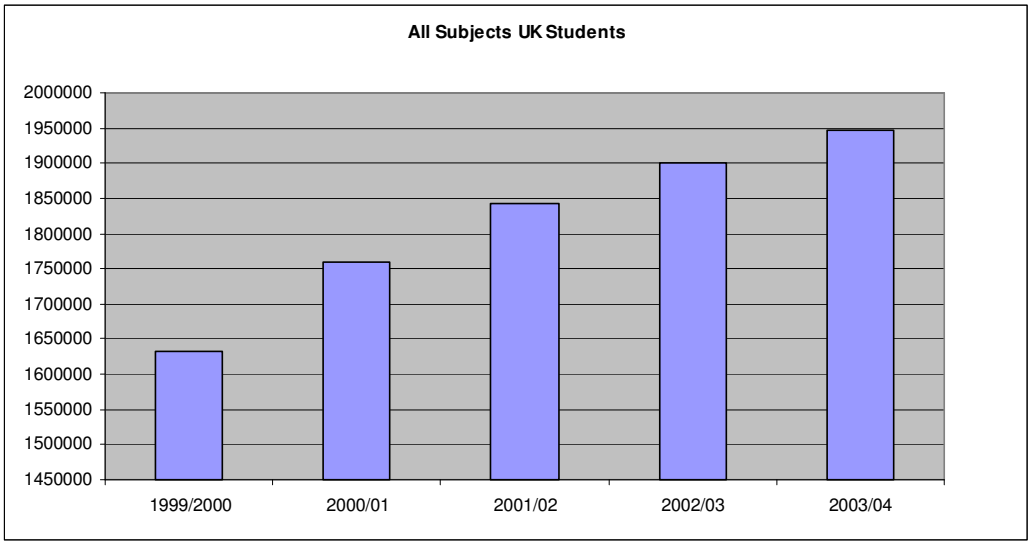
The chart below shows the number of UK students studying subjects that relate to the Cogent footprint during the periods 1999/2000, 2000/2001, 2001/2002, 2002/2003 and 2003/2004. Following that is a chart that shows all students enrolling in Higher Education for the periods 1999/2000, 2000/2001, 2001/2002, 2002/2003 and 2003/2004

Figure 8.4a: Number of U.K students at HE level by subject of study



Source: HESA Tables 2e - All HE students by level of study, subject of study, domicile and gender

Figure 8.4b: Total number of U.K students at HE level

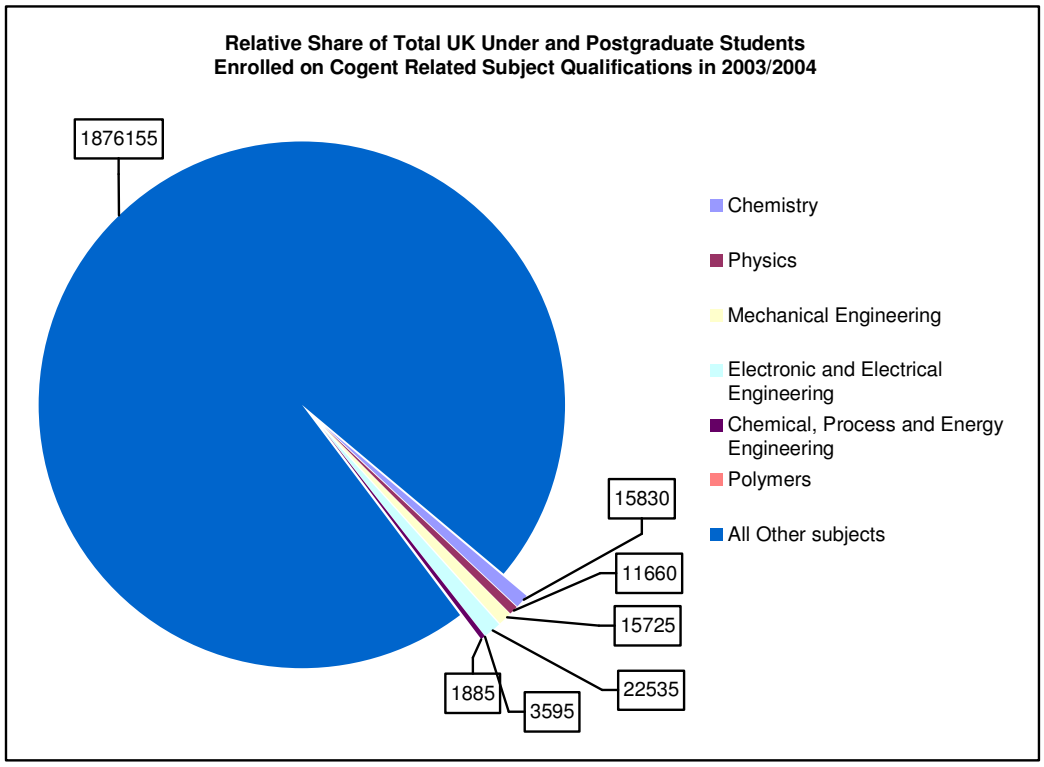


Source: HESA Tables 2e - All HE students by level of study, subject of study, domicile and gender

Overall, across the UK the number of students has increased by 19% in the period from 1999 to 2003. The approximate numbers of students enrolling at UK universities in the 2003/2004 was 1.95 million. In the same year the relative share occupied by some of the subject areas relevant to the Cogent industries can be seen in the pie chart overleaf.

In the same period however, many of the Cogent related subject areas have seen a reduction in numbers ranging from 8% for Mechanical Engineering (17,000 to 15,725) to 41% for Polymers (3,240 to 1,885). The largest decrease exists within Chemistry where 18,290 enrolled in 1999/2000 compared with 15,830 in 2003/2004 (15%) – although there may be more students taking up combined courses. This decrease is larger still when viewed alongside an overall increase in students attending university.

Figure 8.4c: Relative share of total U.K under and postgraduate students enrolled on Cogent related subject classifications, 2003 to 2004



Source: HESA Tables 2e - All HE students by level of study, subject of study, domicile and gender

8.5 HESA data - first year students and qualifiers at HE level

The Higher Education Statistics Agency (HESA) supplied statistics regarding UK domiciled students based upon subject classifications at HE level, relevant to those entering the Cogent footprint. This data includes students attending the very specific courses listed above, but also covers the more general routes that can be taken that lead into careers within the Cogent industries. The data supplied was split across two periods 1995 to 2002 and 2002 to 2005, this was due to a change in the way that subject classifications are grouped (full definitions available at appendix 8a). This change in classification also means that the data is not comparable between the two periods. The subject classifications reported are as follows:

- 1995 - 2002
  - Chemistry
  - Physics
  - Geology
  - Mechanical engineering
  - Electrical engineering
  - Electronic engineering
  - Chemical engineering
  - Polymers and textiles
  - Other materials technology
- 2002 – 2005
  - Chemistry
  - Physics
  - Geology

- Mechanical engineering
- Electrical and electronic engineering
- Chemical, process and energy engineering
- Polymers and textiles
- Materials technology not otherwise specified.

Data was supplied for the number of students at both first year level and the number of students qualifying, during each period across HE levels. The full datasets and gender breakdowns are available at appendix 9, 10, 11 and 12. Data reported below has had a rounding strategy applied as per HESA definitions. Any percentage reported on a population below 52 has also had to be suppressed and will be reported as "…" (full definitions available at appendix 8a). A description of the picture at each level of study in HE is provided below.

8.5.1 Postgraduate 1995 to 2002 and 2002 to 2005

The number of first year students studying subjects relevant to the Cogent footprint during both of these periods appears to be in general decline across the majority of the courses reported on. The exceptions to this are Chemical engineering, which saw a 14% increase in first year students during 1995 to 2002, mirrored by a 20% increase in numbers by the 2002 to 2005 subject classification of Chemical, process and energy engineering, and Materials technology not otherwise specified (2002 – 2005), this subject group also saw an increase of 14%.

Chemistry saw the largest decline in numbers and the largest percentage drop between 1995 and 2002 with a total decrease of 695 students (38%). For 2002 to 2005, Mechanical engineering saw the largest percentage drop in first year students - 30%. However, the subject classification with the largest drop in actual student numbers (- 225) was Electrical and electronic engineering. It is also interesting to note that Polymers and textiles, which has relatively low numbers when compared to the other subject classification has seen a reduction of 25%.

Overall, the numbers qualifying at postgraduate level reflect the same trends as those in the number of first year students across the period (1995 to 2002), with a general overall decline in the numbers achieving a qualification.

8.5.2 First Degree 1995 to 2002 and 2002 to 2005

The picture at first degree level for the reporting period 1995 to 2002 is similar to that at postgraduate level, with a general decline in numbers across the subject classifications. The exception to this is Electronic engineering, which saw an increase of 17%. The subject classification with the largest reduction of numbers in first year students for 1995 to 2002 is Chemistry, with a decrease of 1,855 students (36.96%). Overall the majority of the remaining subject classifications have seen a reduction of at least a quarter of first year students, with some seeing a decrease of almost half:

Table 8.5.2a: Reduction in first degree first year student numbers by subject classification, 1995 to 2005

Subject classification	Reduction in Student Numbers 1995 to 2002	Reduction in %
Chemistry	1855	37%
Physics	590	19%

Subject classification	Reduction in Student Numbers 1995 to 2002	Reduction in %
Geology	370	23%
Mechanical engineering	1100	24%
Electrical engineering	510	38%
Electronic engineering		
Polymers and textiles	375	34%
Other materials technology	255	50%

Source: HESA 1995 to 2002

Over the next reporting period (2002 to 2005) however, the picture changes, with over half of the subject classifications seeing either an increase or only slight decrease in student numbers:

Table 8.5.2b: Changes to first degree first year student numbers by subject classification, 2002 to 2005

Subject classification	No of students		Percent	
	Increase	Decrease	Increase	Decrease
Chemistry		330		14%
Physics	245		9%	
Geology	415		30%	
Mechanical engineering	195		5%	
Electrical and electronic engineering		1775		30%
Chemical, process and energy engineering		5		"…"
Polymers and textiles		110		17%
Materials technology not otherwise specified		14		"…"

Source: HESA 2002 to 2005

Again the numbers qualifying, unsurprisingly reflect the same trends as those above (1995 to 2002). Across all subjects there is also a decrease in numbers from those starting to those qualifying.

8.5.3 Foundation degree - 2002 to 2005

Between 2002 and 2005 the only subject classifications to see a decline in numbers were Physics - with a reduction from 25 students in 02/03 to just five students in 04/05 - and Chemistry with a decrease of 10 students. The other subjects with Foundation degrees attached to them (all excluding Geology), have seen an increase in numbers from 02/03 to 04/05.

The numbers qualifying reflect similar trends, although where Chemistry had seen a decrease in the number of first year students, the numbers of those students then going on to qualify has seen a year on year increase. The opposite is true of Chemical, process and energy engineering, with a slight decrease in those qualifying. Overall the numbers qualifying are relatively low, when contrasted against numbers of first year students. The foundation degree with the smallest numbers of students across the period fell within the subject classification of Polymers and textiles, with only 10 students enrolling and only five of those actually qualifying. The table below shows the number of first year students and the total number of students qualifying in each subject across the period:

Table 8.5.3a: Changes to first degree first year student numbers by subject classification, 2002 to 2005

Subject classification	Total n° of first year students 2002 to 2005	Total n° of students qualifying 2002 to 2005
Chemistry	135	75
Physics	35	5
Mechanical engineering	375	60
Electrical and electronic engineering	485	230
Chemical, process and energy engineering	45	15
Polymers and textiles	10	5
Materials technology not otherwise specified	90	35

Source: HESA 2002 to 2005

8.5.4 HND

At HND level, for 1995 to 2002 all of the subject classifications saw a decline in the number of first year students. For the majority of subjects these decreases in numbers were massive, the smallest sits at a decrease in first year students of 20% and the largest reportable is 71%.

Table 8.5.4a: Reduction in HND first year student numbers by subject classifications

Subject classification	Reduction in Student Numbers 1995 to 2002	Reduction in %
Chemistry	185	67%
Physics	35	"…"
Geology	15	"…"
Mechanical engineering	415	47%
Electrical engineering	485	71%
Electronic engineering	150	20%
Chemical engineering	20	"…"
Polymers and textiles	325	59%
Other materials technology	45	35%

Source: HESA 1995 to 2005

For 2002 to 2005, two of the subject classifications – Physics and Geology took on no new students. Of the remaining classifications, again there was a general decrease in the number of first year students. Only Mechanical engineering and Materials technology not otherwise specified saw an increase (65% for Mechanical engineering). Chemistry however, saw a huge reduction in student numbers from 40 in 2002/2003 to only five in 2004/2005.

The numbers qualifying again reflect the same trends as above, with a general decline in numbers. For the later subject classifications (2002 to 2005) the same patterns apply. Over both periods, the number of students qualifying was lower than the number enrolling, showing a 'drop out' had occurred. The tables below show the number of first year students and the total number of students qualifying in each subject across the periods:

Table 8.5.4b: Comparison of numbers starting HNDs to numbers completing, 1995 to 2002

Subject classification	Total n° of first year students 1995 to 2002	Total n° of students qualifying 1995 to 2002
Chemistry	1070	655
Physics	140	90
Geology	115	95
Mechanical engineering	4225	2415
Electrical engineering	2525	1590
Electronic engineering	4355	2300
Chemical engineering	135	70
Polymers and textiles	2345	1195
Other materials technology	375	265

Table 8.5.4c: Comparison of numbers starting HNDs to numbers completing, 2002 to 2005

Subject classification	Total n° of first year students 2002 to 2005	Total n° of students qualifying 2002 to 2005
Chemistry	75	95
Physics	0	0
Geology	0	0
Mechanical engineering	390	800
Electrical and electronic engineering	1540	1015
Chemical, process and energy engineering	10	5
Polymers and textiles	330	205
Materials technology not otherwise specified	125	110

8.5.5 HNC

At HNC level, there were no entrants to the Physics subject classification across both 1995 to 2002 and 2002 to 2005. During 1995 to 2002 the subject classifications of Mechanical engineering, Geology, Electronic engineering, and other materials technology all saw an increase in the number of first year students. Although it is worth noting that Geology only had five registered students in 04/05.

The remaining subject classifications, Chemistry, Electrical engineering, Chemical engineering, and Polymers and textiles all saw a decrease in first year students. Polymers and textiles shows the largest proportional drop, losing over three quarters of first year student numbers from 1995 to figures reported in 2002.

For 2002 to 2005, the majority of subject classifications saw a decrease in numbers. The only exception to this was Materials technology not otherwise specified that remained static. Geology had no first year students for the entire period. Four of the remaining five subject classifications saw a decrease in student numbers of at least 20%, with both Chemistry and Polymers and textiles attracting around half the number of first year students at the end of the reporting period.

The numbers qualifying across both periods, reflect the same trends as mentioned above. Again, the proportion of students continuing on to qualify shows a level of 'drop out' has occurred.

8.5.6 Overview of HE

As previously reported the overall student population has seen a 19% increase and therefore the decrease in numbers applying to and qualifying in most of the subjects relevant to the sector is a cause for concern. It would be interesting to gauge the perceptions of potential applicants with regards to these subject classifications. There are some hints of a brighter future, with a few of the subject classifications at certain levels reporting a slight increase in numbers over more recent years. However, since 1997, the lack of interest in these courses has resulted in the closure of 18 Physics departments and 28 Chemistry departments, with far more due to close. As a result we now produce only 3,000 Physics graduates a year.

The percentage of students completing their qualification is a cause for concern, with every subject classification at every level reporting some rate of student 'drop out'. The average (mean) drop out for first degree level students (for the reporting period 1995 to 2002) based upon the assumption that the average first degree course taken full-time takes three years to complete is as follows:

Table 8.5.6a: Average number of first degree students leaving courses before completion

Subject classification	Average 'drop out' (no of students)	Average % loss
Chemistry	1330	30%
Physics	785	30%
Geology	270	19%
Mechanical engineering	1500	36%
Electrical engineering	280	31%
Electronic engineering	1915	40%
Chemical engineering	160	17%
Polymers and textiles	245	28%
Other materials technology	100	24%

This is clearly an area where there is an area where there is scope for action to influence drop-out rates in Cogent related Higher Education. To support this there is a need for further investigation to understand the reasons behind these figures and whether this is an issue that affects other HE subjects.

8.6 HESA destinations data

The HESA Destinations of Leavers from Higher Education (DLHE) data supplied to Cogent covers all United Kingdom (UK) domiciled students reported to HESA for the reporting period 1 August 2003 to 31 July 2004 as obtaining relevant qualifications and whose study was full-time or part-time (including sandwich students and those writing-up theses). The destinations reported to Cogent covered those studying the following at HE level:

- Chemistry
- Physics
- Geology
- Mechanical Engineering
- Electronic and Electrical Engineering
- Chemical, Process and Energy Engineering
- Materials Technology not otherwise specified
- Polymers and Textiles.

This includes those who have studied at Postgraduate, First Degree, Foundation Degree, HNC, HND, and other undergraduate level (a full definition is available at appendix 8b). The total reported on is 13,956.7 representing 69.75% of the total qualifiers for the same period.

The data shows that students following the above routes, in the reported period fall within 192 Standard Industrial Classification (SIC codes). As a result of incomplete or unclassifiable responses HESA have only been able to report the destinations for 47% (9,435) of those students qualifying in 03/04. Ranking the SIC codes in descending order, with those attracting the most leavers ranked at the number one position (509.1 in SIC 8030 – Higher Education) and the least at 192 (SIC 7521 – Foreign Affairs), Cogent relevant SIC codes are positioned as follows:

Table 8.6a: Ranking of Cogent specific SIC codes by HE student destinations, 2003 to 2004

SIC Code	Total	Rank
(2440) Manufacture of pharmaceuticals, medicinal chemicals and botanical products	280	**7**
(1120) Services and activities incidental to oil and gas extraction (excluding surveying)	95	**29**
(1110) Extraction of crude petroleum and natural gas	85	**30**
(2400) Manufacture of chemicals and chemical products	75	**36**
(5000) Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	70	**41**
(2540) Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	45	**49**
(2330)Processing of nuclear fuel	45	**49**
(2410) Manufacture of basic chemicals, except refined petroleum products	45	**49**
(2320) Manufacture of refined petroleum products	40	**61**
(2460) Manufacture of other chemical products	35	**67**
(1100) Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying	35	**67**
(2520) Manufacture of plastic products	30	**78**
(2500) Manufacture of rubber and plastic products	5	**146**
(2510) Manufacture of rubber products	5	**151**
(2410) Manufacture of pesticides and other agro-chemicals	5	**153**
(2300) Manufacture of coke, refined petroleum products and nuclear fuel	0	**188**
Total	**895**	

Of the 895; 250 are female and 645 male. Overall, students moving into the SIC codes relevant to the Cogent footprint make up just 6.5% of those whose destination is known.

The data supplied by HESA shows that the majority of students qualifying at HE level within the subject classifications relevant to the Cogent footprint are moving into industries outside of it once qualified. This is no surprise as feedback from employers suggests that attractiveness of our industries is a big issue, as graduates perceive other industries offer better opportunities for career progression.

The table below shows the top ten destinations for leavers across the period over the subject classifications reported on. They account for a third of the known destinations (33%). The appearance of industries such as sales, and leisure and tourism is unsurprising as many students undertake non-graduate positions whilst searching for an appropriate career path.

Table 8.6b: Top ten destinations of HE students, 2003 to 2004

SIC Code	Total	Rank
(8030) Higher Education	510	**1**
(5240) Other retail sale of new goods in specialised stores	370	**2**
(7423) Engineering design consultancy	320	**3**
(2900) Manufacture of machinery and equipment not elsewhere classified	315	**4**
(7510) Central, regional and local government administration, regulatory activities	295	**5**
(7522) Defence activities	280	**6**
(2440) Manufacture of pharmaceuticals, medicinal chemicals and botanical products	280	**6**
(5500) Hotels and restaurants	250	**8**
(7310) Research and experimental development on natural sciences and engineering	250	**8**
(6511) Banks	230	**10**
Total	**3,100**	

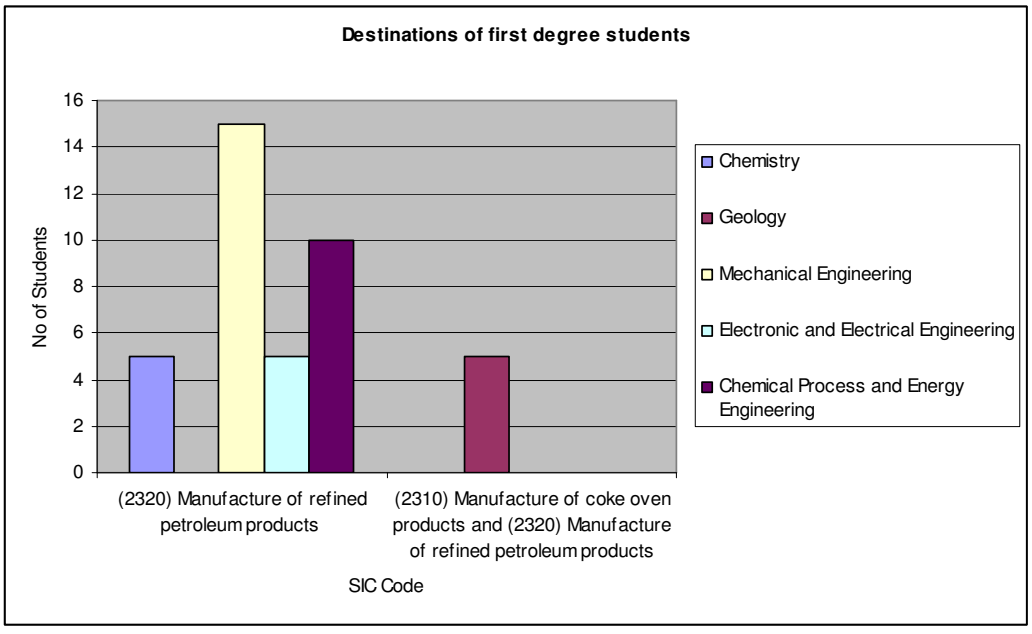
8.6.1 Higher Education routes into industry

Focussing on the routes that those who have completed HE level courses have taken to come into Cogent industries provides an insight into how the industry rates certain types of qualifications and subjects.

8.6.1.1 Petroleum

For the Petroleum industry, the HESA data shows that 40 students moved into areas of work that are within the industry. The bulk of students from HE moving into relevant areas of work have completed a first degree, the most popular of those being in Mechanical Engineering (15 students – 10 of whom moved into full-time employment) and Chemical, Process and Energy Engineering (10 full-time).

Figure 8.6.1.1a: Number of students moving into the Petroleum industry by subject classification

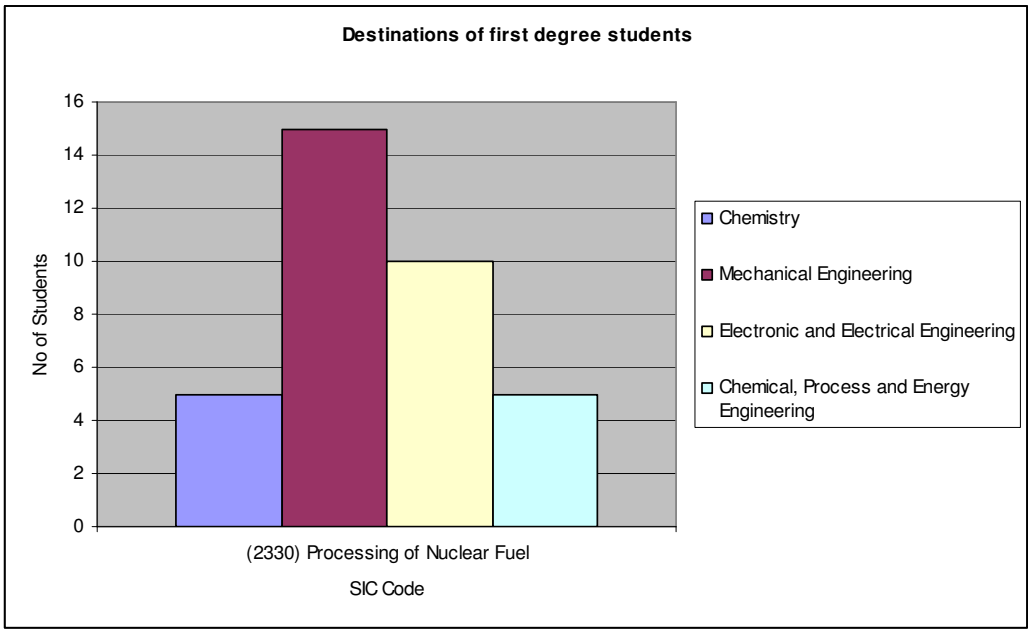


Overall, the majority of students - 30 - moved into full-time, paid work (including self-employed). Ten moved into work and further study. No one moved into the industry during this period form the HND or Foundation Degree route.

8.6.1.2 Nuclear

For SIC codes relevant to Nuclear, the bulk of students moving into these areas came from the First degree route – 30 of the 45 reported. The majority had moved into industry from a Mechanical Engineering first degree (10 full-time, five work and further study), followed by 10 from Electronic and Electrical Engineering route (all full-time).

Figure 8.6.1.2a: Number of students moving into the Nuclear industry by subject classification

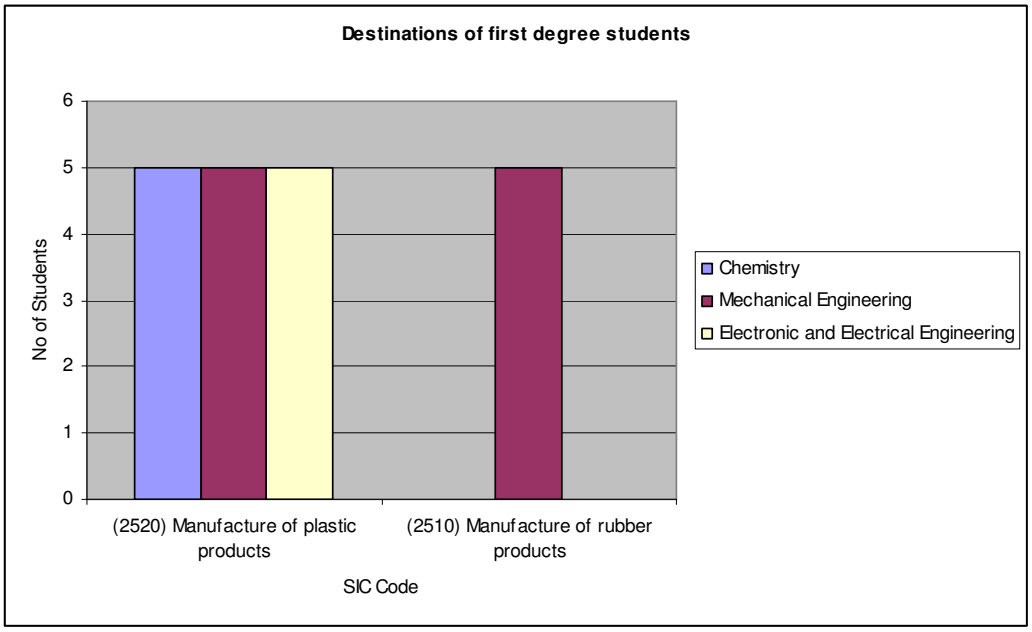


At postgraduate level five students had all moved into full-time paid work in the SIC code area of (2330) Processing of nuclear fuel, from Physics, Mechanical Engineering, Chemistry and Chemical, Process and Energy Engineering. From a HND route, five students had moved into roles within the industry – from Mechanical Engineering into full-time work, Electronic and Electrical Engineering into full-time work, and into work and further study. There were also five students from the HNC route, all of those who had studied Electronic and Electrical Engineering moved into work and further study and those who studied Mechanical Engineering moved into full-time work. Part-time work did not feature at all as a destination for this industry during this period.

8.6.1.3 Polymers

A total of 40 students moved into careers within Polymers SIC codes. Of these, the majority came from the subject classification of Mechanical Engineering at First degree level (10.0) and Polymers and textiles at postgraduate (5.0) and HNC level (5.0). The subject classification of Polymers and textiles at first degree level did not provide any entrants to our sector during this period. 25 of the students came into industry after qualifying at first degree level.

Figure 8.6.1.3a: Number of students moving into the Polymer industry by subject classification



The majority of students (35) moved into full-time paid work and five went into work and further study.

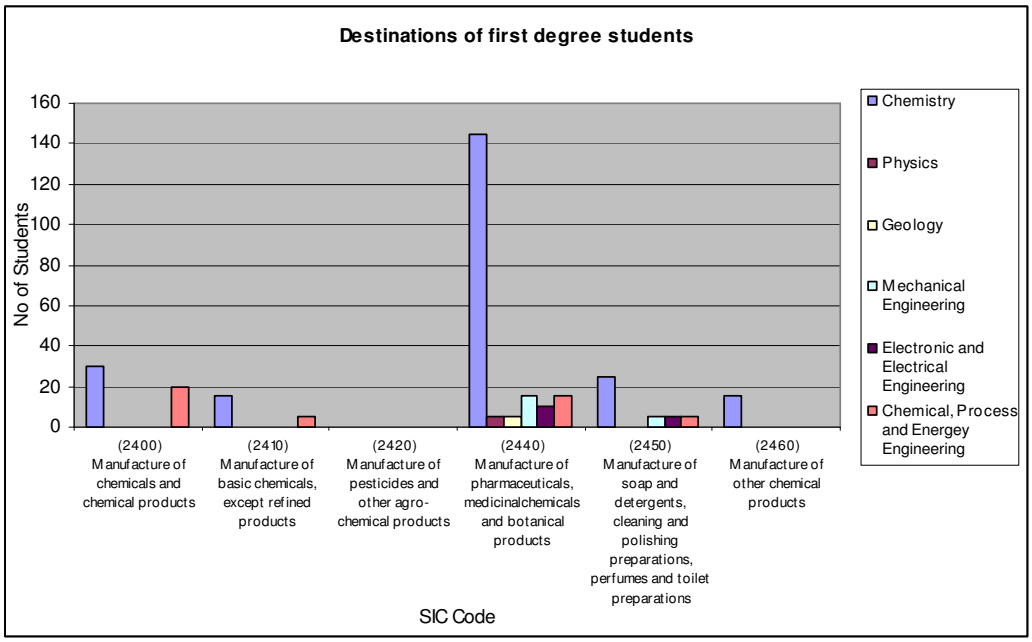
8.6.1.4 Section deleted

8.6.1.5 Chemicals

The largest numbers of students from the subjects reported moved into roles that fall within Chemicals related SIC codes – a total of 490. Again the majority of students moved from first degree level (335), followed by postgraduate level (105). For these levels, unsurprisingly, most of the students moving into these roles had followed either a Chemistry (310) or Chemical, process and energy engineering (55) route, students entering industry having completed a foundation degree also came from these subject classifications. For those having completed a HND or HNC the subject classification of Electronic and electrical engineering also provided a route into these SIC code areas, in fact the only students to move into these areas from HND came from this subject classification.

Of the 490 destinations reported, 450 moved into full-time employment, with only 5 moving into part-time roles. The remainder of students went onto work and further study. Students who had completed a foundation degree moved into industry and continued their studies.

Figure 8.6.1.5a: Number of student moving into the Chemicals industry by subject classification



Appendix 13 provides a view of the gender breakdown for those moving into roles within our industry SIC codes. This reflects the pattern within industry, with female entrants representing the smaller proportion of the students moving into roles within the Cogent footprint. Although the percentage split is higher than within industry, with female entrants accounting for 28%.

9. Comparison of the four UK Administrations' approach to qualifications and related policies

The table below provides a comparison of the four UK Administrations approach to qualifications and related policies. It provides an illustration of how qualifications can be compared across National boundaries and how the policies, authorities and structures surrounding qualifications are organised in each area.

Table 9a: Comparison of the four U.K administrations' approach to qualifications and related policies

Area	England	Scotland	Northern Ireland	Wales
National and Scottish Vocational Qualifications	NVQs are offered in England across 5 levels Based on National Occupational Standards	SVQs are offered in Scotland across 5 levels May have slightly different content than NVQs Based on National Occupational Standards	NVQs are offered in Northern Ireland across 5 levels Based on National Occupational Standards which DELNI are involved in approving	NVQs are offered in Wales across 5 levels Based on National Occupational Standards which ACCAC are involved in approving
Qualifications Frameworks	The National Qualifications Framework (NQF) for England, Wales and Northern Ireland sets out the levels at which qualifications can be recognised except in relation to Higher Education. Higher education sits within the Framework for Higher Education (FHEQ) It includes 8 numbered levels and an entry level	The Scottish Credit and Qualifications Framework (SCQF) is a credit based framework which allows learners to carry forward the credit from previously achieved units to any future qualifications It includes 12 numbered levels	The national qualifications framework (NQF) for England, Wales and Northern Ireland sets out the levels at which qualifications can be recognised It includes 8 numbered levels and an entry level CCEA play a role in approving qualifications to the NQF and in determining the national curriculum in	The national qualifications framework (NQF) for England, Wales and Northern Ireland sets out the levels at which qualifications can be recognised It includes 8 numbered levels and an entry level ACCAC play a role in approving qualifications to the NQF and in determining the national curriculum in Northern Ireland

Area	England	Scotland	Northern Ireland	Wales
			Northern Ireland	
Awarding Bodies/Regulatory Authority	Three statutory awarding bodies for qualifications delivered in schools The Qualifications and Curriculum Authority (QCA) QCA maintains and develops the national curriculum and associated assessments, tests and examinations; and accredits and monitors qualifications in colleges and at work.	Have a single statutory Qualifications Authority (SQA) for qualifications below degree level SQA is also a regulatory body like the QCA (but only for SVQs). The awarding and regulatory functions are separated by statute	The Council for the Curriculum, Examinations and Assessment (CCEA) was established on 1 April 1994 and is a non-departmental public body reporting to the Department of Education in Northern Ireland. CCEA is a unique educational body in the UK, bringing together the three areas of curriculum, examinations and assessment. Advising Government – on what should be taught in Northern Ireland's schools and colleges. Monitoring Standards – ensuring that the qualifications and examinations offered by awarding bodies in Northern Ireland are of an appropriate quality and standard. Awarding Qualifications – as Northern Ireland's leading awarding body they offer a diverse range of qualifications.	ACCAC is the Qualifications, Curriculum and Assessment Authority for Wales - Awdurdod Cymwysterau, Cwricwlwm ac Asesu Cymru. They are an Assembly Sponsored Public Body and have two main roles: • to advise the Welsh Assembly Government on matters relating to curriculum, assessment and qualifications in schools • to act as the statutory regulatory authority in Wales for all qualifications outside higher education.

Area	England	Scotland	Northern Ireland	Wales
Funding	Through the Local Education Authorities for school provision, and the Leaning and Skills Council for all post 16 further and work based educations and training. National entitlement to funding for level 1 and 2 qualifications and training	School provision is funded through Local Authorities. Further Education colleges receive funding from Scottish Funding Council and Local Enterprise Companies. Higher Education institutions receive funding from Scottish Funding Council. Training providers receive funding from Local Enterprise Companies for the following programmes:- • Modern Apprenticeships • Skillseekers • Adult Training for Work • Get Ready for Work		The National Council for Education and Training for the funding of all post-16 education and training in Wales, except HE. A joint management team has been established with the HE Council to ensure a co-ordinated approach to all funding. Together these organisations are known as ELWa, Education and Learning Wales Expressed an aim to offer entitlement to funding up to level three qualifications and training
Key Skills/Core Skills	The term key skills is used in England to refer to a system of qualifications and standards which deliver the skills that are commonly needed for success in a range of activities in education and training, work and life in general These include: Application of number Communication Improving own learning and	SQA has approved national standards for Core Skills - the abilities needed to be active, enterprising, and responsible members of society. These include:- Communication Numeracy IT Working with others Problem Solving	The term key skills is used in England to refer to a system of qualifications and standards which deliver the skills that are commonly needed for success in a range of activities in education and training, work and life in general These include: • Application of number • Communication	The term key skills is used in England to refer to a system of qualifications and standards which deliver the skills that are commonly needed for success in a range of activities in education and training, work and life in general These include: Application of number Communication Improving own learning and

Area	England	Scotland	Northern Ireland	Wales
	performance Information and communication technology Problem solving Working with others. The Key Skills qualifications (Communication, Application of Number and ICT) are assessed through an external test (England and Northern Ireland only) and internally-assessed portfolio. The Wider Key Skills (Working with Others, Problem Solving and Improving Own Learning Performance) are assessed through an internally-assessed portfolio only.	These are not free standing qualifications, but are developed and practiced through the completion of existing qualifications or assessment at all levels both at school and further education and in the world of work. A Core Skills profile forms part of the candidate's Scottish Qualifications Certificate. The profile details the candidate's highest achievement to date demonstrated in each Core Skill or component of a Core Skill in any Course or Unit	• Improving own learning and performance • Information and communication technology • Problem solving • Working with others. The Key Skills qualifications (Communication, Application of Number and ICT) are assessed through an external test (England and Northern Ireland only) and internally-assessed portfolio. The Wider Key Skills (Working with Others, Problem Solving and Improving Own Learning Performance) are assessed through an internally-assessed portfolio only.	performance Information and communication technology Problem solving Working with others. For assessment purposes Wales does not make use of an external end test and relies on Internally assessed and externally moderated portfolio across all Key Skills areas
Apprenticeships	In England there are at least 4 levels of Apprenticeship, including the Young Apprenticeship (Levels 1/2), Apprenticeship(Level 2, Advanced Apprenticeship (Level 3), and Higher Apprenticeship (Level 4)	There is one level of Modern Apprenticeship in Scotland around Level 3	There are two levels of Modern Apprenticeship in Scotland around Levels 2 and 3.	There is one level of Modern Apprenticeship in Wales around Level 3 Wales has also introduced a new training programme for adults – the Modern Skills Diploma for Adults
HNCs/HNDs	Higher National Certificates and	Higher National Certificates	Higher National Certificates	Higher National Certificates and

Area	England	Scotland	Northern Ireland	Wales
	Diplomas are available across England, Scotland, Northern Ireland and Wales	and Diplomas are available across England, Scotland, Northern Ireland and Wales They have a higher profile and are more widely used in Scotland however	and Diplomas are available across England, Scotland, Northern Ireland and Wales	Diplomas are available across England, Scotland, Northern Ireland and Wales
Foundation Degrees	England first introduced Foundation Degrees in 2001 as an innovative degree designed and delivered in partnership with employers to equip people with the relevant knowledge and skills for business. Foundation Degrees are broadly equivalent to the first two years of an Honours degree	Scotland have no plans to introduce Foundation Degrees due to the strength of their HNC/HND programmes	Northern Ireland are currently looking to develop Foundation Degrees	Wales are currently looking to develop Foundation Degrees
Ministerial Structure	The DfES' remit covers all aspects of skills and education	There is an Education Department responsible for schools, and an Enterprise and Lifelong Learning Division responsible for FE, HE, skills and employability	Department for Education and Learning in Northern Ireland is responsible for third level education, training and a range of employment measures, all aimed at giving people the skills, knowledge and opportunities to work.	The Welsh Assembly
University for Industry	UfI in England, Northern Ireland and Wales is a provider of training in conjunction with Learndirect	SUfI is not a provider of training but a broker for other providers.	UfI in England, Northern Ireland and Wales is a provider of training in conjunction with Learndirect	UfI in England, Northern Ireland and Wales is a provider of training in conjunction with Learndirect

Area	England	Scotland	Northern Ireland	Wales
Careers Service	Connexions - providers of confidential advice, support and information for 13-19 year olds - including careers advice. Department for Education & Skills (DfES) - government department which looks after education, training and skills in England (and to some extent Wales) including the provision of careers guidance. Learning and Skills Council - responsible for funding and planning education and training for over 16-year-olds in England. Established in April 2001 its work includes information, advice and guidance for adults and for young people in sixth form/Further Education colleges. LearnDirect - provider of free, comprehensive and impartial information about learning and a network of branded learning centres. Learning Partnerships - a network of 104 Learning	Scotland is to introduce an all age careers service. This involves bringing together several different companies under the banner of Careers Scotland LearnDirect Scotland supports the Scottish Executive's Lifelong Learning Strategy, the mission of it is to help individuals and small businesses across Scotland to realise their potential through learning, at a time, place, pace and style that suits their needs. Work closely with key partners, to enhance the skills and employability of individuals and the competitiveness of companies, by encouraging disadvantaged and disaffected people back into learning to improve their personal and work-related skills and by helping small businesses to access training and development opportunities for their staff.	Northern Ireland Careers Service - website for the new, all-age career guidance service in Northern Ireland launched at the end of May 2004. Department for Employment & Learning Northern Ireland (DELNI) - department within the Northern Ireland Executive with responsibility for education and learning - including the provision of careers guidance. LearnDirect (Northern Ireland) - provider of free, comprehensive and impartial information about learning and a network of branded learning centres.	Wales has amalgamated the various information and guidance schemes already in existence into one all age careers service called Careers Wales. There are currently six Careers Wales companies covering different regional areas.

Area	England	Scotland	Northern Ireland	Wales
	Partnerships in England set up to promote a new culture of provider collaboration across sectors (schools, FE, work-based learning and adult and community learning) and to rationalise the plethora of existing local partnership arrangements covering post-16 learning. They are non-statutory, voluntary groupings of local learning providers, including Connexions/Careers Services.			

10. Foundation Degrees

Foundation degrees were launched in England in 2001. They are a new higher education qualification – each foundation degree is developed by a Higher Education Institution in collaboration with one or more Further Education Institutions, employers and Sector Skills Councils.

Foundation degrees are designed to be flexible, and can be delivered in a variety of ways, to suit employer needs. They also provide a progression route to Honours degrees.

Foundation degrees integrate academic and work-based learning and have flexible teaching arrangements involving part-time or evening attendance at college, distance learning or learning via the internet. Foundations Degrees take 2 years full-time study to complete; part-time courses will take longer.

In 2001 the first Foundation Degrees attracted 4,000 students, by 2004/05 this increased to around 38,000, half of which were studied on a part time basis.

In the last year, 500 new Foundation Degree courses have been launched and all the time new institutions are needed to help design and deliver. At present there are 700 more Foundation Degree courses in planning, soon to add more choice to the 1300 already running.

Steps are being taken to meet the increased demand. HEFCE has allocated an additional 11,500 FTE Foundation Degree places for 2004/2005 and a further 14,000 for 2005/2006.

Table 10a: Foundation degrees applicable to the Cogent sector

Delivering Institution	Qualification Title	Qualification Type
Nottingham Trent University	Chemistry	FdSc Fdg
City of Sunderland College E Durham Community College Houghall College	Chemical and Pharmaceutical Sciences	FdSc Fdg
West Nottinghamshire College	Material & Polymer	FdTech
Burton College	Polymer Technology	FdTech
University of Teesside	Chemical Technologies	FdTech Fdg
Lakes College	** Nuclear Decommissioning Skills*	*FdSc*
Cornwall College	Applied Chemistry	FdSc

Of the seven Foundation Degree programmes on offer, six cover Chemicals/Chemistry in some form or another. The one remaining qualification covers Polymer Technology. * From Sept 2006 Lakes College, W Cumbria will be offering the Foundation Degree in Nuclear Decommissioning Skills.

These relatively recently developed qualifications have been well received in principle, although their uptake in many cases is still very small, both within industry, but increasingly by non work-based learners seeking a clear progression route from 14-19 qualifications into higher education and industry. However, in this respect they are perhaps not being used to the full extent by the intended target audience. It is worth noting that employers within the Cogent industries have often expressed their approval of and investment in HNC and HND qualifications as the best route from 14-

19 qualifications into work or higher education. In contrast, the Foundation Degree was designed for work-based learners seeking access to higher level qualifications, but who did not perhaps possess the credit recognised by achievement of traditional 14-19 qualifications.

11. Systems of assessing provision

Current provision of FE and HE is assessed in a number of ways at different levels and by varying means throughout the UK. Specific policies in each part of the UK are distinct and carried out by various agencies and inspectorates. These systems tend to focus on reviews of educational establishments at an institutional level, and rate the methods of delivery, content of courses and resources available, as well as the scope for action.

As the purpose of this Assessment of Current Provision is not to 'name and shame' individual establishments and due to the massive number of courses available relevant to careers within the Cogent footprint, a report on how each individual educational establishment of relevance to us has performed according to these 'rating' systems has not been produced. It is necessary however, to provide an insight into the systems that have been put into place to help ensure the quality and relevance of provision at the various educational levels. Therefore, below is a breakdown of some of the systems available throughout the UK and the contact details of these agencies and inspectorates should you wish to view relevant inspection reports or learn more about what they do.

11.1 Education inspectorates – England, Northern Ireland, Wales and Scotland

11.1.1 HM Inspectorate of Education (HMIE) - Scotland

The HM Inspectorate of Education (HMIE) is responsible for the inspection and review of systems in Primary and Secondary schools and Further Education provision in Scotland.

HMIE uses a four point scale to summarise judgement about the quality of learning processes. The descriptors are shown below:

Table 11.1.1a: HMIE grading system

Descriptor	Meaning
Very Good	Major strengths
Good	Strengths outweigh weaknesses
Fair	Some important weaknesses
Unsatisfactory	Major weaknesses

HMIE has a website that provides more information and specific inspection reports – www.hmie.gov.uk.

11.1.2 Adult Learning Inspectorate (ALI) - England

The Adult Learning Inspectorate (ALI) is the inspectorate for skills, workforce development and preparation for employment. The ALI was established under the provision of the Learning and Skills Act 2000 and is responsible for inspecting a wide range of government-funded learning, including:

- Work-based learning for all people aged over 16
- Provision of further education colleges for people aged 19 and over

- learndirect provision
- Adult and Community Learning
- Training funded by Jobcentre Plus.

A four point scale is used to summarise the judgements about quality of provision. The descriptors for the four grades are shown below:-

Table 11.1.2a: ALI grading system

Descriptor	Meaning
Grade 1	Outstanding
Grade 2	Good
Grade 3	Satisfactory
Grade 4	Inadequate

More information is available at www.ali.gov.uk.

11.1.3 Estyn - Wales

Estyn is the office of Her Majesty's Inspectorate for Education and Training in Wales. It is independent of, but funded by, the National Assembly for Wales under Section 104 of the Government of Wales Act 1998. Estyn is involved in a wide range of educational and training activity. Estyn is responsible for inspecting education and training at all levels, including FE, HE and Work Based Learning. For more information and inspection reports visit www.estyn.gov.uk.

Estyn use a five point scale to represent all inspection judgements as follows:

Table 11.1.3a: Estyn grading system

Descriptor	Meaning
Grade 1	Good with some outstanding features
Grade 2	Good features and no important shortcomings
Grade 3	Good features outweigh shortcomings
Grade 4	Important shortcomings outweigh good features
Grade 5	Many important shortcomings

11.1.4 Education and Training Inspectorate – Northern Ireland

The Education and Training Inspectorate (ETI) are responsible for the provision of inspection services in Northern Ireland. They evaluate and report on the quality of education and training in schools, colleges, other educational institutions and training organisations. For further information and reports visit http://www.delni.gov.uk/index/publications/eti-reports.htm.

11.1.5 Quality Assurance Agency (QAA)

The Quality Assurance Agency (QAA) for Higher Education is a UK-wide agency established in 1997, and covers a variety of areas. QAA work at a devolved level

with the respective government bodies, UK-wide and with international partners to ensure that higher education in the UK maintains the highest standards.

11.1.5.1 England and Northern Ireland – Institutional review

In England, universities and colleges of higher education are reviewed through an institutional audit. Further education colleges that provide higher education programmes are reviewed through an academic review at subject level.

Institutional audit aims to ensure that institutions are providing higher education, awards and qualifications of an acceptable quality and an appropriate academic standard; and exercising their legal powers to award degrees in a proper manner. From 2006 Institutional Audits will take place on a six-yearly cycle

11.1.5.2 Scotland – Enhancement-led institutional review (ELIR)

In Scotland**,** enhancement-led institutional review (ELIR) has been designed by QAA in collaboration and consultation with Universities Scotland and its member universities and colleges, the student bodies in Scotland and the Scottish Higher Education Funding Council. It is an integral element of the enhancement-led approach to managing quality and standards in Scottish higher education.

ELIR focuses on the deliberate steps taken by each university or college of higher education to continually improve the learning experience of students.

The process has four integrated elements:

- Annual discussion with each institution (to see how the outcomes of its reviews at subject level are contributing to its management of quality and maintenance of standards);
- Once in the four-year cycle, the submission of a Reflective Analysis by each institution
- Once in the cycle, a two part review visit;
- Annual feedback on the learning points from ELIR activity across the sector.

The published report focuses on the effectiveness of each institution's approach to enhancing learning experience and achievements. There is no summative judgement; but the report does include a judgement on the effectiveness of the institution's systems for maintaining quality and standards at an acceptable level. These judgements are comparable with other audit and review methods operating in the UK.

11.1.5.3 Wales – Institutional review

In Wales, institutional review aims to ensure that institutions are providing higher education, awards and qualifications of both an acceptable quality and appropriate academic standard; and exercising their legal powers to award degrees in a proper manner.

Institutional review applies to all higher education regardless of the source of funding, including higher education programmes provided by further education colleges.

For more information regarding QAA and specific inspection reports visit www.qaa.ac.uk.

11.1.6 Ofsted - England

Ofsted is an inspectorate for children and learners in England. They inspect and regulate areas of education including childcare, schools, colleges, children's services, teacher training and youth work. In the case of further education colleges, this responsibility is shared with the Adult Learning Inspectorate (ALI). Both Ofsted and ALI use the same four point scale (see ALI section above). For reports and further information visit www.ofsted.gov.uk

11.2 Student satisfaction

Gathering information from students having completed courses also provides a way of assessing the effectiveness of provision, these surveys are also used to help future students choose courses and institutions that best suit their requirements. More recently this type of information gathering has taken place throughout the UK to help shape future provision.

11.2.1 National Student Survey – England, Northern Ireland and Wales

The National Student Survey (NSS) is an opportunity for final year undergraduates to feedback on their academic experience. In 2005, students near the end of their studies in England, Wales and Northern Ireland were asked their views on the quality of the education they had received. 170,000 students responded, comprising over 60% of the survey sample. The results make comprehensive student views available to the public for the first time. The results are available for each subject taught by each institution and have been published in the Teaching Quality Information (TQI) website (www.tqi.ac.uk). The survey included full and part-time students studying for a wide range of undergraduate courses. Further information about how the survey was run can be found at www.thestudentsurvey.com.

11.2.2 On Track – Scotland

“On Track Class of 2004” is a five year longitudinal study carried out by Mori and Critical Thinking, focussing on graduates at further and higher education level. It was commissioned by the Scottish Funding Councils for Further and Higher Education (SFC). The study has been designed to track the progress of the ‘class of 2004’ and to explore the impact of students’ learning experiences on their futures.

Over the five year period it is hoped that the information gathered will help universities and colleges to assess and improve their provision and services to students as well as helping students to make decisions about their learning and career paths. Further information about the study and the initial findings are available at www.mori.com/ontrack.

12. Centres of Vocational Excellence (CoVEs)

Centres of Vocational Excellence catering directly for industries in the Cogent footprint are few in number. However, there are a number which offer more generic qualifications in the area of engineering or manufacturing technologies which have relevance.

The geographical spread of the sector-specific CoVEs reflects the major industry presence, such as the Polymer Centre in West Midlands, the Nuclear Technology CoVE in the North West, Offshore Technologies in the East and Chemical industry CoVE in North West. In general, there appear to be very few that relate directly, with only fifteen having a general relationship including engineering.

Overall the offering can be derived as:

Table 12a: CoVEs with a general relationship to Cogent

CoVE Type	Comment	Number	Region
General Manufacturing	May serve sector	4	East England, Yorkshire & Humberside West Midlands East Midlands
Engineering	May serve sector	7	South West East Midlands North West West Midlands North West West Midlands South West
Polymers	Specific	1	West Midlands
Nuclear	Specific	1	North West
Chemicals	Specific	1	North West

A full listing is shown at Appendix 14

13. Other Provision

13.1 Training Provision in England, Wales and Scotland

Commercial and private training providers have long been used by employers to deliver the specialist training necessary to ensure a competent workforce. Perhaps because of a perception that publicly funded provision only takes the learner so far along the route to specialist skills and knowledge. These providers are able to offer courses that can adapt and remain relevant to those working within the Cogent industries where technology is constantly changing. Employers can find the world of publicly funded training difficult to access and negotiate, when compared with the private and commercial training available.

Delivery methods for these courses are broad ranging, and can be on site, at a specifically developed training facility or at various other venues throughout the U.K. The majority of training providers offer courses with set content, but also offer the opportunity to tailor course content to suit the customer's specific requirements. The modes of learning available also vary greatly, each provider offers courses in a range studying methods, these include group learning, online learning, individual learning, part time (evening weekend or day-release options) or full time study and work based learning.

Duration of training varies from half a day up to three years depending on the style of delivery and type of provider. Some of the training offered can be used as standalone or modular courses that link together to form a broader provision – particularly the training available from providers associated with universities and colleges.

Those that have a particularly long standing and successful relationship with industry are the providers who lend themselves to flexibility with regards to content, delivery methods and location.

Appendix 15 and 16 provide an illustrative summary of the available informal training courses not leading to nationally recognised qualifications that are specifically tailored to the Cogent industries. The tables for England and Wales are broken down to show courses specific to each of the industries within the Cogent footprint. These tables are in no way a definitive list of training provision and nor does exclusion or inclusion in the tables represent any comment by Cogent on the quality of provision.

There is clearly an abundance of training available for industries within the Cogent sector. However, there is a distinct lack of impartial information regarding the quality and relevance of this training. Employers have reported that they tend to use only training providers who they already have an established relationship with, as finding quality provision outside of this can prove to be an arduous task.

14. Case studies

The case studies below provide examples of best practice within the Cogent footprint.

14.1 Petroleum industry: Case study of training

In the Highlands and Islands, petrol stations may act as the hub of the community, providing essential services alongside the sale of fuel. Due to the sparsely populated nature of the local areas, the forecourts do not have access to a huge number of support and maintenance personnel.

The machinery and equipment used on forecourts is reasonably complex, and requires a certain level of expertise. This expertise is not easily gained out with high density populations, due to the intermittent nature of need. In response to this, an innovative pilot programme was developed by a consortium including Cogent, SummitSkills, SELECT, Highlands and Islands Enterprise and Highlands Council. Financial assistance was provided via the Highlands Skills Fund and Highlands and Islands Enterprise. The associated training was delivered by a team from Forth Valley College.

The pilot involved the provision of local training (using a simulated petrol station rig) leading to industry standard Comp'ex qualifications. This qualification will allow locally based electrical firms to provide installation, repair and maintenance services to locally based petrol stations, leading to reduction in costs previously incurred by having to engage skills from out with the Highlands and Islands.

The reasoning behind such intervention was founded in the need to operate safely in a potentially hazardous environment – faulty electrical equipment has been the source of many incidents where sparks have ignited dangerous petrol vapours.

Such interventions are critical in Highlands and Islands, where the petrol stations (currently 124) provide multiple facilities for the local communities, ranging from post office services, to sale of foodstuffs (often the only shop in the area) as well as being essential to the leisure and hospitality sector. The HIE area covers a similar landmass to that of Belgium, but has a population of around 450,000. By inference, the petrol stations are geographically widespread and therefore require local support as well as transient customers to remain viable. Sourcing of maintenance support locally will help to secure the long term future of such facilities.

It is anticipated that such interventions would be equally relevant to other regions of the UK, where both populations and petrol stations are sparse, specifically Wales and the far south of England.

14.2 Section deleted

14.3 Centre for Assessment of Technical Competence – Humber (CATCH)

CATCH is a Humberside based training facility for the chemicals and allied industries, which is currently under construction and will be taking its first apprentices in September 2006. It is the result of an innovative £8m public-private partnership designed to address the skills needs within the region.

Concerns within the local chemical and allied supporting industries about developing skill gaps were confirmed by a survey in 2002 which showed that around 30% of the skilled people working in engineering crafts were due to retire in the next 5 to 10 years and only 18% were less than 30 years old. It was also recognised that there is an increasing need for companies to be able to prove the competence of existing employees to the Health and Safety Executive. Following the survey the proposal was developed, funding sought and the project launched.

The partners are North East Lincolnshire Council, Humber Chemical Focus, with the Humber Client Contractor Training Association (Impress) as operators, the funding bodies and local industry. Yorkshire Forward have provided £4m, the ERDF £1.7m, the local LSC £0.25m and private industry has donated equipment worth £2m as well as providing leadership to the project.

CATCH is a not itself a training provider, but aims to work with employers and existing training providers to produce a skilled and able workforce. The facility is situated on a 10 acre site in Stallingborough, and offers a unique opportunity for workforce development and competence assessment in an authentic plant environment. Once completed, the site will allow trainees to experience a large workshop, full scale process industry equipment, access control to operational area and industry standard safety rules and procedures.

At CATCH, people will be trained in an authentic environment – adding another dimension to their learning experience and better preparing them for their 'real world' tasks. Training will be delivered by professionals, from existing providers, with industrial experience.

CATCH Mission Statement

To make a real contribution to the competitiveness of the chemical and allied businesses in the Humber region by encouraging people to choose careers in the industry and by facilitating the provision of effective, industry-led training and competence assessment within an authentic plant environment.

Vision Statement

- CATCH will work in collaboration with industry and providers
- CATCH will develop innovative training and competence assessment solutions
- CATCH will promote the highest standards of safety behaviour
- CATCH will be nationally recognised as a best-in-class facility
- CATCH will be financially self-sustaining and reinvest in developing the facility.

As a result, CATCH will have a positive impact on the region and we will see sufficient high-calibre, local people attracted into the chemical and allied industries to meet recruitment needs. The local workforce will be recognised as highly competent and internationally competitive.

Those behind CATCH believe that a more highly-competent workforce with the right attitude will deliver real productivity gains for industry and that training, development and assessment in an authentic chemical plant environment will add another dimension, better equipping the local workforce to bring success to their companies.

They promise to develop the most effective solutions to training and assessment through close collaboration between industry, providers and the CATCH team, based on mutual respect, honesty and integrity. They are aware of the constant need for improvement and change and state that they will listen to all the people they work with and seek to learn from all that they do in order to continually improve their operations and to provide an excellent service.

14.4 Nuclear Technology Education Consortium (NTEC)

Introduction

A new concept in postgraduate-level training for the nuclear sector has been developed by a strong consortium of UK universities and HE institutions. The training is designed to meet the UK's projected nuclear skills requirements in decommissioning and clean-up, reactor technology and fuel cycles, environment and safety, policy and regulation, project management, fusion and medical use.

The consortium is the Nuclear Technology Education Consortium (NTEC) and comprises the Universities of Birmingham, Lancaster, Leeds, Liverpool, Manchester and Sheffield, City University, London, HMS Sultan, Imperial College London, UHI Millennium Institute & Westlakes Research Institute. Together these institutions represent more than 90% of the nuclear postgraduate teaching expertise residing in the UK's universities and research institutes. NTEC provides a one-stop shop for a range of postgraduate training in Nuclear Science & Technology in the UK.

The structure and content of the programme, which leads to qualifications up to Master's level in Nuclear Science & Technology, was established following extensive consultations with the UK nuclear sector, including industry, regulators, MoD, NDA, Government Departments and Cogent.

Funding

A Collaborative Training Account to provide masters level and CPD training in nuclear-energy related skills has been funded with £1 million from the Engineering and Physical Sciences Research Council (EPSRC) and £1.6 million from industry partners.

Key features

It has been designed specifically with the needs of the nuclear sector in mind

It offers a broad range of subjects, from reactor theory through decommissioning to waste disposal and storage, the subject matter being presented by leading specialists in their field

Each topic is presented in short course format which is ideal for employees within the industry

Great flexibility: the modular format allows students to undertake a MSc on a part-time basis over a period of 3 years as well as full-time in 1 year

Students may also undertake a Postgraduate Diploma or Postgraduate Certificate within the framework programme

It is ideal for employee development: each module may be taken as a standalone short course for CPD purposes

The core of each module is one week of direct teaching at the relevant institution, minimising the time away from the workplace for an employee whilst maximising its effectiveness.

Initially the modules will be delivered by direct teaching but will subsequently also be available in a distance learning format to provide greater choice for students. This is scheduled for 2007, when the syllabus will also be broadened to provide pathways in nuclear fusion and nuclear medical technologies.

Modules will generally be delivered on the campus of the providing institution. Students seeking a postgraduate qualification will register with the university of their choice and visit other members of the consortium to attend their selected modules.

Programme launch

The MSc in Nuclear Science & Technology was launched in September 2005 with 26 students registering for degrees. Ten students are undertaking the full-time programme with the remainder from industry studying on a part-time basis. A further 18 students are taking individual modules for CPD purposes.

New modules for 2006/07

The following additional modules are to be offered:-

- Chemical Engineering in Reactor Design & Waste Treatment
- Geotechnical Aspects of Radioactive Waste Disposal
- Particle & Colloid Engineering in the Nuclear Industry
- Practical Reactor Operation
- Public & Political Aspects of Nuclear Decommissioning

Further information available at www.ntec.ac.uk

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15. Information available to prospective employees

Cogent has developed a range of materials to inform pupils, students, educationalists, career advisors, guidance teachers, parents and the general public of the range of careers and opportunities available within the Cogent sector in order to create a potential future workforce with the skills, knowledge and attributes to secure the future competitiveness of the industry.

Cogent has one employee dedicated to the role of sector attraction and they have worked in partnership with employers and industry associations to develop this resource.

Resources currently available to prospective employees are listed below by industry.

15.1 Chemical industry

Careers web pages including:

- Industry Overview
- Frequently Asked Questions
- Useful Links

15.2 Nuclear industry

Fact Sheet – explains the structure of the industry, brief outline of some job roles and where to find other sources of industry information.

'Day in the life of a …' – individual's profiles, currently available:

- Instrument Mechanic
- Maintenance Optimisation Coordinator
- Fitter
- Dragon Project Decommissioning Planner

Careers web pages including:

- Industry Overview
- Frequently Asked Questions
- Useful Links

15.3 Section deleted

15.4 Petroleum industry

Fact Sheet – explains the structure of the industry, brief outline of some job roles and where to find other sources of industry information.

'Day in the life of a …' – individual's profiles, currently the following are available:

- Process Engineer
- Process Operator
- Tankfreight Driver
- Optimisation Technician

Careers web pages including:

- Industry Overview
- Day in the Life series
- Frequently Asked Questions
- Useful Links

15.5 Polymer industry

Fact Sheet – explains the structure of the industry and where to find other sources of industry information.

'Day in the life of a …' – individual's profiles, currently the following are available:

- Sign Maker
- Plastics Moulding Manager
- Apprentice
- Senior Production Certification Engineer

Careers web pages including:

- Industry Overview
- Day in the Life series
- Useful Links

15.6 Planned for 2006

Cogent, along with 7 other Sector Skills Councils and the 4 pathfinder SSCs are working on the SSC Information, Advice and Guidance (IAG) Project which links directly to the government review for reform for information, advice and guidance for adults and provides the Skills for Business Network (SfBn) with an excellent opportunity to position Sector Skills Councils (SSCs) to help fill skills shortages and provide sectoral IAG services that offer careers opportunities across their respective industries.

The project is based on piloting and evaluating the potential SSC contribution to a universal careers IAG service with 3 groups of SSCs at different stages of development of their IAG function through Sector Skills Agreements.

15.6.1 Outcomes of this project for Cogent are:-

Providing sectoral LMI accessible to practitioners through National Guidance Research Forum (NGRF) website.

Developing a programme in order to train and support careers professionals in how to use LMI to provide a better service to clients and devising a system for ensuring ongoing provision of updated LMI.

Linking in to the UfI's Guidance Trial project for extended IAG through its telephone helpline service.

Developing a sustainable plan for IAG provision through the mentoring agreement with Cogent's allocated pathfinder SSC.

Linking with the TUC, trades unions and the work of the Union Learning Representatives to share LMI and enhance the IAG offer.

Exploring and showcasing the extent of employer engagement in IAG services within the participating SSC sectors.

Contributing to the government's review of IAG services for adults.

15.7 Previous activities aimed at raising the Cogent sector profile

Schools Radio Quiz

Oil and Gas Schools Challenge – North East Scotland
High Energy Schools Challenge – East of England

Careers in Engineering Roadshow – East of England

Careers Showcase – Catalyst Science Centre – North West England

16. Input from the Employment, Skills & Training Survey

108 face to face interviews with employers and 10 online questionnaires were conducted, which included questions on skills needs and usage/perceived value of training provision. This activity was concerned with clarifying employers' views of the provision currently available to meet the skills needs of their workforces. The results of the questionnaire relevant to this Assessment of Current Provision are set out below. A copy of the question schedule used in the interviews has been included in this report within Appendix 18.

16.1 Training issues

16.1.1 Accessing training

Employers in Chemicals and Petroleum were the most likely to provide off the job training (supported by findings from NESS and SSDA Employer Surveys) with Polymers the least likely. By region employers in the South were least likely to provide off the job training (just over half) in contrast, nearly all employer asked in the North and Scotland had provided training. In the Midlands 82 per cent of employers had provided some off the job training. Training provision varies between those who provide it for all occupations and those who provide it for specific occupational groups. Within those who tend to provide training for specific occupational groups it varied across the range where the training was focussed. For some employers training was focussed upon technical occupations – apprentices, tool setters, production operators, manufacturing supervision and engineering; for other employers training was more focussed upon more senior occupations and office based staff.

16.1.2 Selection of off the job training

There are views among employers that off the job training delivers a higher quality of training, partly because it frees the employee from the distractions of their day to day job. Also it is recognised that some types of training need to be delivered off site:

"*I think it's the quality of training. If you send people off site then it's away from the working environment, and they get a better delivery of training. If it's on site they've got distractions, they've got issues within the company itself, so off site is a lot better. It's a bigger learning curve.*"

"*There are some external courses, for example, the influential-management course. They tend to be off site, because you want to have the managers outside of the work place so that they have a free mind and no interference.*"

"*Recently, management training for leadership motivation and team-working was performed off site as there were a number of role-play activities and scenario games to play in terms of team-working.*"

However issues were raised with the use of off the job training in that it causes disruption to work patterns and the higher level of cost (owing to provision not being available locally):

"*One of the biggest issues is the shift pattern that we run… it is often quite difficult to marry up the two because academics seem to do nine to five, but we work 24 hours.*"

"*Some people have personal commitments, sending them away to train becomes very difficult and can interfere with their private lives.*"

16.1.3 Selection of on the job training

Most employers provide some form of on the job training. There is a suggestion that on the job training conducted in the industries is well structured as opposed to the "sitting with Nelly" image of it. This type of training is a significant part of the training used for process operators and is conducted by in house and external trainers:

"*We do an awful lot of training on the job. We've got training officers, and then for the operators we've got operator trainers. We use online training, we develop our own procedures in-house, and we have mentors. The on the job training delivered by suppliers tends to be more technical based training.*"

"*Certainly where a new plant, equipment or systems… are brought in then, yes, indeed we will use it <on the job training> for the system or the product supplier to come in and explain the best applications.*"

"*There are two types of training. We do health and safety training… that involves interactive CD-ROMs, videos, and then walk-and-talk situations, and then on the job training specific for the job they're going to be doing is done by the team leaders on their shift, with an experienced operator that goes through skills-analysis sheets.*"

16.1.4 Management and leadership training

Employers report using a mixture of formal and informal training provision for management and leadership skills. A change in the mix of training is also noted by some. The business drivers for greater efficiency in terms of process, activities and budgets, as well as the transfer of management activities from HR to the line managers mean that professional standards in team leadership/management are being driven upwards.

"*I would say a large number of our team leaders, supervisors and managers are individuals who excelled at an operator or team-leader level, and because of their ability at one job were ultimately promoted to a role of management, and, as such, have received very good informal training. As a business… a key business driver, and the effectiveness of all operators, is around our ability to manage effectively our teams. It's all elements of management, be that people management, organisation skills, financial awareness, commercial budgeting for consumables and plant, all of those*"

"*I think a combination of both really. What we don't want to do, is go down one route and forget about some of the other things that we could, and some of the informal training. For example, just a fairly brief meeting, or even a chat in the corridor about things, that can help some people. We do more formal training as well, we use external training providers predominantly for this work. We've actually got people in this week doing some leadership development training with us.*"

"*It would be a combination; there will be some formal training required certainly on the areas of things like project management, the behavioural training stuff. We have had some formal inputs on things like that, especially at management level. Things like coaching and mentoring within the workplace, though it's a formal system within the environment, it's an informal thing rather than a formal qualification. I think that's certainly something that we've got increasingly into and we'll continue to increasingly*"

"*It's a perpetual process. They <<Managers & Leaders>> are all learning new skills all the time in terms of team-work, formal management training, involvement with health-and-safety issues, product issues, and we are stretching the organisation from in terms of its capability. You could say that's a learning-curve issue, but there's no doubt that every member of the management team is a more capable, more highly-trained, more experienced person now than they were 12 months ago. No doubt about that.*"

16.1.5 Technician training

Two streams of training are considered and discussed in relation to technician positions. Firstly there is the matter of recruitment of new technicians through apprenticeships and the second is the continuous development of the existing workforce to meet the changing job role requirements.

Formal external training is used for those who use apprenticeships as a recruitment route. While no comment has been made in the interviews over the quality or content of these programmes the feedback is that there simply are not enough apprentices coming through the system to meet industry requirements for a variety of reasons. Shortages of applicants are explained by employers as relating to attractiveness of the industry, attractiveness of apprenticeships programmes in general and also attributed to high rates of local employment meaning young people are in great demand. However applicants' having the skills required is also an issue for employers using the apprenticeship route

In terms of training of existing workforce, employer's responses are mixed as to whether they prefer informal or formal training for those in technician roles. There is also a mixed opinion over whether formal training is best delivered in-house or by external providers. As a result a full mix of training provision is invested in at this job level with choice also influenced by type of training need.

"*We try to do it through a variety of methods. We have in-house training, particularly on technical skills, or we may bring in external specialists. We also encourage people to attend college, or even university if they want to go on and take a degree that will further enhance their technical skills. We see this as a benefit to the individual and the company because we might then have a professional engineer of the future.*"

"*We use external providers as well as internal coaching, depending on what we're trying to develop. If it's plant based, obviously the people who are working here, who will generally write the training manuals and deliver the training themselves but for external stuff, like for first line management training, we'll get an external provider in.*"

There is a need for formal validation and outside training to add rigour to internal, informal training:

"*I think you need some formal training with some formal validation and assurance processes within it. I think we've found over many years that the kind of informal approach doesn't lead you to the kind of 100% consistency and compliance that is essential in this industry. So certainly some kind of formal, and whether it's offsite providers or onsite providers or in-house or out-house.*"

Of those that have a preference for internal systems:

"*We do our own in-house training here, using seminars and presentations for example. We haven't used any formal off-the-job training as yet, because we haven't found anything that we really think can help us.*"

"*We have established our internal training programme, and we are doing everything internally. There is only one particular reason for that, which is we're a company that believe that we can achieve things significantly better if it's under our control.*"

"*I think this is all about informal learning… using informal groups. It's very much about creating communities in which people share their knowledge and they see themselves and their practice as bio-technicians as the thing they need to really develop. I have not yet seen any external provision that creates that sort of focus.*"

16.1.6 Operator training

For job roles at operator level employers tend to favour in-house to external training however they were also keen to stress that this did not necessarily mean informal training.

"*A good percentage of it <training> is formal. However, currently we are spending a lot of time and money training a person properly through coaching, which is an informal method.*"

"*Training around new technologies and new skills is generally done in-house or by using machine manufacturers or suppliers of equipment to come in to do in-house training.*"

At this level there is also considerable interest linking into N/SVQs:

"*At an operator level, we've agreed on an NVQ-level-two programme with two options.*"

"*Certainly they are now all required to do an NVQ which was something they weren't before.*"

16.1.7 Training evaluation

There is a high level of employer activity in evaluating training. This may on occasion be informal but many employers have formal systems in place (may reflect that sample is biased by larger employers), including the use of post-training measurement.

"*Prior to anybody going on any training there is a pre-evaluation to establish what the individual wants to achieve, and then upon return that's re-visited.*"

"*A lot of the activities or departmental activities those supervisors manage are measured. Currently we measure things like down-time, up-time, and absenteeism; eventually we hope to see evidence of improved productivity.*"

"*I like to have independent evaluations wherever possible.*"

16.1.8 Assessment of training provision

The majority of employers appear to be generally content with the training provision that is on offer. Where it is not regarded as being adequate this is often because of the very specific nature of technical training that is required or the availability of training locally.

"*Regionally I think it <provision> could be better. I don't think providers are customer focussed enough.*"

"*…we do find that specific needs are usually quite difficult. Very often we do have to get bespoke work.*"

"*…not a lot of colleges cater for the polymer industry. It's generic. That's where I think it fails in its targets.*"

"*There seems to be sufficient provision for softer skills such as presentation skills, leadership skills and communication. At a local level, it is difficult to find provision to cover the technical skills that are specifically related to our equipment and our market.*"

16.1.9 Qualifications

Nearly all employers were able to identify qualifications that they valued and N/SVQs received particular mention as employers appreciate the competence related nature of the qualification tailored to industry needs and its application as a benchmark for standardisation across the workforce. VQs are valued by employers as an integral part of apprenticeship programmes and are also seen by employers as beneficial to both them and the employee:

"*NVQs are important to us. It's a benchmark. They represent what people do on a day to day basis. They are rewarding for both us as an employer and the employee. They see it as a challenge and something that they can be proud of as well.*"

"*Certainly the NVQ programme has had a value. The levels two and three are certainly of value.*"

"*I would say the NVQs are a vehicle of enhancing the employees knowledge, making them feel that the knowledge that they've got is valued. Obviously the recognised qualification at the end is something that is important, and also looks good from an employer and an employee perspective. Also when we have external audits, having NVQs against operative names always looks positive.*"

16.1.10 Skills problems

Half of employers (who answered the question) believed they would have skills problems in the immediate future. This seems to be less of an issue for employers in Scotland and in the South. Skills problems often relate to the perceived decline in the long term interest of young people to come into the manufacturing industry. Whilst they may not have current recruitment and skills shortages employers perceive that with current trends they may have in the future as the pool of technical skilled staff that they recruit from shrinks. The issues relating to provision of training impacting upon supply of a skilled technical workforce centre around finding training provision capable of meeting industry specific requirements and attracting funding for that training provision:

"*The largest issue I have currently is in finding a calibre of training provider for the NVQ level 2 programmes with appropriate funding support to enable us to deliver that throughout the entire company.*"

"*It has become evident over this last week with our new intake of apprentices, they're trained at a general level – electrical or mechanical engineering, they do not have specialised industry knowledge. Specialised provision has suddenly disappeared from the syllabus of local providers as there is not enough uptake. So they've just cancelled the courses. We've now have to consider sending our apprentices further a field to find a suitable course.*"

"*There is a need for an NVQ for Sign installation personnel.*"

Further issues with skills supply were raised by employers relating to the flow of graduates from Higher Education into the industries. These concerns relate specifically to the volume of available chemistry and chemical and process engineering graduates but there is also some question about the quality of graduates as well.

"*There are not currently a lot of people going to university to do engineering and process chemistry and it is therefore increasingly difficult to attract the best candidates. I think there is concern of the quality of our graduates and the number of our graduates, which is why I think we're also looking to develop staff we already have and support promoting our staff more than we ever used to.*"

"*I think in general there are fewer and fewer people going into engineering and chemical streams, to universities and through colleges. So there is a smaller pool to choose from now rather than when people came out of university and we could pick who we wanted.*"

"*The other difficulty we've had is in chemical engineering. Again this is a very competitive market and we find that there are not as many people going through the maths and sciences routes at universities, so the talent pool is smaller.*"

"*If you look broadly at the pharmaceutical industry, it is a real issue that chemistry is dying out and chemistry departments are closing. This is a huge issue.*"

16.1.11 Changing training requirements

Of those responding to this question forty per cent of employers believed they would be increasing the level of entry qualifications or requirements while over half said that they would not. There is little variation across the sector or regions in terms of response. A group of responses focussed upon the need to establish entry standards for basic skills while some employers were looking for more industry applicable skills/qualifications. In particular it is reported that there will be a decreasing demand for workforce at the lower levels (and therefore also training for this group) as operations move higher up the value chain. In turn this drives demand for higher skilled and trained entrants to the industries.

16.1.12 Training provision improvement

Employers are broadly seeking to improve the quality of training provision that is on offer to them, favouring quality assessment of trainers and improvement of information. It is possible that the introduction or revision of N/SVQs may have a role to play in this. A point around quality assessment of trainers is also raised and that it should not be assumed just because a trainer is providing the training that they are necessarily qualified to do this.

16.2 Industry specific training and qualifications

16.2.1 Sources of training and qualification information

There were a wide variety of sources of information cited by employers, of which Cogent is mentioned frequently. Cogent employer networks are cited as being valued by employers as a forum for exchanging information and understanding what training is available. Half of employers believed existing information sources to be adequate, 15 per cent partly so, 36 per cent believed this information to be inadequate. It is to be expected that the responses to this line of questioning will be biased as the sample of employers interviewed has been drawn from direct contacts and those provided by trade associations working with Cogent. If over one third of the employers Cogent is already engaged with find that information about sources of training and qualification information are inadequate it may be reasonable to assume that this proportion may be higher among those not engaged with the network and particularly among smaller employers. It was also found that employers in the polymer industry were most likely to be happy with the information made available to them while less than one third of chemicals employers found it to be adequate.

16.2.2 Quality assurance

The main reason for the perceived inadequacy in current training provision is a lack of quality assurance and there appears to be demand for an intermediary to provide this:

"*I think we're very much left to ourselves at this point in time. We would appreciate any support, to give us some guidance as to the best courses possible for different disciplines.*"

"*While it is possible to find out what is being offered, I have no means of establishing how good it is. So there's no quality assurance of training.*"

"*I think we value the relationship we've got with Cogent and the Learning and Skills Council.*"

"*We would value a web based service provided by the SSC and Learndirect.*"

16.3 Accessing external funding

16.3.1 Volume of employers accessing funding

Just over half of employers surveyed are currently in receipt of external funding to help pay for training and development. Of the remainder, 19 per cent have received funding in the past. LSCs and SSCs (or predecessor bodies) were the main source. Employers in the Midlands were the most likely to be accessing funding – this reflects the strong relationship in the region that has been carried from the Polymer NTO. Once again, this is among a sample of employers where a relationship with the SSC has been established – access may well be poorer among those companies not directly engaged in the network.