

THE PATH TO PRODUCTIVITY



The progress of Work-Based Learning
strategies in Higher Education
engineering programmes

January 2007

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strategies in Higher Education
engineering programmes**

Final report

January 2007

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The New Engineering Foundation (NEF) was established in 2004 as a grant awarding charity that supports the development of vocational education in science, engineering and technology through providing policy advice and advocacy, undertaking and commissioning research studies and impact analyses, and developing and delivering educational programmes and resources.

As well as the work on knowledge exchange detailed in this report, recent projects include the establishment of on-line master classes in science and engineering, and programmes designed to help Higher Education fulfil the economic potential of Work-Based Learning.

The NEF also provides financial support of up to £12,000 per time for further education lecturers to take up secondments with local engineering and technology companies and improve their current knowledge of industry best-practice and cutting-edge developments.



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We would also like to take this opportunity to thank the Gatsby Charitable Foundation and our Advisory Panel² members for their guidance, helpful contribution and continued enthusiasm.

1 The New Engineering Foundation (NEF) is an independent registered charity that supports the development of Vocational Education, Knowledge and Technology Transfer through:

- Offering professional development programmes and e-learning resources;
- Commissioning and undertaking educational research studies and impact analysis;
- Providing policy advice and advocacy.

The Foundation currently operates a national Fellowship Scheme that supports the secondment of engineering lecturers to industry.

2 NEF's activities are guided by a Panel of Experts representing many organisations including:

- Association of Colleges;
- BBC (Engineering Training);
- CBI;
- EEF;
- Foundation Degrees Forward;
- Gatsby Technical Education Projects;
- Higher Education Academy -Engineering Subject Centre;
- Institute of Directors;
- London Development Agency;
- North West Development Agency;
- OfSTED;
- Qualifications and Curriculum Authority;
- Royal Society of Chemistry;
- Continuing Education in Electronic Systems Integration - CEESI.



department for
education and skills



OUR DEFINITION OF LEARNING

Learning is a process of active engagement with experience. It is what people do when they want to make sense of the world. It may involve an increase in skills, knowledge or understanding, a deepening of values of the capacity to reflect. Effective learning will lead to change, development and a desire to learn more.

QUOTATIONS

HE must be willing to be more responsive to business needs and demand 'pull' as well as exercising both academic and commercial 'push'

– (CBI 2006)

Business is investing heavily ...but is being badly let down by a system that does not deliver on its claim to be demand-led

– (EEF 2006)

Employees...and employers...will only respond to the challenge of engaging with HE in WBL if they see the business benefits, if the learning is relevant...and if it is delivered in forms...that suit them

– (CIHE 2006)



EXECUTIVE SUMMARY



The Government's renewed emphasis on education, training and skills was highlighted by the Chancellor's pre-budget Report December 2006.³ This has followed the earlier report on the Government Review of Skills in the UK led by Lord Leitch.⁴

Whilst the Leitch Review recognises the relatively continuous economic growth in the UK with the highest employment rates in the G7, it identified the following key challenges:

- The skills base in the UK is fundamentally weak and it is considered to be a key factor in holding back productivity and growth;
- The UK's global competitors are advancing rapidly in their educational provision not just in volume but also in the quality of provision;
- Even if the UK meets its current skills target set by the Government, the UK skills will lag behind competitors in 2020.

The Report emphasised that the role of skills development is pivotal in the UK's ability to compete internationally. The Review also highlighted the need for rapid and radical change in the provision of learning and skills development.

³ Rt. Hon Gordon Brown MP, Chancellor of the Exchequer's pre-Budget Report - Investing in Britain's potential: Building our long-term future, 6 December 2006

⁴ The Leitch Review – A roadmap directing UK towards world leadership in Skills by 2020, 5 December 2006.

WORKING DEFINITION OF WBL

This Review has adopted the following working definition of Work-Based Learning:

*A Work Based Learning Programme is a process for recognising, creating and applying knowledge **through, for and at** work which forms part (credits) or all of a higher education qualification.*

The Review made a number of recommendations including:

- The need to strengthen the voice of the employer through better articulation of employer views on skills by creating a new **Commission for Employment and Skills** accountable to Government but with devolved administrations;
- An increased level of employer engagement and investment in skills by reforming the role of the Sector Skills Councils, and providing them with powers for approving vocational qualifications that are publicly funded;
- An expansion in the skills brokerage services;
- Improved higher level skills by seeking better employer commitment through Sector Skills Agreements, and encouraging stronger employer-university collaboration through changes in funding and the creation of a new integrated employment and skills system;
- Routing all adult vocational skills funding

through **Train-to-Gain** and individual **Learner Accounts** by 2010.

The Leitch Review also recommended that attainment targets for Level 4 and above qualifications should grow to 40% by 2020 – up by 29% from its current level.⁵ In addition, the Review gave specific emphasis on '**economically valuable skills**', to include the generic transferable skills that graduates gain through their degree programmes, both vocationally focused and otherwise, and which are clearly of value to employers.⁶

The Chancellor's pre-budget report welcomed the recommendations of the Leitch Review. The pre-budget report also identified the Government's reforms to raise productivity growth by pushing up the skills levels to support the development of a more flexible, responsive and productive workforce.

In addition, the Chancellor confirmed the introduction of the '**earn-to-learn**' programme to enable people to gain graduate qualifications while they are still in work.

Furthermore, the consideration of the Further Education and Training Bill to enable the Privy Council to grant powers to Further Education Colleges to award Foundation Degrees (which must contain a component of Work-Based Learning) is recognition of the need to strengthen

⁵ This means that the number of people studying level 4 (degree level qualification) per annum will grow from 250,000 currently to 530,000 by year 2020.

⁶ Science, Engineering and Technology have been identified by Government and the by Higher Education Funding Council for England as "Subjects of Strategic Importance".



vocational higher education base in the UK.⁷ Universities are being urged to support the recent specialised 14 to 19 diplomas, which aim to provide a valid pathway to higher education and the workplace. The diplomas will offer a blend of academic and practical learning that will enable young people to study issues and concepts in a real-life context. Students on these diplomas will be expected to engage in work based and related learning. The Specialised Diploma in Engineering is one of the first five that will be introduced in 2008.⁸

Therefore, it is not surprising to see the Government's increasing emphasis on flexible modes of delivery, including Work-Based Learning (WBL) as important mechanisms for achieving the realisation of the UK's higher skills agenda, and for delivering better productivity levels and economic growth.

This research project focused on assessing the level and type of WBL activities in engineering and technology departments in higher education institutions in England. Ultimately, the aim of this study is enhance the capability and capacity of engineering and technology departments to deliver innovative WBL solutions to support the national agenda stated above.

In doing so, the study has engaged a number of key stakeholders including representatives from:

- business and industry;
- employer associations;
- sector skills councils with engineering and technology remit;
- Government and funding and quality agencies;

- Professional bodies and councils.

The research study embraced a four-strand approach that included the following:

- A scoping exercise of engineering and technology departments in English higher education institutions. A questionnaire-based research instrument was used and was supplemented by additional questions where appropriate;
- A 360-degree evaluation of 12 universities where WBL was offered. The evaluation included the university staff, the student and the employer;
- A think-tank event with two focus groups with representatives from all the key constituents was held to discuss and validate the initial findings that were reported on in the Interim Report;⁹
- A selected number of case studies that demonstrates best practice of WBL, reflecting the three different types of WBL (*Learning at Work*; *Learning through Work*; *Learning for Work*).

⁷ The Further Education and Training Bill, which was introduced in the House of Lords on 20 November, takes forward many of the reforms announced in the March 2006 White Paper 'Further Education: Raising Skills, Improving Life's Chances'.

⁸ Five initial diplomas in information technology, engineering, construction and built environment, creative and media, and health and social care will be introduced in 2008, with five subjects the following year and the final four in 2010.

⁹ The think-tank meeting was held on 14 November 2006. A participants list is shown in Appendix F.

The key findings of this study include the following:

- There is a real lack of common understanding over the definition of Work-Based Learning by all stakeholders. The language barriers between employers and higher education providers were clearly demonstrated. In addition, there are issues surrounding the relationship between higher education learning and skills and competence;
- The existing Quality Assurance systems are considered to be inflexible to meet the special needs of workplace delivery of learning. The QAA (Quality Assurance Agency) guidelines are not clear or helpful in assessing WBL and therefore, it is slowing the move towards expanding WBL development and delivery;
- The higher education sector generally and engineering and technology in particular lack the capacity and the incentives to engage in riskier markets linked to employer needs, when traditional young entrants continue to represent a safer investment. However, there are serious issues that universities will be faced with about the expected decline in the number of students being recruited post 2010;
- Lack of a commonly accepted credit accumulation and transfer scheme that is recognisable across the engineering and technology departments in universities. Linked to this, is the issue of planning and funding for teaching that universities receive from the higher education funding council is not defined on the basis of learning credits;
- WBL is seen by the majority of university engineering departments as learning for work, where a placement learning contract is established against a competence assessment framework where (in most cases) the placement assessment is not taken into account in the final grade;
- Academically, WBL is not considered to be an activity of high esteem amongst the engineering and technology educational community. There are real issues concerning improving the value of learning gained in the workplace (e.g. comparing a degree gained through academic studies vs. a degree gained through workplace learning). In addition, the level of staff development in universities with respect to supporting, delivering and assessing WBL in engineering and technology is very limited.

The main recommendations from the study include the following:

- Improvement in the quality of employer engagement activities through:
 - Providing better support for placements;
 - Promoting joint curriculum development;
 - Supporting a more structured collaboration between sector skills councils, university engineering and technology departments and the other stakeholders such as the professional bodies, Engineering Subject Centre and Lifelong Learning networks. There is an opportunity for universities to embed higher education into the skills infrastructure, particularly at regional and

local level through such initiatives as Train-to-Gain and the provision of accreditation of companies' in-house training;

- Improving universities capacity to manage market intelligence on skills issues and undertaking regular evaluation of employer satisfaction with graduate skills and qualities in engineering and technology.
- Developing better quality assurance, credit accumulation and transfer recognition systems through:
 - Reviewing the Quality Assurance Agency Guidelines to support and promote flexible learning;
 - The latest announcements by the Burgess Group of the national guidelines for Learning Credits in England published in December 2006, presents a major opportunity for universities to embrace a credit based framework. This opportunity will need to be harnessed by the key engineering and technology stakeholders through the development of pilot projects;
 - Creation of a common framework or a qualification structure for the development and delivery of generic skills. The professional bodies in partnership with the QAA and Sector Skills Councils should consider taking the lead in such development;
 - Providing training for tutors that are involved in WBL assessment and support;
 - Offering short courses and workshops for industrialists on effective learner mentoring and assessment.
- Providing better information and support services for learners and employers through:
 - The creation of a one-stop-shop information portal with Engineering and Technology Focus. This is an opportunity for the Sector Skills Councils that have an engineering remit to work with Regional Development Agencies to focus on the needs of employers and learners regionally and locally;
 - The development of a generic 'Learning Contract' for learners in engineering and technology companies;
 - Making a better leverage of the Learndirect e-learning portal capability to particularly enhance the capability of engineering and technology departments to deliver the Learning *through* Work strand of WBL;
 - Providing better information and communication technology support to workplace learners;
 - Offering more flexible progression routes through the Lifelong Learning Networks;
 - Improving institutional and departmental links with graduate alumni to support continuing professional development (CPD);
 - Staging and delivering regional and national events to improve employer's understanding of higher education. A number of stakeholders could take the lead of this recommendation (e.g. EEF, SSCs, Higher Education Academy and Professional Bodies).

In addition, the report also identifies a number of other measures for improvement that are aimed at the various stakeholders.



THE CHALLENGE

By the end of this decade, China's economy might be larger than Germany's. Within a decade, it might overtake Japan to be the world's second largest economy. The EU and US will account for a steadily diminishing share of world output."

"The most successful economies will be those that are able to respond quickly to rapid technological and market changes, promote enterprise, productivity and innovation and thus move up the value chain.

– HM Treasury Report, 'Long term global challenges and opportunities in Europe', March 2005



1. INTRODUCTION



The need to increase participation in Higher Education (HE) has been identified as an urgent and important priority for meeting the demands of the economy, particularly in terms of the following contemporary issues:

- Globalisation;
- Technological innovation;
- Organisational change;
- Trends in working practices;
- Learning Patterns.

The pressures of global competition and the diversity of requirements being sought from higher education institutions (HEIs) means that the HE sector will need to be more innovative, flexible and responsive in meeting these demands. In particular, there will need to be a step change in the approach to the delivery and assessment of learning. Where once the pursuit of knowledge for its own sake was the *raison d'être* of the universities, they now have to face the pragmatic and expedient demands of employers and, increasingly, the government itself, to contextualise learning as a vocational rather than an academic exercise.

To meet the needs of the economy, the HE sector will have to continue to grow, but this growth cannot just be more of the same. Significant developments to meet this vocational imperative

are anticipated in many areas such as the inculcation of work related or work ready skills, increased opportunities for work experience, a greater variety in the pace and places for learning – including workplace learning, growth to address under-provision in some areas of the country, and the continued exploration and integration of new technology to support learning and teaching.¹⁰

How and where students learn is changing rapidly: nearly 55% of students starting undergraduate studies are 21 years old or over, and 45% study part-time.¹¹

This has in significant part been driven by the increase in employee training whether sponsored by the employer or driven by personal motivation. Employers increasingly demand the renewal of the knowledge and skills to deliver post-experience learning to their employees. These shifts in student profile and behaviour require HEIs to work more flexibly with employers, often working in partnership on content, modes and patterns of delivery, and the use of new technologies to reinforce the links between the workplace, learning and productivity.

Therefore, the clear distinctions between students and employees are diminishing as more people return to HE either through the workplace or on a part-time basis.

It should be made clear that the situation that HEIs find themselves in is complex, and there is no magic bullet which will transform the sector to one which delivers all its targets for Work-Based Learning and work ready graduates. There are many positive examples of proactive employer engagement, and of innovative delivery and assessment methods being produced.

These examples clearly demonstrate the extensive links between employers and HEIs across the country. This ranges from work placements that are integral components of some degree courses to contributions from employers to course and curriculum development. However, it is just not enough, and while employers must shoulder a good part of the responsibility the fact is that there is a pervasive lack of understanding and innovative activity around the area of Work-Based Learning. This research also shows that the engineering and technology sector has far less activity than any other comparable sectors such as business or health.

This research study focuses on examining the role of WBL in the higher education engineering programmes in England. It aims to identify the issues and challenges and will highlight areas of good practice, as well as recommending a number of actions that could improve the capability of HEIs to deliver high quality WBL programmes.

The project is co-sponsored by the Higher Education Academy - Engineering Subject Centre and the fDf (Foundation Degree Forward) and has attracted the support of many organisations such as EEF, Gatsby and government departments.

Work-Based Learning (WBL) is learning derived from undertaking paid or unpaid work. It includes learning *for* work (e.g. work placements), learning *at* work (e.g. company in-house training programmes) and learning *through* work (profes-

¹⁰ HEFCE Strategic Plan 2006-11.

¹¹ Higher Education Statistics Agency (HESA) 2003/4 student records.

sional development), linked to formally-accredited further or higher education programmes.¹²

There has been a steady trend in higher education aiming to inculcate WBL into a range of degrees, as it has been recognised that the value of graduates increases if they are well prepared for the transition to work. However, previous research has indicated that the scope and quality of Work-Based Learning varies widely.¹³

In addition, university academics have often reacted with caution and suspicion at the introduction of WBL into the curriculum. The development of Foundation Degrees (FDs) in 2000 – this is the two year HE qualifications designed to give people the intermediate technical and professional skills – which are explicitly intended to be employer and employment driven, has further accelerated the need for universities to take cognisance of WBL as a key element in the range of learning strategies that are adopted within higher education. This poses a challenge for university lecturers in the structuring of WBL into a taught degree programme, and in the assessment of WBL as part of the overall assessment of the degree.

The novel and innovative nature of WBL requires that non-traditional means have had to be found for assessing it, such as approaches that meet the (sometimes differing) needs of learners, employers and higher education institutions. The use of traditional assessment methods such as formal examinations is entirely inappropriate to the philosophy, educational objectives and adult target audience for WBL. It is assumed that work-based learners are self-directed, bringing personal experience and motivation to the learning situation. Assessment methods need, therefore, to be tailored to a student-centred, problem-based approach. Unfortunately, evidence suggests that there is

probably a greater lack of understanding of the significant issues in assessment than in any other area of higher education.¹⁴

Work-Based Learning in HE is a broad area that encompasses all manner of study associated with the workplace and employability. In the context of engineering and technology disciplines, WBL could be considered as a methodology that can be adapted to address undergraduate engineering and technology education at pre-university, university, postgraduate and continuing professional development stages of education.¹⁵ Typically, this definition would include WBL undertaken by full-time undergraduate students as part of their degree course in the form of sandwich placements and work experience modules.

During the course of this research study, there was a demonstrable lack of clarity surrounding the definition of WBL, which was reflected in participants' responses throughout the project.

This is a key barrier that will need to be addressed if good practice of WBL was to be promulgated and implemented across the engineering and technology disciplines in HE.

¹² HE Academy – 30 November 2001.

¹³ Boud D & Symes C. Learning for Real: Work Based Education in Universities (2000).

¹⁴ Boud D Assessment and Learning: Contradictory or Complementary? In: Knight, P. (ed.) Assessment for Learning in Higher Education (1995).

¹⁵ Burns, GR and Chisholm CU Factors relating to the incorporation of workplace learning, Global Congress on Engineering Education (1998).

APPROACH

In engineering and technology, WBL stresses an approach to education that is:

- Reflective
- Learner centred
- Applied (theory in practice)
- Mentor supported
- Collaborative
- Relevant to the continued personal and professional development of practicing engineers.

LINES OF ENQUIRY

Therefore, the research follows three main lines of enquiry:

1. To scope a representative sample of university engineering departments and identify the level and extent to which they employ WBL strategies in the teaching and learning process;
2. Using established criteria,¹⁶ to provide a general evaluation of the WBL activity, highlighting where significant shortcomings occur and also areas of good practice;
3. To identify the role of employers in the WBL strategies and provide some best practice examples of successful employer engagement.



2. BACKGROUND



This section will explore the justification for the growth in Work-Based Learning, and also to look at some of the research that has already been undertaken which has informed this research.

The concern over Britain's competitiveness in the global economy is certainly not new. The great debate over the role and function of our higher education system can be traced back to the Thatcher years and before, and the present government has produced two major White Papers on the skills agenda plus a range of other policy documents on this theme. Historically, however, the attention has been on basic and intermediate level skills.¹⁷

The formation of the Manpower Services Commission (MSC) in the 1980s, which has evolved into the Learning and Skills Council (LSC), and the slow and painful development of the National Qualifications Framework (NQF) have absorbed a huge amount of time money and energy, and the country now has a vocational qualifications system which is internationally held in the highest esteem.

However, the spotlight is now very much on the HE sector as well. There are two main reasons – firstly, the desire to increase the numbers of people with higher qualifications at all levels has

¹⁶ Gray D, A Briefing on Work-Based Learning for the Learning & Teaching Support Network, University of Surrey (2001).

¹⁷ 21st century Skills(2003) and Skills Strategy – getting on in business, getting on at work (2005)

led to a growth in a whole raft of new qualifications, which are essentially vocational in character, and require different approaches to their design and delivery.

Secondly, there has been an important shift in government thinking around the role of employers at all levels of education and training. The formation of the new Sector Skills Councils (SSCs) has enshrined this developmental role in setting the standards for workplace performance. In so doing, employers have increasingly exposed the ineffective preparation for work affecting a large proportion of the graduate population, and attention is now on the efficacy of current vocational, and some general, degrees in preparing graduates within their chosen field of endeavour.

Current thinking has now been crystallised around the Leitch report on skills development for the early part of this century.¹⁸ The Review made a number of recommendations including:

- The need to strengthen the voice of the employer through better articulation of employer views on skills by creating a new **Commission for Employment and Skills** accountable to Government but with devolved administrations;
- An increased level of employer engagement and investment in skills by reforming the role of the Sector Skills Councils, and providing them with powers for approving vocational qualifications that are publicly funded;
- An expansion in the skills brokerage services;

- Improved higher level skills by seeking better employer commitment through Sector Skills Agreements, and encouraging stronger employer-university collaboration through changes in funding and the creation of a new integrated employment and skills system;
- Routing all adult vocational skills funding through **Train-to-Gain** and individual **Learner Accounts** by 2010.

The Leitch Review also recommended that attainment target for Level 4 and above qualifications should grow to 40% by 2020 – up by 29% from its current level.¹⁹ In addition, the Review gave specific emphasis on '**economically valuable skills**', to include the generic transferable skills that graduates gain through their degree programmes, both vocationally focused and otherwise, and which are clearly of value to employers.²⁰

The Chancellor's pre-budget report welcomed the recommendations of the Leitch Review. The pre-budget report also identified the Government's reforms to raise productivity growth by pushing up the skills levels to support the development of a more flexible, responsive and productive workforce. In addition, the Chancellor confirmed the introduction

¹⁸ Skills 2020: a review by Lord Leitch

¹⁹ This means that the number of people studying level 4 (degree level qualification) per annum will grow from 250,000 currently to 530,000 by year 2020.

²⁰ Science, Engineering and Technology have been identified by Government and the by Higher Education Funding Council for England as "Subjects of Strategic Importance".



of the '**earn-to-learn**' programme to enable people to gain graduate qualifications while they are still in work.

In addition, the recently announced Department for Education and Skills initiative, Gateway to the Professions, aims to utilise WBL where appropriate as a means to achieving recognition for professional registration.²¹ Currently, EC (UK) is in the process of developing a pilot that will test such mechanisms. It is envisaged that the Gateway to the Professions initiative will address some of the skills gaps issues that stem from the failure of employers to develop their staff once they are in post.

The Government believes that with the changes in HE arena, the bulk of future graduates will be from industry and will not be the typical 19 year old school leavers that HEIs currently have. It will be the industrial graduate students who will form a greater part of the 50% graduate target that government are fixed on. Therefore the model of provision has to be changed.

The Government partly attributes the reason why the UK lags by 5% behind the OECD average on graduate employment to the deficit in WBL. There is a range of research, particularly from the USA to indicate that our HEIs are lagging behind in embracing some of the methodology employed by practitioners of WBL. Portwood and Naish as long ago as 1993 had evaluated some of the innovative work being undertaken in American universities.²² Higher education had re-evaluated WBL to respond to changing socioeconomic conditions, such as the needs to increase the workforce by educating disadvantaged groups and to upgrade skills of the existing workforce. The role of the U.S. Federal government and several U.S.

organisations in shaping WBL was examined and it was found that at Federal level strong inducements had been developed for employers and institutions alike.

The existence of customised WBL to meet the needs of both the company and the company's individual employees was noted, as well as the complexity in the many different types of providers of WBL. Components of good practice in WBL were specified, including direct employer involvement in curriculum design and the flexibility in delivering to large scale organisations at times and places to suit rather being institutionally based. There were some problems identified by employers including the calibre of graduates and funding concerns. However, the comparisons with what was happening in the UK at this time were not favourable.

The Government acknowledges the other potential benefits that WBL could offer in meeting its other agenda strands *vis-à-vis* the following.

- Increasing participation and widening access to HE, particularly through the development in Foundation Degrees, where WBL is an integral part of such programmes

²¹ DfES report on the Gateways to the Professions by Sir Alan Langlands, 2 November 2005.

²² Portwood D and Naish J 1993 Work Based Learning and Higher Education in the USA. Unpublished paper Middlesex University

- Extending the engagement of HEIs with employers and developing skills for employability. This is to meet the continuing demand from employers for a well-educated and skilled workforce.
- Reducing the HEI's reliance on funding from HEFCE. The government highlights that there is a staggering opportunity for HEIs to tap into UK market for continuing professional development (CPD), which is approximately £4 billion through a better focus on WBL.²³ The HE sector currently gets just 0.5% of this market worth around £140 million.
- Upgrading the existing level of skills in the economy. The Leitch final report has also highlighted the expected significant increase in demand for NVQ level 4 and above by 2020.²⁴
- Supporting lifelong learning through the development of a flexible provision including the implementation of a National Credit Framework that is recognised in Europe and internationally.^{25, 26, 27}

23 This is in terms of Business Focused Training (according to Bill Rammell, Minister for Higher Education, June 2006).

24 HM-Treasury Review of Skills by 2020 led by Lord Sandy Leitch (Final Report 5 December 2006, www.hm-treasury.gov.uk/leitch)

25 HEFCE 2005/41 Review of teaching funding method.

26 The Framework would ensure that achievements can be measured in smaller steps, and that learners can transfer their credits making it easier for them to access learning and to progress to at different HEIs and at different times. Universities UK, (September 2005).

27 The Bologna Declaration is a pledge by European countries to achieve greater compatibility and comparability between the HE systems.





2.1 The Pedagogical Dimension

The final part of the background research concerns the organisational and pedagogical issues associated with the delivery of WBL. Since this report is intended to focus on the political and logistical issues surrounding WBL, the pedagogical dimension will not be given detailed attention. However, there are certain aspects of curriculum design delivery and assessment which do have an important bearing on the evolution of WBL as a process within HEIs, and more significantly in terms of the resourcing of provision, which has a WBL focus.

- **The content of WBL programmes**

We have referred to the relatively slow pace of growth in WBL within engineering and technology departments, and the research has pointed to manifold resistance to the concept in the majority of HEIs. The objections centre around some key perceptions, not to say prejudices, around the problems of converting programmes to take proper account of WBL methods – to re-iterate we are talking here about learning through work, where the practice and achievement is measured and accredited within the core credit rating for the degree. These perceptions can be said to cluster around scepticism as to the academic rigour that can be achieved, a tacit support for the dichotomy between workplace and academic learning, and a reluctance to be drawn into the necessary engagement with industry and the business world.

- **The staffing of WBL programmes**

The underpinning view amongst many academics is that their role should not extend

beyond research and conventional forms of teaching and tutoring. Predictably, perhaps, it is the new universities and those who have had experience of non-advanced vocational programmes who have the best practice. For example, a small but growing number of engineering and technology departments in HEIs have highlighted the growing trend in demand for delivering and recognising 'portfolio based learning' (PBL) by employees and individuals who wish to pursue a higher education qualification or engage in a professional development programme. PBL is a process that allows learning to be centred on the individual's learning needs. It empowers the learner and encourages a self-directed learning.

- **Quality in WBL**

The regulator for HE provision is the Quality Assurance Agency (QAA). QAA defined the Code of Practice (the Code) for the assurance of academic quality and standards in HE. The Code provides sets of precepts, with accompanying guidance, on arrangements for placement learning. It outlines the following:

1. General principles of placement learning;
2. HEIs policies and procedures;
3. Placement providers (what is the HEIs responsibility in assuring themselves that employers know their responsibilities);
4. Student responsibilities and rights;
5. Student support and information;
6. Staff development of those who are involved in placement learning;
7. Dealing with complaints;
8. Monitoring and evaluation of placement learning opportunities.

Whilst the above precepts are useful as general guidelines they are limited in dealing with workplace learning including PBL. Firstly, the language used is not easily understood by employers, students, placement officers or in some cases even the academic tutors. The Code may benefit from expansion to embrace WBL. In addition, a number of SSCs have also expressed their desire to see better training in QA for WBL programmes.

- **Planning WBL activity**

Several researchers have commented on the benefits of the academic staff involvement in the Work-Based Learning process. A recent case study by staff from the HE Academy Centre for Materials Education²⁸ showed how staff intervention adds value in a number of ways. The aim of this project was to enable the student to:

- a. Develop his/her ability to analyse and to carry out metallurgical investigations;
- b. Apply theoretical knowledge into practical 'real life' situations;
- c. Extend and develop technical report writing skills;
- d. Develop skills to solve problems in service failures, production, process control or other investigational work;
- e. Support the metallurgical/technical reports with the appropriate metallurgical/materials knowledge and content at an appropriate academic level;

²⁸ Centre for Materials Education HE Academy 2006 A Work Based Learning Case study

-
- f. Assess and review his/her own performance and be positively involved in planning appropriate areas of further study or courses of action.

In this example, students were required to carry out an investigation of a metallic component to ascertain what material was used to manufacture the component and the processes employed in the manufacture. Students were then asked to comment on the materials and manufacturing processes employed. Here, the clear objective was that students should apply theoretical metallurgical knowledge on the structure, properties and processing of metals. Many of the students who undertook assignment were already contributing to product evaluations in the workplace.

The assignment provided an opportunity for them to develop their skills further in this area, and to demonstrate those skills to their employer. Student motivation was therefore high and employer support for the learning was not in doubt. The investigations that were carried out often threw up challenging subject issues. However, what proved most interesting was the comment that academic involvement brought a broader perspective to the investigation than would otherwise have been present in the workplace.

This study encapsulates many of the key benefits of the WBL approach in terms of the way the activity was designed and set up, the planning of the student's experience to ensure the congruence of areas of theory linked to relevant practice, and the notion of reflection by the student as an integral part of the assessment. It is also important to note that this approach added significant value in the development of more

generic skills around report writing, problem solving, team work skills etc. What this research omits however, are the specific references to how the assessment is undertaken and whether evaluation is incorporated into the overall credit score alongside the taught modules and the examinations and assignment tests. These are important matters not least because there has to be acceptance that these methods of testing are technically robust and durable, and can demonstrate a consistency in results over time and location.

- **Generic skills in WBL**

An important ingredient in the WBL model of delivery is skills development over and above knowledge acquisition. This combination is deemed to enhance the employability potential of graduates. The CVCP (now Universities UK) and the DfEE (now the DfES, Department for Education and Skills) identified the core/key skills, attributes and knowledge relating to employability as including:

- a. application of number;
- b. ICT;
- c. improving one's own performance;
- d. working with others;
- e. adaptability, flexibility, nous, creativity;
- f. knowledge of how organisations work

There are clear links, therefore, between work in HE relating to key transferable skills and work related to the skills for graduate employability. In any curriculum area subject, benchmarks provide general guidance for articulating the learning outcomes associated with an undergraduate programme of study within the subject. The great majority of subject benchmarks identify the variously termed general, key or transferable

skills, in addition to the subject-specific skills, which students at undergraduate level should develop.

Each subject benchmark will be underpinned by the defining principles or essence of a subject:

- Nature and extent of a subject;
- Attributes that a graduate in the subject might be expected to display and demonstrate in terms of the subject knowledge and

- understanding, subject skills and other skills;
- The criteria that would be used to determine whether a graduate satisfied the "threshold" standard for the award of an Honours Degree in the subject.

Generic skills, then, are increasingly seen as an important part of the HE curriculum agenda. However, defining the full range of generic and transferable skills that are useful (or essential)

Table 1

A framework for the development of key skills (Bennett, Dunne and Carre, 1999)

Management of self

- Manage time effectively
- Set objectives, priorities and standards
- Take responsibility for own learning
- Listen actively with purpose
- Use a range of academic skills
- Develop and adapt learning strategies
- Show intellectual flexibility
- Use learning in new or different situations
- Plan/work towards long-term goals
- Purposefully reflect on own learning
- Clarify with criticism constructively
- Cope with stress

Management of information

- Use appropriate sources of information
- Use appropriate technologies
- Use appropriate media
- Handle large amounts of information
- Use appropriate language and form
- Interpret a variety of information forms
- Present information competently
- Respond to different purposes/context and audiences
- Use information critically
- Use information in innovative and creative ways

Management of others

- Carry out agreed tasks
- Respect the views and values of others
- Work productively in a cooperative context
- Adapt to the needs of the group
- Defend/justify views and actions
- Take initiative and lead others
- Delegate and stand back
- Negotiate
- Offer constructive criticism
- Take the role of chairperson
- Learn in a collaborative context
- Assist/support others in learning

Management of task

- Identify key features
- Conceptualise ideas
- Set and maintain priorities
- Identify strategic options
- Plan/implement a course of action
- Organise sub-tasks
- Use and develop appropriate strategies
- Assess outcomes

for university students is an exhaustive process. It is almost as exhaustive as finding agreement in the terms which might best be used to describe the set.

Many questions still surround the concept of generic skills. They are described by a number of synonyms including personal, transferable, generic, common, work and employment related skills. Are they skills or are they competencies, capabilities or learning outcomes? The key skills that are reported as important outcomes of schooling tend to be broad and extensive. In university teaching, the skills set is often narrowed to focus on those that are not, or cannot, be taught as discrete components of coursework. At the same time, those skills sought by university education assume learners are numerate and literate as a consequence of the requirements of university entrance.

Bennett, Dunne and Carre (1999) offer an elegant model (Fig 1) to conceptualise generic skills in the higher education sector by suggesting a framework comprising four broad managerial skills.²⁹

These authors argue that the important key skills are fundamentally those associated with being able to manage self, others, information and task. They propose that such a model can be applied "to any discipline, to any course and to the workplace, and indeed, to any other context". (p77)

Bennett et al were referencing Australia, and, like the USA the embedding of employability skills into degree programmes is far more advanced than in the UK. There is a view within HEIs here, and who are committed to WBL, that a new taxonomy for skills should be agreed across the board and then be submitted to QAA.

In the meantime, the search for the best way to deliver and measure generic learning skills within the context of an academic degree goes on.

A problem-based learning model provides very powerful contexts for learning the course content, and this meets requirements for academic rigour. The activities encourage the learners to interact with the course content, to read and explore beyond the immediate setting and to reflect on what is being read. At the same time, the learning activity encourages and supports many other useful tasks. There is likely to be a high degree of incidental learning occurring in the form of key skills.

The learning setting helps and encourages learners to practice and develop key skills across the full range of managerial skills. Taking the generic skills model proposed by Bennett et al and applying the problem solving approach just described, the workplace environment is ideal for assessing projects, which contain hard and soft data, and which embrace a wide range of knowledge and skills on different levels.

Applying the four skills fields to a WBL project – the project can be assessed on this template:

- **Management of self**

The activities require students to complete a large and unstructured task within a set timeframe and within a number of constraints and limitations. The activities require learners to plan their steps, explore

²⁹ Bennett, N., Dunne, E. and Carre, C. (1999) Patterns of core and generic skill provision in higher education. *Higher Education*, 37(1), 71-93.

the domain and work towards a goal. In the process, they need to confront unexpected outcomes and hurdles, reflect and judge their progress and use a variety of learning strategies to develop their solution.

- **Management of others**

In the group setting, students are required to work with others and maintain a good working relationship throughout the semester. On a day-to-day basis, they need to be cooperative and adaptive to the group's needs, defend their own stance, negotiate and give and accept criticism.

- **Management of information**

In this regard the activities require students to apply the various technologies to seek information and to deal with the large amounts obtained. They need to interpret the information and deal with the multiple perspectives presented. They have to then create a succinct summary requiring reflection and critical thinking.

- **Management of task**

In terms of managing the task, these activities compel students to identify sub-tasks and to conceptualise what is being asked and how it can be dealt with. The activities require the learners to instigate and carry out the course of action and to reflect on the outcomes and directions.

This research identified a range of different approaches to the challenge of providing robust delivery and assessment methods for generic skills. Many providers are using a web based learning environment for students to access. The capacity of an on-line problem-based learning system to support the development of such a

large set of generic skills suggests many more contexts and applications for its use. While the initial rationale for its development and design was to promote learning in discipline areas, its capacity to promote learning in other key areas makes it more valuable again. This is an important topic for which there has not been enough time to investigate thoroughly, given the remit of the research.

- **The role of new technologies**

The role of online web learning has just been described in the model above and new technologies and their educational applications are now a consistent factor in the effective dissemination of WBL systems and operations. Radcliffe makes some interesting observations about the development of WBL in engineering. He argues that there is a strong technological and economic push for higher education providers to adopt online learning strategies.³⁰ This is driven, in part, by the requirement of industry for lifelong learning on a flexible, just-in-time basis. Simultaneously, there is a rising awareness amongst engineering faculty of the pedagogical issues that underpin good teaching and learning practice, stimulated by revised accreditation approaches and related reviews. These significant drivers of change are often experienced as discordant, if not competing issues.

It is clear from previous research into the relationship between WBL and the wider academic learning environment that there are

³⁰ Radcliffe D Technological and Pedagogical Convergence between Work-based and Campus-Based Learning Educational Technology & Society 5 (2) 2002

tensions between the pedagogical pull and technology push in conventional campus-based programs and opportunities and challenges offered by WBL. Most workplaces now have the technological infrastructure to support a variety of learning activities. Workplaces offer experiential opportunities that are far richer than those in traditional campus-based learning environments.

We have observed that societal changes, competing demands on students' time, and changing expectations of formal institutions all point to the need for more flexible approaches to how we support learners in higher education. As a result, Radcliffe argues, the most effective use of new learning technologies is held back by poor underlying pedagogical assumptions.

All the stakeholders involved in Work-Based Learning – academic staff, students and employer staff – operate from a set of pedagogical assumptions or a world view of the nature of learning. These are often deeply held and usually implicit. It requires considerable discussion and reflection to even begin to bring these to the surface. Unless or until this is done, communication is distorted about what is being done and why. Failure to devote time to discussion and reflects leads to poorly managed expectations and subsequent problems. Radcliffe highlights three main areas; firstly, the different understandings (often tacit) of learning, training, competency and capability held by university and industry staff need to be made explicit; secondly, an integrated and coherent approach to the design of learning programs and the assessment of outcomes in relation to professional development in the workplace is essential; and thirdly, the meta-learning process – learning about learning – must be managed by those

responsible for the development and operation of work-based and university learning programs.

It is also widely recognised that for WBL to work effectively, the current credit accumulation and recognition systems will need to change to recognise areas such as accreditation prior learning (APL) and CPD short course provision. A report on developing a National Credit Framework was recently published by the Burgess Group.³¹ The proposed framework is intended to be permissive rather than prescriptive and will be introduced by academic year 2008/09. Universities are expected to have credit-rated their main course provision by the start of 2009-10. Whilst all learning may be expressed in terms of credit values, not all credits can or will necessarily be accumulated towards a specific programme or award. Each HEI will determine what credit it will accept for the purpose of accumulation or transfer.

This report aims to raise the profile of the debate over WBL, particularly as it relates to engineering and technology by:

- Identifying drivers, issues and challenges through a range of case studies and qualitative interviews; and,
- Engaging a number of key players through think-tank / focus group activity.

³¹ The Universities UK Measuring and Recording Student Achievement Scoping Group headed up by Professor Robert Burgess proposed a National Framework for Higher Education Qualifications (FHEQ), 14 December 2006.

2.1 THE PROJECT AIMS

The research aims are to:

- Scope the range and methodologies applied in the use of Work-Based Learning by HE providers of engineering degrees;
- Identify appropriate criteria for judging the effectiveness of Work-Based Learning;
- Evaluate the overall effectiveness of Work-Based Learning strategies in engineering programmes; and
- Identify some examples of good practice.



3. THE CHALLENGES – MULTIPLE PERSPECTIVES



This research project has covered a 360-degree viewpoint of the key participants in WBL. It has highlighted a number benefits and issues as seen by the various stakeholders involved in providing, undertaking, supporting and funding WBL.

This section aims to identify these challenges from the various view points including:

- Higher education providers;
- Employers;
- Students / employees;
- Government and its agencies (e.g. HEFCE, QAA, RDAs);
- Professional Bodies.

3.1 Higher education providers

The primary driver for HEIs to engage in WBL is the financial benefit that can be achieved through such collaborative activity. WBL allows them to build long-term relationships with employers. However, other benefits include providing opportunity for:

- Staff development for engineering and technology lecturers, which is considered to be as part of their scholarly activity, particularly if the partner employer is a large company;
- Course validation, curriculum development, industrial speakers and visits to industry.

- Consultancy services (e.g. product and process development).
- Access to Government or EU funding (particularly in the case of SMEs) through such initiatives as the Knowledge Transfer Partnership (formally known as the Teaching Company Scheme).³²
- Ensuring highly employable students (which has a positive impact on institution positioning and recognition, as well as the potential for attracting research and consultancy contacts with employers).

“Our internal research suggests that WBL placement students produce one grade higher dissertation marks... WBL placement produces a better rounded individual.”

– *Steve Donohoe, Senior Lecturer, School of Engineering, University of Plymouth*

However, there are a number of issues that HEIs face including:

- **Lack of common understanding of what WBL is within HEIs**
This issue was particularly of concern amongst the engineering and technology academic lecturers that were sampled as part of this project. A number of HEIs that were interviewed have stuck to the conventional form of WBL – the one year sandwich placement or bolt on accreditation to achieve part recognition from a professional body. Additionally, a number of HEIs, particularly the more traditional ones, do not see WBL as part of their remit, and as such tend to avoid getting involved.

- **Remit and expectation**

There can frequently be a disconnect between the expectations of employers and academics as to what are the appropriate knowledge and skills sets that the graduate should have. Employers tend to focus more on what one might describe as ‘work-ready’ attributes which are encapsulated at sub degree level in the generic skills. Generic skills cover such areas as literacy, numeracy, IT, problem-solving, self presentation, working in teams. In a Work-Based Learning model these generic skills are easily assimilated into the overall body of learning that the individual student undertakes.

- **The status of WBL in HEIs**

WBL for undergraduate education is considered as a lower esteem activity by many engineering and technology academics. As such, WBL has often been carried out by specialist units (e.g. Placement Unit) where the posts are administrative and lower status. This results in limiting the opportunity for spreading and embedding good practice within the HEI, as the people who are in contact with the employers and the supervisors do not have the curriculum knowledge to create an environment for engagement and knowledge transfer. There is therefore a lost opportunity for potential further collaboration between the employer and the HEI.

³² The Knowledge Transfer Partnerships presents an excellent win-win example of business-universities engagement with clear benefits to the Associates. WBL forms an important part of supporting the educational development of the KTP Associates (<http://www.ktponline.org.uk>).



- **Speaking the employer language**

Having the right staff capacity with the communication ability to interpret what employers actually require is considered to be a key issue for HEIs to promote and engage in WBL activities. Academic staff tend to stay clear of the front end marketing of their programmes to employers and most show little understanding of how their practice needs to modify to build the sorts of positive customer relations that one would expect outside academia.

- **Quality Assurance**

HEI's quality assurance mechanisms (Validation, Accreditation, Assessment) of WBL are generally not well developed, and particularly in engineering and technology. Accrediting and assessing WBL programmes employ similar processes to those established for APEL (Accreditation of Prior Experiential Learning).³³ They both require the '**identification of learning outcomes**' resulting from work experience. They also require recognition in the form of a '*level*' and '*volume of credit*' and they need to be located within a credit and qualification framework.

Understanding and using the building blocks of a credit based modular framework is therefore essential, and an area that academic staff in HEIs are relatively weak in. Equally, teaching staff who are involved in this kind of delivery must have current knowledge of the workplace that the students will be located in. They will need to be able to articulate issues around the embedding of theory into practice, to stimulate and encourage innovative approaches to the projects that must be undertaken, and have the ability to lead the assessment

process and support the workplace supervisor. In all these areas there are serious gaps in staff experience and competence to fulfil these positions, and raise real questions about staff development and the problems that may be encountered in delivering to the WBL agenda.

- **Financial considerations**

Funding parts of a qualification is not considered to be attractive by many heads of HEIs. This issue is further exacerbated in such disciplines that are resource intensive as engineering and technology. This impact of issue might be reduced when the National Credit Framework is implemented and the HEFCE funding is designed to support it.

- **Managing the diversity of student experience**

A key question that course tutors always ask is the issue pertaining to the control over the experience of students who use their full-time employment to meet the learning outcomes for a module. This often requires the assessment to be very carefully planned and designed, so as to be as broadly based as possible.

- **Managing Student numbers on WBL**

Managing over or under demand presents a planning issue to many HEIs, particularly those who are involved in delivering FD programmes.

³³ Qualification and Awards Authority (QAA) Guidelines on APEL (2005).

- **Placing excessive dependency on one employer**

There are a number of FD programmes that depend primarily on one major employer in the region. Mitigating the risk of depending for their student recruitment on one employer in the region is one of the issues that senior academics are concerned about.

“It is essential to ensure a broad base of committed employers, sufficient to meet needs of students.”

– John M Sinclair, Associate Dean, School of Applied Sciences, The University of Northampton

- **Collaborative Arrangements**

A number of commendable collaborative partnerships have been forged to address skills needs particularly at a regional level (e.g. the Advanced Engineering Project in the South West involves all the Aerospace companies and the universities in that region; the Engineering Training Partnership in Northamptonshire links the university with a range of employers). However, it is often very limited funding or not enough incentives for each partner that makes such partnerships difficult to maintain.

3.2 Employers

There are a number of drivers that motivate employers to pursue educational and professional development through an HEI. These amongst others include:

- The opportunity for upgrading their own employees' skills, particularly in specialist engineering areas (e.g. mathematical modelling and predication techniques in sonar and under water acoustics);
- The opportunity to have access to prospective new employees (particularly in highly competitive labour market areas);
- The opportunity to explore projects or undertake project work at reduced costs using highly skilled students and to have access to specialist academic opinions;
- Access to specialised kit or equipment and to train their employees on how to use such systems;
- Many very large employers offer student sponsorships and they see such an engagement with HEIs is part of their civic duty, and they use their engagement as a means to influence the quality of the supply of talent from their partner HEIs.

However, many employers did not know what WBL really meant. Such understanding of WBL was also variable from one business sector to another and from one company to another. The majority of large companies tended to understand the conventional forms of placements. The size of the company is also a major determinant in the level of understanding of what training is available and



how it might be delivered or benefit the company, and how easily or willingly the employer will engage in what might be a long term commitment to training a key member of staff.

Employers are keen to consider learning and training programmes that do not require their employees to attend a full-time course at the HEI. However, a number of employers have expressed the following issues:

- **Time to Delivery**

The response time it takes to package and validate a programme of study for an organisation is generally very long and does not fall into the priority category of academics and their institutions (turn-around should be in weeks and not 18 months- one HR Director said).

- **Interpretation of the “Academic” Language**

Many employers feel “baffled” by the language used by academics when considering the development of a new learning programme. This issue is mainly associated with aspects of HEI’s quality assurance procedures.

- **QA and Approval Procedures**

Many employers feel that HEI’s tend to over emphasise quality assurance aspects and sometimes at the cost of innovation in developing and delivering a WBL based solution. The lack of clearly defined framework or set of guidelines for employer engagement with respect to WBL is also considered to be a key issue.

- **Costs**

Many employers considered the HEIs charges are unrealistic. For example, a university charged £800 per day to develop a WBL assessment. An academic from the HEI concerned confirmed this rate.

- **Recognition of Experiential Learning**

Employers (large ones or self-employed individuals) are becoming more aware of the opportunities offered by HEIs through such mechanisms as APEL and awarding credits towards the experiential elements of their work.

- **Mentoring and Continuous Support**

A number of employers have highlighted that the support that the student receives whilst on placement is very limited and highly variable. Employers expect HEIs to provide tangible mentoring and support to their learners and not just rely on the student’s self-directed study.

- **Placement Duration**

Many employers are not interested in placements that are less than 6 months. According to one employer in Huddersfield, they said:

“Once the student spends 4 to 5 months with us in the company, the student starts to become more effective. Placements have to be for a minimum of 1 year. 6 month placements require too higher investment in training and the independence level of the student is not as great, therefore the benefits to the company not as great.”

– Cath Hardake, Manager, DePuy (A Division of Johnson and Johnson)

- **Flexibility to 'Pick and Mix' Modules of Learning**

Employers are not keen to attend full or lengthy programmes and favour arrangements where small chunks of learning can be provided more flexibly and easily. Currently, this approach is considered to be very limited.

- **Learning Contracts**

There is a genuine ambiguity around who the Learning Contract is aimed at, and what are the expected responsibilities (other than health and safety and risk issues) for the parties involved. Many companies stated that they would favour a generically accepted learning contract for the engineering and technology sector.

3.3 Students / Employees

Almost without exception, all the students that were interviewed during the course of this research have highlighted the immense benefits that they have gained from engaging in industrial placements. However, students who were primarily employees and were trying to upgrade their skills, felt that the pressures of work-study-home and financial commitments have affected them, but at the same time, they also recognise the sense of achievement and career opportunities that were presented as a result of following a WBL programme.

"Placement greatly enhances a student's motivation, understanding of the context of engineering, maturity and transferable skills."

– David Pearce, Senior Lecturer, University of Hertfordshire.

"The best, and most worthwhile exercise for both students and companies. WBL combines academic and business needs well and shows the students 'real case' circumstances."

– Peter Hopkins, Parker Sterling.

The vast majority of students said that the WBL activity has improved their generic and personal transferable skills (e.g. multi-tasking, working under pressure, communication and time keeping). WBL also offered the opportunity to earn income whilst studying.

Most of the employees who are students have highlighted the prospects for improved career opportunities as a result of continuous learning



and/or being enrolled on a WBL programme. However, there are a number of issues that the students have also highlighted. These amongst others include:

- **Learning whilst earning**
The lack of modularisation meant that most courses tend to be structured, fixed and have specific delivery points, whilst work demands are more varied and sometimes less predictable. Employer are unwilling to commit employee students to long term and fixed courses.
- **Life / work balance**
Lack of flexible delivery that often result in inappropriate time allocations leading to possible life/work imbalances and prioritisation difficulties (also the level and emphasis of prioritisation changes depending on the case if the student is on an industrial placement or if the student is an employee who is pursuing his/her studies).
- **Student Employees**
Students who are employees have highlighted that failure of employers to recognise training and professional development with career progression.
- **Access to resources**
Lack of access to learning resources for the employee-students, particularly in certain regions or from a specific type or size company.
- **Lack of qualified supervision**
Generally, most students felt that their academic tutors and industrial mentors have not provided adequate technical, educational and pastoral support when needed.

In a number of situations, students have felt that the feedback received by supervisors (HEI tutor and Industry mentor) was very limited and reactive, and it was perceived to be more of a process of 'ticking boxes'.

- **Lack of grants and financial support for individuals to undertake WBL**
Employees, particularly of small and micro businesses are unaware of any forms of financial support for training.

3.4 Government, Funding & Quality Agencies

The Government wants to pressurise HEIs to offer a more utilitarian provision that meets the practical, immediate needs of business and industry. It has identified a number of initiatives that aim to create a demand-led approach to skills development. For example the Regional Skills Partnerships (RSPs) is considered to be as a major component of the national Skills Strategy. The aim of RSPs is to give regions the flexibility to tackle their own individual challenges and priorities.

In addition, the Government would like to see HEIs working closer with the FE sector, particularly around the government's newly introduced Train-to-Gain initiative. A small number of initial pathfinders have been developed to include HE provision.

Furthermore, agencies such as HEFCE and the Higher Education Academy and its subject centres are continuing to support:

- The implementation of a national credit framework
- The strengthening of the lifelong learning networks
- The development of employer-led provision.

The development and expansion of Foundation Degrees is an example of such agencies support to WBL programmes. In addition, HEFCE has invested £315 million in Centres for Excellence in Teaching and Learning (CETL) to recognise and

reward specific areas of innovation and excellence, of which WBL is featured highly (although limited in engineering and technology).

According to the Government, the Sector Skills Councils (SSCs) are considered to have a central role to play in WBL.

There are ten who have engineering and technology remits. They are implementing their skills agreements, which aim to increase the participation of employers in the development and delivery of WBL programmes. Although the emphasis of the SSCs has so far been on Modern Apprenticeships and NVQ level 3, a number have been active in promoting the development of Foundation Degrees. For example, in the IT sector – e-Skills has worked with Microsoft to produce the '*IT for Business*' degree.

At regional level, RDAs are also taking an active role in the development of skills strategies and delivery plans through the RSPs to meet their respective workforce and economic needs.

"WBL is imperative in the drive to up-skill the workforce of the UK. There is a broad acceptance that the relationship between HE, work and the professional bodies needs to be improved"

– Prof Freda Tallantyre, HE Academy,
Former Deputy Vice Chancellor of Derby University.



3.5 Professional Bodies

The professional institutions and EC^(UK) view the increased interest in WBL as a positive development. They consider the need for alternative models that deliver higher education alongside the conventional full-time undergraduate programmes as timely, and reflect the various economic, political and societal changes. For example, EC^(UK) is currently engaged in the DfES Gateways to the Professions project. The project aims to develop a model for professionally accredited programmes, including WBL components which might also integrate elements of professional development.

It is also worth pointing out that the professional bodies operate in an international environment. EC^(UK) is a signatory to international agreements such as the Washington and Sydney Accords, and these involve mutual verification by signatories of accreditation practice and observation of the standards of academic programmes in different countries.

“We have been playing a major part in a European project to develop a framework for accreditation of engineering degrees within different European countries, with a system of mutual recognition on much the same lines as operates in the Washington Accord.

This is taking place against the background of developments in the Bologna process, and an increasing tendency to scrutinise and compare degree programme structures within different countries, not always in the most constructive manner. What all this means is that we do

have to have regards as to how UK engineering degrees are regarded in other countries, where practice and customs may differ significantly”

– Richard Shearman, Deputy Director, EC^(UK)

The requirement for registration as a professional engineer or technician is open to all who can demonstrate the competences and commitment specified in UK-SPEC.³⁴ Whilst knowledge and understanding are vital components of competence, UK-SPEC makes it clear that these can be acquired and demonstrated in a variety of ways, including through WBL, providing that there is adequate assessment evidence.

For individuals, therefore, the fact that knowledge and understanding may have been acquired through WBL is no bar to registration. UK-SPEC makes it clear that the key criterion for accreditation is that the programme delivers the required learning outcomes; how it does so is a matter for the HEI concerned.

The report on Integrating WBL into HE report provides a guide for tutors on how to successfully integrate WBL into their programmes.³⁵

The position of professional institutions on recognising and accrediting the “WBL component” as part of the professional qualifications at different levels and stages, is briefly outlined below.

³⁴ UK-SPEC Standard for professional engineering, www.uk-spec.org.uk

³⁵ Brennan L, Integrating Work-Based Learning into HE – A Guide to Good Practice, 2006

a) As part of a conventional sandwich undergraduate courses:

Sandwich courses which treat the work-based component as a 'placement' without negotiating, assessing and accrediting learning outcomes relating to professional and transferable skills are considered to be anachronistic by many professional institutions. However, one of the licensed professional institutions has accredited a 4-year MEng programme, of which one entire academic year was spent on industrial placement. This was achieved as the HEI concerned has demonstrated that it has worked with the employer to put in place arrangements to ensure the necessary learning outcomes were delivered during this year in industry.

b) As part of a Foundation Degree course:

Foundation Degrees are not themselves a full exemplifying qualification for registration as Incorporated Engineer. Hitherto, when professional institutions have accredited FDs, they have generally been as part of a suite of qualifications including Bachelor degrees to which FD graduates will progress. Once again, the key criteria is the learning outcomes delivered, and it is assumed that FDs will deliver some part of the learning outcomes specified within UK-SPEC for IEng degrees; although it is recognised that the balance between these different outcomes will vary considerably across the range of FD programmes.

'Authentic Work-Based Learning' is mandated to be at least 20% of a Foundation Degree. However, professional institutions believe that unless the WBL elements are accredited, they are unable to see how

these elements could be considered credible and useful.

The imperative when designing Foundation Degrees is to get employers involved in the design, delivery and assessment. This is fine in principle, and is certainly consonant with the notion of 'employer-led' provision.

However, in practice academic QA systems are not predicated on the assumption that external organisations / employers are going to be involved in the assessment of qualifications validated by the higher education institution.

"Academics are also generally wary of giving too much of a role to employers in the area of assessment because of the perceived conflict of interests and potential lack of objectivity. Of course, there are ways round this problem if you think creatively e.g. minimising the input of the employer or putting extra verification processes in place. The first option keeps control of assessment process firmly within the academic arena, whilst the second option gives the employer more of a say but adds to the administrative costs of the programme."

– Michelle Richmond, Director of Qualifications, IET

c) As part of a "Portfolio-based" award that is mainly conducted through WBL:

The portfolio-based approach is considered to be a more interesting and attractive option to many professional institutions. They consider it as a potential means to broadening membership to the profession



(e.g. the Technical Report Route for those candidates without formal educational qualifications but with significant experience).

“There is no doubt that Work-Based Learning is gaining credence... Much of the work-based-learning is likely to contribute to a candidate’s Initial Professional Development (IPD) rather than their educational base.”

– *Deborah Seddon, Senior Manager, Education and Learning, ICE*

However, professional bodies also recognise the issues around:

- Acquisition of relevant knowledge and demonstration of learning outcomes – it is difficult to guarantee that all graduates will meet the required learning outcomes with portfolio-based learning programmes.
- Quality assurance arrangements – the nature of the assessment evidence and who might provide it, are considered to be difficult issues.
- Securing employer engagement – professional bodies believe that employers are not doing enough to support their employees who are registered or those who may consider registering on WBL programme.

d) e-Learning and e-Mentoring:

Whilst professional institutions acknowledge some of the excellent work in the e-learning domain, especially the Learn Direct and the expected Open University’s e-Portfolio virtual learning environment (VLE), they consider that the picture of e-support through e-mentoring and e-coaching to be patchy.³⁶ They suggest that a lot more work

is needed to persuade (and equip) employers to become more involved in supporting their WBL registered employees through a designated WBL mentor or coach.

However, e-learning and e-support should be considered as part of a ‘blended-learning’ approach and should not be relied upon as the sole means of delivery when students are based in industry,

“There needs to be a greater recognition of the various learning channels that are being effectively used by business and their potential contribution to the mix or ‘blend’ in finding an effective learning solution, be it e-learning, work-based assignments, reflective practice, monitoring etc.”

– *CIHE 2006*³⁷

³⁶ The Learn Direct ‘Learning through work’ portal at www.learn-direct-ltw.co.uk (currently, 8 HEIs use this portal, but only two use it for engineering and technology).

³⁷ Work Based Learning – A Consultation, CIHE 2006

3.6 Engineering Professors Council (EPC)

The following views were coordinated by Professor Fred J Maillardet, the EPC's Immediate Past President, on behalf of committee members:

- The value of industrial experience remains widely accepted, and few would argue against improving the structuring and enhancing the learning opportunities available within student placements of all kinds.
- As the pressure for programmes to become longer grows (*vis-à-vis* Bologna) and the cost to students increases (Tuition Fees) the case for focusing more attention on improving and assessing student WBL grows.
- However, given the emphasis on research in universities in recent years, the recruitment of teaching staff with significant industrial experience is becoming difficult, particularly in areas such as design. This has created some difficulty in terms of developing the most appropriate programmes, including assessment methods.
- The French Grand Ecoles system appears to have accepted the need for the formal assessment of industrial placements despite their unashamedly 'elitist' approach to selection and progression.
- Given the rich and growing mix of teaching and learning approaches being used across the university sector, it would appear inappropriate to try to impose a 'Generic Framework' or 'Sector Specific Guidelines'. However, this does not preclude more attention being focused on the structuring and assessment of placements.
- The current quality assurance arrangements would appear appropriate and sufficient to enable the future growth and development of WBL in engineering. There is no need for more regulation within Higher Education.

4. RESEARCH METHODOLOGY



Research methodology

The research methodology can be divided into four areas:

1. Desk research;
2. The selection of the sample frame;
3. The selection of the interview instrument and format;
4. Contextual analysis.

Literature review

The literature review has covered the following topics:

- Historical origins – the roots in NVQs, apprenticeship, OU etc;
- The academic references dealing with WBL methodological issues;
- The ways of evaluating what is going on in WBL – particularly, in respect of delivery and assessment;
- Key government and agencies' reports;
- International references.

Sample frame

The selection of the sample frame has consisted of:

- In-depth interviews with experts in the field of WBL outside the field of engineering;

- A basic questionnaire to over 40 engineering departments in English HEIs;³⁸
- Using a sample of 12 HEIs, a 360° evaluation was conducted. This involved:
 - Telephone interviews;
 - Visits to HEIs and employers to conduct an evaluation using a set of structured questionnaires, targeting the following constituents:
 - Dean / head of departments;
 - Course tutors / co-ordinators with WBL responsibility;
 - Employers, industrial supervisors; and
 - Final year students (and recent Graduates).^{39, 40}

In addition, the views of a number of stakeholders including those attending the Think-Tank / Focus Group from:⁴¹

- Government Departments;
- Sector Skills Councils;
- Professional Institutions and bodies;
- Regional Development Agencies;
- Funding Council and Quality Assurance Agency; and,
- Over 50 businesses of different sizes and representing different engineering market segments.⁴²

The research sample has also taken account of the following parameters:

1. The categories of degree which universities are delivering where each has a different

relationship with WBL:

- The academic or vocationally oriented degree in traditional universities;
- The vocational degree in new universities;
- The foundation degree.⁴³

2. The different areas of engineering specialism – the sample has taken account of a spread of these disciplines. It also looked at a small sample of WBL in an allied science area.
3. The focus on WBL practice in the context of full time undergraduate and postgraduate programmes as distinct from the broad raft of professional development (short course) provision that may be offered to employers.
4. The regional variations, particularly in terms of the industrial and economic characteristics of the catchments' area, which might influence both the ease of building employer relations, and the nature of the degree offered.
5. In examining the sample frame, attention was also given to the philosophy under-

38 A list of HEIs that were contacted can be found in Appendix A.

39 Sample of questionnaires used can be found in Appendix H.

40 The research will also pay attention to the perceptions and experience of employers in their interaction with universities. Therefore, a separate questionnaire will be developed and a forum of employers convened to provide collective feedback.

41 The list of participants in the think-tank / Focus Group can be found in Appendix F.

42 A list of companies that were contacted can be found in Appendix E.

43 For the purposes of this research the foundation degree will subsume the range of HND/HNC programmes offered in universities.



pinning any given degree and the extent to which WBL is **central** or **peripheral** to the operation of the programme.

6. Foundation degrees, given their explicit requirements for the curriculum to be embedded in employment, were used towards developing the base-line for assessing the performance of other degrees against the agreed criteria. Naturally, the recent QAA evaluation of Foundation Degrees will be used in this context.⁴⁴

Some of the key aspects the research has aimed to highlight include:

- The diversity of HEIs activity in the field of WBL;
- Establishing the proportions of those universities that are fully engaged, not engaged and partially engaged in WBL;
- Differentiating the WBL practice according to the methodology and delivery (e.g. integration of workplace learning with taught content; assessment - whether credits are given to work based activity; extent that workplace supervisors are involved in assessment);
- Evaluating levels of support provided by universities to facilitate the Work-Based Learning process (i.e. materials, guidance to student, tutors and employer);
- Evaluating levels and approaches of employer engagement;
- Identifying best practice models of Work-Based Learning.

For the purposes of this research the evidence for good practice was collated and organised under the following headings:

1. The embedding of WBL into the philosophy of the programme as evidenced by the programme documentation;
2. The incorporation of teaching time for organisation of placements, preparation of students for placement etc;
3. The presence of employment-led or employment specific curriculum content;
4. The presence of work related assessment methods such as: self and peer assessment, assignments and projects, portfolio-building, presentations and the practical assessment of professional competence within the workplace;
5. The presence of learning contracts which consolidate the link between a learner's objectives and the outputs of learning;
6. Evidence of formal partnerships with companies and organisations.

Careful attention in the design of questionnaires and interviews was made in order to cater for each of the above areas.

³⁸ Quality Assurance Agency (2005) - Review of Foundation Degrees: England and Northern Ireland.

The following targets were identified as a result of this research project:

1. Provide an assessment of the value of WBL within the selected engineering and technology departments according to:
 - university staff perceptions;
 - employer perceptions;
 - student perceptions.
2. Assess and make recommendations on the effectiveness of the WBL delivery methods used.
3. Provide an analysis of the effectiveness of the assessment methodologies used.
4. Identify a number of best practice models for a) quality delivery leading to improving progression to work b) employer engagement in both the design and delivery of programmes, which can be used for dissemination purposes.

The research findings and recommendations were initially reported through an Interim Report and were discussed at a Think Tank / Focus Groups event on 14 November 2006.⁴⁵ This event provided a platform for examining and validating the results from the field research. It also sought the participants' views on identifying critical success factors for underpinning the development of Work-Based Learning across the engineering and technology sectors.

⁴⁵ The Think-Tank had drawn together a balanced representation of academics, industrialists, professional bodies and employer associations as well as Government (DTI and DfES) and the higher education funding council for England (HEFCE).



The Think Tank /Focus Group event has focused on the following key areas

Definitions

How legitimate is our definition of WBL in its applications to the pursuit of an academic award?

The role of HEFCE and QAA

How should HEFCE and QAA's own policies and guidelines be modified to facilitate the development of WBL throughout undergraduate and postgraduate provision?

Can Work-Based Learning be adequately measured within the credit accumulation framework which QAA prescribes?

Employer-university links

Are HEIs responding to employers appropriately and/or in sufficient measure, to ensure that provision meets employers' expectations i.e. through continuing professional development which has Work-Based Learning at its core?

What are the key characteristics of successful employer-HEI engagement? What best practice models exist to illustrate this?

The role of HEIs in curriculum design and delivery

Do you see the need for a "Generic Framework" and/or "Sector Specific Guidelines" for WBL that will enable?

- Academic staff to improve delivery, recognition and learner progression of WBL programmes of study; and
- Employers (and employees) to have a better understanding of how to engage in WBL programmes that will lead to recognised awards and / or credits?

What would such frameworks or guidelines look like?

To what extent is it the case that the quality assurance and support mechanisms (including technology-enabled delivery such as e-learning and e-mentoring) are appropriate to enable a greater uptake of WBL programmes by industry?

Summary

What are the critical success factors to increase the 'level of uptake' of WBL from both the supply and demand sides?

What are the dangers of developing employment-led curricula and qualifications alongside the traditional academic route?

The outcomes are addressed in the Research Results and the Suggested Measures for Improvement sections of this report.



5. RESEARCH RESULTS



As outlined earlier, WBL is learning derived from undertaking paid or unpaid work. It includes learning *for* work (e.g. work placements), learning *at* work (e.g. company in-house training programmes) and learning *through* work (professional development), linked to formally accredited-further or higher education programmes.

The results from the in-depth surveys and subsequent discussions with the target respondents illustrate that there exists quite a significant disparity in the understanding of what activities constitutes the term 'Work-Based Learning'. 70% of respondents claimed that for them, WBL was about student placements in local companies as part of a degree or masters programme. The high number of universities focussing on the 'Learning for Work' approach demonstrates that there is still a reticence in the HE sector in Engineering to adopt the 'Learning through Work' approach.

With the exception of Open University, there was no other evidence to show 'Learning at Work', an approach usually associated with short in-house training programmes, and which often required the lecturer to teach on site at the company's premises. The research remit did not examine the role of Corporate Universities such as the Honda Institute, which also offers dedicated learning at work, although discussions were made with such organisations.

From the sample frame, 21% failed to respond at all. Of the 79% of respondents who did respond, 32% (12 HEIs) took part in the 360° assessment,

incorporating the views of the WBL tutor, Head of Department, Student and industrialist. 42% of the respondents who answered took part in the single survey and responded to 5 specific questions.⁴⁶ Only 5% claimed no interest in participating in the survey, due to time or personal commitments.

A broad range of key stakeholders were approached with respect to this project. Over 50 companies of different sizes and from different engineering and technology sub-sectors were contacted as well as professional bodies, SSCs, RDAs, funding councils and quality assurance and enhancement agencies.

In the following sections, the research seeks to outline through case studies that three different approaches or categories of WBL.

- Bath University – Learning for Work
- Salford University – Learning for Work
- Huddersfield University - Learning for Work
- Sunderland University - Learning for Work (with Licentiatehip)
- Loughborough University–Learning for Work (with Diploma in Industrial Studies – DIS), and partly, Learning through Work at Masters Level.
- Derby University – Learning through Work
- Leeds University – Learning through Work
- The Open University – Learning at Work

In undertaking this research, careful examination of all WBL approaches has been made, and the results have focused on the methods, assessments and evidence of best practice.

5.1 Learning *for* Work Approach

This approach of WBL was the one most adopted by university respondents. The Learning for Work approach in this context, was either a 48 week placement in a company as part of a sandwich degree or a short period in a company as part of the WBL requirement for a Foundation Degree. The WBL constituent on a Foundation Degree makes up a minimum of 20% of the overall degree. The percentage of WBL that makes up a sandwich degree was found to fluctuate between 7.5% to 25% (or a quarter of a 4 year bachelor degree).

Over a third of respondents claimed that the WBL element played no credit in their final award, stating that if the students took the placement and satisfied the criteria of assessment (undertaking log book, interviews and project report), then they would be presented with an award that included the category of ‘sandwich’ in the award title. In a third of respondents, it would not make a difference to the classification of a degree.

Research showed that those universities who have a good WBL record were the ones who tended to have a more dedicated and structured administrative function to manage their interactions with companies. HEIs who have specifically written induction packs, training placement manuals and interview and CV practice sessions tended to be much more successful in continuing their WBL activities with local companies.

⁴⁶ Refer to Appendix B for a list of the 5 questions that were asked.



The following analysis will look to answer such questions as:

- How the WBL is undertaken (structure, process and management);
- What (if any) is the value add;
- What is the industrialist's relationship with the HEI;
- What will be assessed;
- Who is going to assess;
- What other feedback besides assessment is available.

Salford University – Case Study

The evaluation has examined WBL as part of the BSc Construction Management degree which is offered by the School of Construction and Property Management.

Procedures and Practice of WBL

The BSc Construction Management is a 4 year degree programme that has been successfully running since 1988. It contains a major WBL element.

The programme does not adopt the traditional 48 week placement, but instead, has created 3 WBL components, each lasting a period of 22 weeks.

Therefore, the structure offers students the opportunity for more time being spent in industry. It seems to satisfy the needs of the students, employers and the programme.

The students all have to be sponsored by a company before they start on the course, although the university organises sponsorship interviews with their consortium companies at Open Days, thus enabling students to gain sponsorship at the same point as signing up to the course.

A close university-company-student relationship was apparent.

After students graduate, they follow the CPD path to achieve CIOB membership, indicating that the programme is focussed on achieving recognition through delivering the skills and knowledge needed by the profession.

The Learning Contract

The learning contract that Salford provides takes the form of a set of guidelines in the Industrial Training Manual (ITM). The manual is very informative and lays down all the key points for undertaking industrial placement.

The expectations of the student in terms of the industrial placement are clearly spelled out in ITM's 'Aims and Objectives'. The placement specification states that placements are 'intended to be broad based and flexible in response to the diversity of the industry'. As a result, three different types of industrial placement are offered, and these must all be undertaken, but the sequence of them can be altered, if required:

Period One – Site Based Training

This focuses on the student experiencing and observing the construction process, site environment, control of workforce, and project and process management techniques.

Period Two – Office Based Training

This focuses on the student working as part of a larger project or in some cases, Head Office, and will involve the student working in areas such as estimating or planning, but should have access to study other areas where possible.

Period Three – Management Training

This focuses on the student developing their career plan based on periods one and two, and therefore the exact location/specification of period three would be the subject of negotiation between the company and student. In general, students are expected to perform some management function and accept increasing

responsibility e.g. management of sub-contracts or be part of a tender team.

The ITM clearly laid out the responsibilities of both the industrial supervisor and the university tutor in supporting the student.

A completely detailed structure of placement assessment is provided to all students in the ITM, thereby removing any possibility of ambiguity over what is and is not assessed.

Student Support

The ITM identified that each company had to provide a *training coordinator* and a *placement supervisor*, and the university should provide a *tutor* who would visit students once on training periods 1 and 2, and who would offer a support role via email to both the student and the employer.

The Training Coordinator is the training manager in the company and is the person that the student deals with throughout the course. The Training Coordinator is responsible for organising and allocating the student's placement.

The Supervisor from the company ensures that the student performs satisfactorily and that the company is providing appropriate training to match both the students' ability and application and the educational requirements of the course.

The Supervisor is normally a senior member of a project or office team. They are responsible for student training and assessment whilst they are on the placement.

Once on placement, the student discusses with their supervisor their job responsibilities and their Industrial Placement Development Plan



(IPDP). The student is encouraged to ensure that their placement project will achieve the objectives identified in the student's IPDP.

The Supervisor is responsible for assessing the student's placement performance and for liaising with the University in areas of difficulty relating to the student's performance.

The University Tutor makes a placement visit around June or July, to ensure that the student is performing satisfactorily and that the training received is appropriate to the educational needs of the University. The Tutor also discusses the IPDP with the student and how this related back to the work and the project or office environment.

Students on placement period 3 are not visited by a Tutor, but they are requested to communicate via email with the university Course Leader to develop their Final Placement Report and Dissertation Proposals.

It is clear from the feedback received from the respondents and the emphasis placed on student support in the ITM, that student support is something that is valued and considered at the outset, and students received the appropriate level of support, as required.

"First hand knowledge of the industry allowed me to use personal experiences and situations in my study and improved my management, interpersonal and reflective skills greatly"

– David Blundell, Student at Laing O'Rourke

The Industrial Relationship

The programme is delivered in partnership with a consortium of 14 national construction

companies and students are sponsored with the industrial placements and even receive a modest bursary to assist with their expenses.

The placement allows students to gain experience in their sponsoring company as well as in the industry and the construction process itself. In return, sponsoring companies get to see future graduate recruits in action and commence training in company protocols, as well as construction skills.

Salford claimed that their WBL programme was successful due to their 'partnership approach' with the consortium of construction companies. This 'consortium' approach is certainly a good idea as it avoids the rush to try to find places with local companies (where in many places the employer pool is shrinking) and it helps to maintain a form of quality and continuity that industry can appreciate as adding value to their investment in sponsoring the student.

Assessment and Feedback

The placement assessment is based on two measures:

- The University 'Placement Report'
- Company Assessment of Placement Performance

The Placement Report has been designed by the University to record and evaluate experience that has been gained by the student in the course of the placement. The report includes: placement details, placement description, job role, case study, and placement review and report presentation.

The Placement Report contributes to 7.5% of

the overall qualification of the award.

Students are expected to keep an ongoing journal or site log of their activities and tasks, together with a pocket book of notes at work to record all aspects of experience gains and how this experience contributes toward the objectives in the IPDP. The pocket book however is not a chronological list of tasks completed, and is not used as the basis for the placement report.

The company assessment is based on the student's performance achieved against their own Industrial Placement Development Plan (IPDP). Performance is measured in terms of skills and competences that a student would be expected to have developed by the end of each year of placement.

The Placement Report contributes to the programme assessment through the Professional Practice Studies and through the Project Suite in year 4.⁴⁷

The Company Assessment, although important does not contribute to final academic marks. However, it is a requirement of the programme that the company's assessment should remain at least at 'satisfactory' to ensure continued sponsorship.

Accreditation and Value Add

The BSc programme is not accredited by the CIOB, however many students after graduating, follow the CPD route to gain CIOB's membership. In the past, the programme's assessment was based on the CIOB CPD system with students being asked to collect evidence of competences gained. However, this proved unworkable, as the University was unable to provide the

level of mentoring and job allocation required. Presently, students reflect on the level of competences gain, but no objective assessment by the university is actually made.

Motivation for WBL

The motivation for WBL was summed up by the following quote:

"The Construction Management Programme has used this thin sandwich approach for the past 18 years as a way of grounding academic studies and allowing industry based project work to be successful. The benefits to the students, in terms of their work place performance, can be seen by their improved transferable skills levels and has this improvement has been endorsed by the employers consortium since 1988.

WBL is a grey area where education and training merge, and the University has partnered with the consortium and explored this on a number of occasions including the introduction of formalised competence based training programmes based on CIOB standards. Issues of reliability, consistency and equality of opportunity will always arise where a number of different employers are involved, and it is currently beyond the resources of HE to design, implement, monitor and police such schemes."

– Andy Turner, Principal Lecturer at Salford University

⁴⁷ The placement report is available online: <http://intranet.scpm.salford.ac.uk/studentintranet/>



Huddersfield University – Case Study

The research has examined WBL as part of the following programmes in the School of Computing and Engineering:

- BSc (Hons) Music Technology and Audio Systems
- BEng (Hons) Engineering with Technology Management

Procedures and Practice of WBL

All the programmes delivered by the School have some form of WBL element in their structure. Such elements range from either a company placement, or exceptionally, setting up and running their own company for a year, and is operated in conjunction with Business Mine (an entrepreneurial initiative that is run by Huddersfield's School of Business).

On average, there are around 200 students in the School of Computing and Engineering who undertook sandwich placements. Out of all full time students, 75% opt for the placement period of 48 weeks in industry.

Due to the great number of placement students, Huddersfield employs a highly structured placement unit that has the responsibility for all aspects of student placements.

Over the years, the Placement Unit has accumulated a significant number of employers on their industrial database, ranging from large scale to SME, and thus they have a continuous pool of employers with whom the School maintains a strong relationship with.

The practice adopted in the School is that the Placement Unit submits placements opportunities that they have secured on to the specifically created MAPPIT website. The students then review the MAPPIT site and forward their CVs to the Placement Unit, who checks their CV before submitting to the company offering the placement. The Placement Unit provides weekly sessions giving support to students on CV writing, and preparing and handling job interviews as well as an induction to health and safety issues.

This preparation is vital, as the student is seen by the company as employee and therefore, in many instances, especially in the case of larger companies, the interviews are of the same standard of toughness as if the student was applying for an actual position after graduation.

The student is provided by the Placement Unit with a handbooks and other documentation relating to the responsibilities of the tutor and supervisor; what is expected of the student and assessment criteria. The company is also provided with handbook regarding responsibilities and assessment procedures.

All WBL tutors in the School receive specific training to support their WBL activities, and this factor can be seen to contribute to the success of their programmes, where WBL is a significant element.

Engineering students follow a 120 credit module 'Industrial Placement' and Computing students follow two 60 credit modules 'Personal, Social and Technical Skills' and 'Self Assessment Skills'. The aims for these modules are identified in the General Notes specific to students of Engineering or Computing disciplines.

From the discussions and observations, it can be seen that the procedures and practices adopted by the School follow ones of meticulous attention to detail in every aspect of the placement cycle.

The Learning Contract

Although the School does not refer to it as a Learning Contract, all students are provided with what is known as the placement's 'General Notes'. This is an information pack that outlines the responsibilities of the student, the employer and the university in the placement, the lines of communication, student support, how to escalate issues and a clear explanation on what is being assessed.

Any student undertaking a placement must agree to the terms and conditions in the General Notes.

Student Support

For both Engineering and Computing placement students, a Supervisor is assigned from the industrial company and a Visiting Tutor from the University visits twice during the year. Huddersfield, clearly documents the role and activities expected of the Supervisor in their 'General Notes' handout.

The Visiting Tutor provides both academic and pastoral care, and could, if necessary, visit more than twice a year if required. Due to the School's continuity with placements in companies year after year, the Tutor often becomes familiar, over time, with the Industrial Supervisors, and understands far better their business needs.

During the interview, the Engineering student (Samantha Hill) advised that she was given induction over the course of a day, and this

included a brief history of the company, introduction to products and processes together with presentations from various departments throughout the company outlining the business practices.

The level of support provided to the Engineering student by the designated workplace supervisor was deemed to be 'extremely supportive and helpful'. However, due to the changeable nature of the work, no formal objectives were set up and no formal appraisal was undertaken by the line manager. The student did have frequent meetings with her mentor (assigned by the company) to ensure her projects were up to date and to discuss future work requirements.

During the interview, the Computing student (Alex Quinn) advised that he was given an induction over the course of a day, and this included office procedures, health and safety, disability awareness, first aid and CoSHH. The Computing student also had regular reviews of work progress through monthly supervisory meetings on a one-to-one basis.

The Industrial Relationship

The School, through their Placement Unit have been liaising and forming relationships with companies for a very long time, and as such they have built up a sturdy reputation in the business community.

The procedures and practices adopted (especially the detailed 'General Notes' literature) have assisted companies greatly in deciding to take on a placement student. Nothing in the Placement Unit appeared to be ad hoc. It is structured, clear and precise and this is a key attraction point that was highlighted by the



sponsoring companies, who although they like the idea of having bright students, they do not want the responsibility of having to devise their own placement procedures.

Clear definition of the industrial supervisor's role ensures that they understand from the outset what the commitment will be, and thus there is no opportunity for ambiguity or tension in the relationship.

When asked the industrialist at DePuy whether they considered the experience in providing WBL to be successful, their reply is given below:

"Without a doubt yes, even though there are downsides of high staff resource required to train/mentor students, the benefits from additional resource, and the independence gained from the students during the years of placement, outweighs the downsides. It is expected that students will be sufficiently independent to be able to carry out certain functions and hence contribute heavily to the team-working environment."

The fact that the School has a active Placement Unit has definitely helped in their relations with companies, since most companies wanting to take a student will seek to contact University placement officers first requesting appropriate CVs. A University wide Placement Unit, although appears to be cost-effective on resources, the inherent value to the School in having their own Placement Unit that understands the disciplines as well as the capabilities of the students on the programmes has proved to be one of the main ingredients to Huddersfield's successful WBL activities.

Assessment and Feedback

The assessment measures were different for each of the programmes.

Engineering

The industrial placement is assessed by:

- a) Progress against guidelines set in the Employers Assessment Report for 10 set competences:
 - 1. Comprehension – the ability to understand and interpret instructions;
 - 2. Performance – the ability to carry out assigned tasks;
 - 3. Interest – attitude to tasks set;
 - 4. Confidence – the capacity for self reliance and assurance;
 - 5. Communication – the ability to give a complete and concise account of a situation either orally or in writing;
 - 6. Analytical and diagnostic skills – the ability to analyse problems and identify their cause;
 - 7. Working with others – the ability to mix with others and to gain respect;
 - 8. Self organisation;
 - 9. Attitude to training – understanding of the programme's content and its purpose;
 - 10. Conduct – attitude and behaviour of the individual.
- b) Progress in technical skills and projects summarised in a log book following institution format.
- c) Company evaluation contained in a profile report.
- d) A report from the industrial supervisor.

Computing

A formative appraisal of the students' achievements against agreed learning outcomes are carried out halfway through the placement. This provides the student with feedback on progress to-date and helped in identifying areas for further development.

A summative assessment takes the form of an appraisal by the supervisor using a standard form, and involves the student and the mentor/visiting tutor. The assessment is based on an exit performance and is not averaged over the year. The grading is considered to be at employment standard and covers the planned competence areas, weighted in relation to the needs of the job.

Throughout the placement period, a log book is used to document the student's activities and tasks.

A meeting between the industrial supervisor and academic tutor is set up to decide if the student has 'passed' or 'failed' the placement.

When the Academic Tutor was asked as to whether the assessment process was reliable and valid in measuring accurately the value of individual performance in the workplace, he said:

"Supervisor grades are generally higher than the academic grades, but overall the assessment does produce a fair assessment of the student's experience and reactions to the Placement year. This is reflected in the final year classifications where the students perform measurably better than those students who opt out of the Placement year."

– Dr Dexter Booth, Academic Tutor, School of Engineering and Computing, Huddersfield University

Accreditation and Value Add

Engineering courses are linked to professional accreditation by professional institutions such as IET and IMechE.

Motivation for WBL

The motivation for WBL from the University perspective was clear; having good links with industry means that the students have much greater opportunities to secure graduate employment, and this in turn makes the University much more attractive in the marketplace with students, and increases the University's position on the employability league tables.

Dr Booth adds on the aspect of employability:

"I believe that our placement year is an invaluable component of our courses. Through this year, we inform potential employers of the quality of our students, who in turn, inform us of employer requirements. We can then react as required, not least in the development of relevant courses."

From the perspective of the participating company, the main motivating drivers for a company to engage in WBL at Huddersfield were listed in the following order:

- The recruitment of high calibre employees;
- Links with the University for possible research;
- Access to additional high quality resource (adding different viewpoints to issues/problems);
- Influencing future academic development.



Motivations for students were centred on the placement year giving them the opportunity to learn new techniques and to train on the use of new technologies and specialised equipment, as well as gaining a better understanding of how a company works. Intrinsically, students learn to handle the world of work, to become more productive, organised and motivated to succeed, even when having to undertake more mundane tasks.

The Computing student was so impressed by his experiences of teaching in schools for his placement at Corridor Arts, he decided to pursue a PGCE and embark upon a teaching career, something that, before his placement he had not considered.

“My placement has helped me decide what I really wanted to do once I had graduated.”

– Alex Quinn, Final Year BSc Student,
Huddersfield University

Similarly, the Engineering student found her experiences at DePuy to be exciting and she would really recommend placement to other students. Her experiences during placement helped her to select her final year project and improved greatly her work and generic skills. As part of the placement she was also invited to go to Africa with DePuy, and this is what she says on this unique opportunity:

“Going to Malawi to help build a feeding station was a wonderful opportunity. To know that I was offering my skills to a developing country was rewarding. A fabulous and a chance of a life time experience.”

– Samantha Hill, Final Year BEng Student,
Huddersfield University

Bath University – Case Study

Procedures and Practice of WBL

In Bath University, WBL activities are being undertaken in the Department of Mechanical Engineering and the Division of Lifelong Learning. In the former, the WBL activity is student work placement as part of a sandwich degree, whereas the latter is involved in the development of Foundation Degree and the WBL element that forms a third of the award.

Division of Lifelong Learning

Bath University also have WBL activities in respect of the newly proposed Foundation Degrees, and these activities are managed through the Division of Life Long Learning.

The Lifelong Learning Division's activities in WBL focus on:

- Supporting the development of knowledge and skills required by employers to develop their workforce;
- Supporting individuals in acquiring vocationally relevant skills and to enhance their immediate employability in a relevant field.

The Division's main vehicle for WBL is Foundation Degrees that are delivered by partners such as S & B Training, Avon Vale Training and Brunel Training.

The Division regards a number of factors as being imperative to ensure an effective WBL strategy and these include:

- Keeping up to date with national/regional

priorities/initiatives and models of good practice in WBL;

- Ensuring commitment and involvement of all stakeholders e.g. FE colleges, training organisations, LSC, employers;
- Identifying clear WBL feeder routes to higher level WBL qualifications as well as providing guidance on progression routes for the student;
- Identifying appropriate funding streams to provide support in WBL development;
- Appointing staff with a specific responsibility for WBL;
- Creating Curriculum Working Groups with the involvement of employer representatives and carrying out Employer Focus Groups;
- Encouraging employers to drive development of WBL programmes;
- Providing a framework to integrate professional and sector skills qualifications;
- Identifying lessons learnt from developing and running Foundation Degrees with employers.

The Foundation Degree in Engineering, currently in development and due for launch in 2007. The Division have successfully launched Foundation Degrees in Computing/Digital Media Arts (which grew out of their existing HND), as well as other Foundation Degrees in Addiction Counselling and Youth Work. All Foundation Degrees are delivered under license,



through a learning partnership with either local colleges or training providers, and all programmes lead to a Bath University award.

The Curriculum Working Groups are responsible for the development of each Foundation Degree. The membership of these groups is carefully selected to ensure balance across all stakeholders is achieved. The membership includes:

- Curriculum Leader (representative from the Lifelong Learning Division);
- Programme Leader;
- Link Tutor (the most appropriate representative from the department developing the Foundation Degree);
- Sector Skills Council (representative from the appropriate sector skill reflecting the Needs of business and industry in that sector).

The Division's ethos of collaborative working is exemplified by their involvement with the Western Foundation Degree Consortium (WDC) that includes Bath Spa University, University of Gloucester, University of Bristol and the Royal Agricultural College. The WFDC provides Foundation Degrees in the West region, and works with the RDAs, SSCs and employers to identify skills shortages in the region.

In developing the Foundation Degree programmes, the Division have applied the QAA precepts in programme development. They believe that their programmes are not just about delivering training, but they also integrate the skills and knowledge required within an academic framework. Students completing their

Foundation Degrees will discover that a number of pathways are offered to them, to achieve higher awards including honours degrees.

The Division has a widening participation remit through WBL. It is involved in the Train-to-Gain government initiative, as part of the High Level Skills Pathway supporting level 4+ provision.

They are also working with the Lifelong Learning Network to develop a series of general regulations to enable transfer of credits amongst other HEIs, gained through WBL activities (not Foundation Degrees).

Department of Mechanical Engineering
The research has reviewed the MEng programme in the Department of Mechanical Engineering.

The WBL component of the MEng is managed and administered by two part-time staff in the department, who are totally dedicated to supporting students and helping them with their WBL activities.

On average, there are 60 students per year who take the 48 week placement period in industry and WBL has been part of the University's programme for 40 years.

There is a handbook for all students on WBL, which details what they can expect during their placement year. The handbook provides hints and tips on ensuring a good WBL experience. Students are initially interviewed and they prepare their CV with guidance from the placement staff. The students are then matched with placement opportunities. Students are interviewed by the companies and offered places through the placement officers in the department.

The Learning Contract

All students are providing a learning contract which identifies what support they will receive together with what they should expect from the placement company.

To enable a student to undertake a placement, they must be comfortable with agreeing to the terms and conditions of the learning contract.

Student Support

Two visits are made to the student whilst on placement, the first is made by the placement officer in the department and the second is made by the tutor towards the end of the placement. It is usual practice for the placement officer and tutor to discuss the student's placement performance with the industrial supervisor in the company.

The industrial supervisor is given a handbook outlining the department's expectations and requirements for health and safety and insurance.

The industrial supervisor plays an important role in how successful and rewarding the student experience of WBL is. The supervisor ensures that the projects allocated are appropriate to student's expected learning objectives. Supervisors assist students by selecting a project manager or engineer for the student to shadow, as well as even proof reading student reports (although these are not assessed).

The student from the MEng Aerospace Engineering programme (Stephen Hapgood) who took part in our study advised that during his placement with Agusta Westland Helicopters, he was 'given talks on the history of the company, future aims and targets, as well as talks on security, health and safety'. He was also introduced to various team-bonding activities which enabled

him to meet members of staff and other placement students.

The Industrial Relationship

The main issue with all WBL activities is the shrinking pool of employers in the South West region. Although regionally, amongst companies, Bath University has an excellent reputation, the number of opportunities for placement is decreasing every year.

The industrialist respondent from Parker Sterling advised that they have a company-wide policy regarding work placement, and they become involved, to some extent, in the informal assessment of the WBL component.

Parker Sterling has been engaged in WBL over the past 3 years and their experiences have been excellent. They added:

"Projects covered were needed but company staff levels and work load would not enable them to be completed without student help"

– Peter Hopkins, Head of Engineering, Parker Stirling

Through the Division of Life Long Learning's development activities in Foundation Degrees the Employer Focus Group has been created. The Group is designed to meet for Breakfast Briefings. Involvement from QinetiQ, BMW, GKN Aerospace and Rotary Precision Instruments has assisted in identifying new opportunities for WBL in the Engineering department.

Assessment and Feedback

The placement period is not assessed and therefore, it does not count towards the degree classification. The decision for not assessing the WBL



component of the MEng is principally, due to the assertion that the Bath 'do not believe that sufficient and appropriate quality standards can be guaranteed, in order for placement to be assessed and counted towards the degree.'

While at the company, the student is assessed by their line manager and training officer, and although this is not academically assessed, the process is structured with one-to-one appraisals with their line manager and a review with the training officer.

Assessment sheets are provided by the department, and enables the line manager or supervisor to rate the student's performance over a range of aspects of their work. The results of the assessment are then discussed with the student. Although the student is not assessed academically, they are given a 'pass' or 'fail' depending upon their placement performance. They are also required to complete a report to help provide information on the company and the WBL experience to students in the following year.

Accreditation and Value Add

The degrees offered within the Department are accredited by the Institution of Mechanical Engineers or the Royal Aeronautical Society as complying with the academic requirements for chartered engineering status.

"If WBL is to count towards chartered status, the training should be wide ranging and well documented"

– Prof Tony Mileham, Head of Department, Bath University

Motivation for WBL

The Senior Lecturer responsible for WBL in MEng

programme said this:

"WBL is very important in improving generic skill set, specific engineering skills and employability. It is very clear which of our students undertake WBL and this is recognised by employers when it comes to graduation..."

We very much encourage WBL as part of our degree, but it is not assessed and is not recognised as an academic element of our degree."

– Dr Jos Darling, Senior Lecturer, Bath University

The final year Student, considered that the work placement was a good experience, and says this on the subject:

"I have gained an insight into the aerospace industry, and had an opportunity to gain experience in a number of different engineering environments and disciplines. I have had the chance to use the theory I have learnt, in 'real life' projects, and contribute important work to the company."

– Stephen Hapgood, MEng final Year Student, Bath University

The industrialist at Parker Sterling gives a strong motivation for companies considering taking on a student for work placement:

"The best and most worthwhile exercise for students and companies. It combines academic and business needs well and shows the students 'real' case study circumstances"

– Peter Hopkins, Head of Engineering, Parker Stirling

Sunderland University – Case Study

The evaluation has examined WBL in five areas of the School of Engineering and Technology, namely:

- Sandwich Degrees;
- Foundation Degrees;
- FD Special Module – practitioner Module;
- Short Courses / CPD;
- Knowledge and Technology Transfer Partnership (KTP) – previously known as Teaching Company Scheme.

In addition to the Sandwich and Foundation Degrees, the School offers short courses for CPD. These short courses have 20-30 credits and can be accumulated towards a university certificate. They are delivered using a blend of learning on a day and evening basis, and e-learning through WebCT. Some of the short courses are linked to professional accreditation through Cisco, Microsoft and Macromedia (in partnership with the New Technologies Institute NTI).

Sunderland University have a very active programme of running Knowledge Transfer Partnerships (KTP). These KTPs enable recently qualified graduates (known as a KTP Associates) to work out in companies managing a challenging and exciting project that is central to the development needs of their company, placing the Associate in a high profile role. The placement provides the Associate with a great opportunity to accelerate their career prospects.

Each Partnership is a strategic collaboration between a business, a graduate and a knowledge base partner (University). The Associate will work on a project (which can be any time between an 18 month and a 3 year period), which is central to the needs of the business and its development.

The Associate manages their project on a day-to-day basis, facing many challenges on the way such as designing and introducing new or improved products and processes, improving technologies and quality systems, or developing and embedding marketing strategies to break markets.

At Sunderland, all KTP Associates are registered on Masters Programme (MSc) through Work Based Learning. This is normally spread over two to three years.

The Associate have a dedicated budget of approximately £3,500 for training. The associate is also required to spend 10% of their time on training and have the opportunity to register for a postgraduate study – normally MSc. In addition, the associate can enlist on NVQ level 4 in Management.

The following analysis will look at Sandwich and Foundation degrees in greater detail.

Procedures and Practice of WBL

Sandwich Degrees

The School of Computing and Technology offers computing and engineering sandwich degree courses that include traditional 48 week placement in industry. The School also offers a BSc in Computing that includes an integrative project. The integrative project takes place in year 2 of the BSc. It is regarded as Work Related Learning



than Work Based Learning, as the students do not go into industry, but work from the University instead. Students split into team strands and form a company. As a company they have to respond to an invitation to tender to a specific project. A team of industry representatives then selects the project that they think will work. Companies that have helped in this integrative project include Bret Oil and the AA. The aim of the project is to help improve team-building and professional business skills, as well as promoting healthy peer competition.

Foundation Degrees

The School offers foundation degrees in engineering, computing, multimedia and maths. Maintenance Engineering and Operations Improvement FDs, each have a third of the degree focussed on WBL. Each WBL period makes up 40 credits towards the overall Foundation Degree.

The Maintenance Engineering FD is taught in the first year by New College Durham and the second year is taught by Sunderland University. The programme is open although students seem to come exclusively through Nissan Apprenticeship Scheme and its associated supply chain. The programme is day release. The Operations Improvement FD in the first year is taught by Gateshead College and the second year is taught by Sunderland University. Unlike the Maintenance Engineering FD, this programme is open and includes a greater spread of companies and sectors. Sunderland University manage all matters pertaining to the WBL element of the FD.

The School also offers an additional special Foundation Degree module – the ‘Student Practitioner’. This module is delivered as part of

another FD in engineering, computing, multimedia or maths. The WBL in this module accounts for 30 weeks of unpaid placement in a company by the student, and is in addition to the WBL period split over two years in the Foundation Degree. The Student Practitioner FD module requires the student to design, build or architect something (either a process or product) that actually solves a particular issue that the company has. The student works to a set of specific objectives identified before the 30 week placement period commences. All objectives set have to be met to satisfied completion of this special module.

The Learning Contract

All students undertaking the WBL period in the Computing or Engineering sandwich degree courses have to develop a learning contract. The Learning Contract is generated and signed by the student, academic supervisor and the industrial supervisor. The Learning Contract is reviewed twice by the Tutor and subsequently is updated twice during the year.

Student Support

The School has a dedicated placement officer (0.5 FTE) supported by a senior academic. The Placement Officer provides:

- Advice on good CV writing;
- Advertising of all placement positions;
- Searching for positions;
- Liaison with employers;
- Database administration;
- Runs the induction programmes;

- Works as intermediary on all communications (student and industrial supervisor).

While a student is on placement, the Tutor makes a minimum of 2 visits, and they liaise with the student and industrialist on any issues arising via telephone and email.

The Industrial Relationship

The research showed the School engages in a significant level of business and industry collaboration. The School runs employer days, giving students the opportunity to have Poster Displays and interchange ideas.

The employers see the WBL activity as a good way of interviewing 'Protective Staff'.

The School has established a **Virtual Employers Forum** that provides employers with the opportunity to look at curriculum development, methods of learning and skills development and provide feedback and advice.

Assessment and Feedback

Three areas of assessment are used for final assessment of the WBL period:

- *Control element* – monthly student logs and the Learning Contract gets reviewed twice by the tutor and is subsequently updated during the year – this is worth 25%;
- *Report on the industrial project* – this is worth 50%;
- *Final achievement of goals against action plan Review*. This is appraised by Tutor and Industrial Supervisor on the value of the student's work – this is worth 25%.

The placement period carries 20 credits and counts towards the final award and classification. The placement period has been known to lift up a degree by one class. The certification is a sandwich degree.

Accreditation and Value Add

In addition to their degree qualification, students can opt for a City and Guilds Licentiateship. The Licentiateship is a University wide award, run by the University Quality Support Unit. The Licentiateship qualification accredits the students non-technical and generic skills learned during placement. The Licentiateship is also offered to staff as well as students. As this is a value added element of the sandwich degree, it is charged for separately from the placement fees, and is entirely optional for the student.

Motivation for WBL

The motivation for students to engage in WBL is that it improves their personal and organisational skills, as well as their technical skills, and aides the development of more rounded students.

The school has great motivation for WBL as it gives an opportunity to discuss and collaborate closer with industry, and thus identify areas of new curriculum development, making students more employable on graduation.



Loughborough University – Case Study

Loughborough University is the home for the HE Academy's Engineering Subject Centre was also awarded a Centre for Excellence for Teaching and Learning (CETL) in Engineering in 2005.

The Faculty of Engineering has 3971 students. It includes Aeronautical, Automotive, Chemical, Civil, Electrical, Electronic, Mechanical, Manufacturing, Systems Engineering, Construction, Quantity Surveying, Transport and Sports Technology.

The faculty enjoys an extensive range of industry contacts in both research and teaching many of which are national and international companies (e.g. Rolls Royce, BAe Systems, JCB, Ministry of Defence and major construction companies).

All undergraduate MEng (5 year) programmes have an optional sandwich year which is taken by about 60% of the cohort. Traditionally, many of the programmes are offered with the industrial placement year, which has led to the award of separate Diploma in Industrial Studies (DIS). This WBL diploma is assessed by a combination of student portfolio work showing outcomes and evidence, dissertation, presentations plus feedback from employer. Key skills form part of the assessment for the DIS. The Diploma is mainly a pass / fail additional award but it does not count towards the quality of the degree.

A newly introduced MSc in Construction Project Management has been designed to contain modules that are delivered *through* Work-Based Learning. It is assessed by a combination of portfolio work, reports and examinations.

In addition, many other part-time MSc students undertake their dissertation in the workplace on a project related to their work.

The university follows the CVCP Code of Practice for Safety in Fieldwork.⁴⁸

In this case study, the evaluation has focused on highlighting the student experience as result of the industrial placement. Mr Alan Curtis, a recent graduate (2006) has undergone an industrial placement with JCB as part of his MEng degree in Mechanical Engineering:



The induction programme organised by JCB was very comprehensive, enjoyable and worthwhile. The induction programme lasted six and a half weeks in total.

The first four weeks were spent at the local college following a hands' on NVQ based course. Here we all learned how to use the full suite of machine tools, as well as gaining practical insight into material properties and limitations. The latter two weeks of this course were spent working in a group on a design and make project.

⁴⁸ CVCP Code of Practice for Safety in Fieldwork July 1995. Additional Legislations include: the Management of Health and Safety at Work Regulations 1999; and the Control of Substances Hazardous to Health Regulations 2002.



Following the course at the college we spent a week on a 3D CAD course learning from the very basics through to a high level. This prepared us for any design related elements to the placement. The CAD course was run by the vendors of the software to ensure the highest quality.

The fifth week of the induction was called the 'survival skills' week. This consisted of various elements of training and knowledge sharing to prepare us for a year at JCB. This included:

Presentation skills which was delivered by an outside consultant who has been used throughout the world (world leaders, sports personalities, TV presenters etc) to teach the best in public speaking skills. This was an intense day but the video evidence at the end of the day showed a dramatic improvement;

Negotiation skills which was delivered by a retired commercial director of JCB. This involved several scenarios where negotiation skills were taught and applied;

'Politics of JCB' was delivered by another retired JCB director. Working for a large privately owned company is very different and the day was full of tips and case studies about how to survive!!

The final half week was the first week within the business. The first day was a JCB induction day which included presentations from health and safety, training and development, MIS (computers etc), security, salaries... The second two days were a product familiarisation course. This is internally run and organised and gives a good understanding of the markets, volumes, specifications and operation of 6 core JCB products. This involved classroom learning, looking around the machines in a workshop and operation on the JCB test site.

Industrial Relevance

Further study (years 4 and 5 of the course) involved a lot more theory both technical and commercial. Having done a placement year it was clear to see where the theories could be directly applied, adapted and applied or not applied at all to the industrial world.

Industrial Approach

Problem solving in industry is a much more realistic approach to that in academia. The placement year identified this and made sure that future problems were solved with a structured approach. This included time scales, milestones, deliverables, budgets, facilities etc. Frequently, something was explained in theory but it was clear that in industry it would be done differently to meet the time and financial constraints.



Contacts

Some knowledge cannot be sought from text books or the internet and so access to people, is key. I found this particularly useful for my individual project since I was able to write a quick email or pick up the phone and get the answer I needed. This was also true for technical questions in the more depth subjects (JCB Power Systems was very useful while studying IC Engines for example).

In addition, knowing people who are useful with their hands is a key benefit. For any project work there is inevitably an element of manufacture/rig building etc and knowing people who can turn your designs into products straight away is a huge time saver. This is much more satisfactory both in quality and time scale than using the university workshops.

Technical Knowledge

The placement year occurred after the second year of study. At this stage, the engineering knowledge delivered is very broad. As such there is a lot of knowledge but within a particular industry only elements can be applied.

What was definitely noticeable was the ability to tackle problems. Within the company, even as a placement student with little product specific knowledge, large problems were often

shared with me. I believe this is because the methodology used throughout the first two years at university for problem solving was able to be applied to large scale industrial problems to solve the problem.

One key piece of work I carried out was on the development of the JCB engine. I had limited knowledge of the working of a Diesel engine, yet armed with a little bit of technical information; I put a series of tests together, processed the data, investigated further and arrived at a solution which meant that the engines would pass emissions legislation.

With no classroom / lecture based learning, coming out at the other end of the placement year I was much more educated in the field I had been working in. Further study in these areas was much easier to understand and hence the learning of other elements was possible. Since my peers all worked for different companies for their placement year, we all had different knowledge banks which we could share with each other making the learning process that much easier.



5.2 Learning *through* Work (LtW) Approach

This is the least referenced approach in WBL. Only 14% of the sample confirmed that they offered Learning through Work WBL programmes. The majority of the university respondents confirmed that they were not interested in this approach due to the following:

- Time it takes to develop programmes;
- Assessment costs;
- Lack of appropriate funding;
- Lack of appropriate level employer of employers or participation;
- Lack of academic frameworks that will enable WBL programmes to be developed more easily but maintaining rigour and quality assurance.

From the responses, Universities who are offering Learning through Work, either use the Learndirect/Ufl Learning through Work framework or have devised their own framework based on their own validation and assessment processes.

Learndirect's Learning through Work framework has enabled Universities to offer programmes that learners themselves design, whilst following a structure of APEL, taught and online modules and validated assessment processes that adhere to the participating university's academic rigour and quality.

Universities participating in the WBL Learndirect LtW scheme include: University of Derby, Staffordshire University, University of Chester,

Northumbria University, University of Northampton, University of West England, Southampton University and Wakefield College. Only Derby, Northampton and Staffordshire offer engineering and technology as part of their WBL provision.

The Learning through Work programme builds on their existing learning, takes account of work context, and provides a structure to plan for new learning that is specific to the student as an individual.



University of Derby – Case Study

Procedure and practice

The University of Derby grew from a background of Further and Higher Education, with experience of WBL through NVQ based programmes, and as such, has grounded best practices in skills and Work-Based Learning. They work in partnership with Universities and Colleges to provide a validated framework of programmes through Learning through Work that offers students flexibility for credit transfer and accredited prior experiential learning.

Derby's Learning through Work – LTW Department - started in 2000, and currently has 839 registered learners (315.9 FTEs that attract HEFCE funding). It should be noted that these learners cover a variety of disciplines and not just engineering and technology.

Two thirds of the students are on a Cohort Programme of study. The Cohort programme is a set of self contained training modules (e.g. CAD, Ceramics) that has been devised to meet the needs of companies or a sector, and it equates to 12-15 weeks of work per module, and typically the framework consists of 3 taught modules (evening classes) and one WBL module. A Cohort programme could also include a group of learners from different organisations focusing on a particular learning need (e.g. leadership). The success rate in securing part of an award (i.e. gaining credits) is 65%.

One third of the LTW students are individual learners that have used the learning contract, with University support, to create their learning aims, programme of study and anticipated learning outcomes.

The University participates in the Learndirect Learning through Work initiative. They use the website and resources to:

- help the student design their programme;
- approve their programme;
- help the student prove what they have learnt;
- confirm what they have learnt;
- support the student as they undertake new learning;
- assure the standards of the student's qualification.

Seventy-five percent of the LTW students are undergraduate and 25% are postgraduate. Two thirds are women and a third are men, and over 60% are 35 years of age.

Learning contract

In Learning through Work at Derby University, the Learning Contract was found to be crucial in the development of appropriate WBL programmes. An example of a typical learning contract can be found in Appendix G.

Derby utilises the Learning through Work portal on Learndirect. The Learning Contract was created by the student, following on screen prompts; drop down boxes and text fields. Working through the learning contract undertaking each category in turn, until all the requisite information for building a programme of study was captured.

The learning contract covered the categories shown below.

Experience

Qualifications and credits

Purpose

Aims

Components

Timetable

Signatories

Under '**experience**', the student's employment, review of experience including a 'where are you now' current status and relevant qualifications was captured by the system.

Under '**qualifications and credits**', identification was made of the type of qualification and the number of credits needed to reach the qualification. The student stated their programme focus or title at this stage.

In the LtW Learning Contract the '**purpose**' focussed on why the student was undertaking the programme.

In the '**aims**' section of the Contract, the student stated the learning outcomes that would be achieved from taking the study.

At the '**components**' stage, the student selected

a number of components to make up the final programme of study. The selection was made with support from the tutor, to identify the following:

- *Title and objectives of each component* – this would include a short statement that explained what the component intended to achieve. This objective would relate to one of more aims in the learning contract.
- *Contributing activities within the component* – would include description of what the student undertakes. If the activity relates to a project or self-managed learning activity, a concise 'project plan' that details the activity would be included by the student.
- *Timescales* – would include the overall timescale of the component, as well as highlighting key milestones within the component.
- *Intended learning outcomes* – would include a statement from the student on what they expect to learn once the component has been completed; the learning outcomes forms part of the criteria for assessment of the component.
- *Proposed evidence* – would include the materials (such as reports, plans, log books a portfolio or a narrative) produced by the student to demonstrate that they have met the intended learning outcomes.
- *Level and credit rating* – would include a level relevant to the intended qualification being sought and the credit rating would be agreed as appropriate for the intended component.



- *Relevant level indicator* – would be selected from the Learndirect level indicator for the qualification being taken. These indicators are a set of pre-configured abilities, and are reflective on the student entering the level and credit rating. Along with intended learning outcomes, the relevant level indicators form the assessment criteria for the component.

These programme components make up the major activities of a programme of Learning through Work. Selection of components must be at the right level for the award sought, add up to the correct credits for the qualification chosen and form a coherent programme that meets the aims identified in the Learning Contract.

APEL component

APEL has been an area that often has been problematic in capturing the appropriate information; however, the coherent structure of the Learning Contract enabled students to make a claim for credit for prior learning, by following through the same sections as they had done in creating a specific component of study.

- *Title and objectives of each component* – this would include a short statement that explained what has been gained from this component. This objective would relate to one of more aims in the learning contract.
- *Contributing activities within the component* – would include description of the activities that led to the learning outcomes that the student claimed a credit for.
- *Timescales* – would not be included for an APEL component, as the work has already been done.

- *Intended learning outcomes* – would include a statement from the student on what actual learning outcomes had been achieved.
- *Proposed evidence* – would include an APEL portfolio or evidence of the student's previous qualifications.
- *Level and credit rating* – would include a level relevant to the intended qualification being sought and the credit rating would be agreed as appropriate for the intended component. In APEL, the University would make a judgement on the volume and quality of work being put forward and would suggest an appropriate credit rating to reflect this.
- *Relevant level indicators* – the indicators that are selected can be used as assessment criteria for the APEL component. If the component is larger more of the indicators will need to be used.

Student support

The support was provided by the LtW Tutor in the University and a Mentor or Supervisor in the workplace together with the online dialogue environment inside the LtW portal.

Derby University's Learning through Work provides students with support and guidance to help them develop the knowledge and skills necessary to:

- design a programme that is unique and meaningful to them;
- prove what they have learnt;
- identify their future learning needs;

- plan for their personal, professional and career development.

"I've got a mentor at work, a more experienced engineer, and he's guiding me through. He helped me put together my own design module against the criteria the university needed to make sure that it was going to meet an MSc level. He's useful too, because I can talk to him about what I've discovered in my research and he comes up with things that he's found and between us we can develop it. And my tutor has been excellent. Whenever I needed help, I can phone, email or use the dialogue facility on the web, and we can sort things out."

– John Blundell, LtW MSc (Eng) Student, Derby University, Alstom Power

Student support in Learning through Work is very important as the student needs to feel that if they need help, for example with completion of the learning contract, that the support infrastructure is available to assist them.

Industrial relationship

For the students undertaking the Learning through Work approach, the industrial relationship is a given, in so far as, students are normally employed and the employer is responsible for paying for the WBL programme undertaken.

Derby University has been approached by companies interested in the 'chunks of learning' style that enables employees to gain HE qualifications in their own time, using the Learndirect LtW framework for negotiated learning. The ability to credit prior experience and learning, enable employees to shorten programme timescales, and suit employers better than pre-defined, rigid pro-

gramme that stretch over a long time and involve employees spending time out of the workplace.

Since 2000, Derby University has worked with employers to produce programmes for individual learners or cohort/group learners, covering a range of qualifications from specific upskilling delivering credits to masters' level awards.

The driving factor has been the company or learner specific requirement that led to a programme of study, which met target learning outcomes in an industrial/business context.

Assessment and feedback

The assessment has been driven by satisfying 'learning outcomes' and meeting the appropriate level indicators for the awards

Derby University uses the level indicators in Learndirect's Learning through Work, and these have been built on from the standards identified at each HE level by QAA, and by the regional credit consortia descriptions. The level indicators cover five main areas:

- Complexity and responsibility;
- Scope;
- Thinking and understanding;
- Investigation and evaluation;
- Innovation and originality.

The level indicators are written in generics, not sector specific as they apply not just to engineering and technology.

The level indicators relate to HE levels as follows.



Level indicator	HE level	Qualification type
4	HE 1	Certificate in Higher Education
5	HE 2	Diploma in Higher Education
6	HE 3	Honours Degree, graduate diploma
7	HE 4	Postgraduate / Master's
8	HE 5	Doctorate

Decisions on the types of assessment are the product of discussions between the student and the tutor. Assessment is in the form of reports, assignments, log books, portfolios and/or plans.

Motivation for WBL

Derby University has seen the demand for Learning through Work programmes grow from just 41 in 2001 to a 2007 target of 1205 students. This growth clearly indicates that there is a demand for Learning through Work WBL.

Derby found that a key motivator for industry was the ability to deliver tailored responsive solutions to stated learning needs. In addition, business wanted delivery in appropriate timescales and to meet their budget constraints.

For example, Alsthom Power has funded a cohort of 12 students on an LtW programme of specific knowledge up-skilling. Having the flexibility and the industrial context was important, they said.

The RAF (Engineering Division) had also a set of requirements to up-skill their engineers. They wanted the learning to have credit awards at the end. A 30 unit programme with credits of learning was specifically created to meet both the RAF needs, through Derby University's LtW programme.

University of Leeds – Case Study

This particular case study focuses on Work Based Learning Unit's partnership with Yorkshire Water; however the WBL Unit also has programmes with the Cabinet Office's Emergency Planning College and Abu Dhabi Police Force.

Procedures and practice of WBL

The WBL Unit at Leeds University have developed an academic framework for Postgraduate Diploma (PgD), Masters, Postgraduate Certificate, City and Guilds Licentiate (LCGI) and Graduateship, that enables modules to be mixed and matched, and supplemented with other modules, as long as the compulsory modules of induction, evaluation and research methods are taken.

This framework provides flexibility to the University in meeting the needs of business and industry, but still ensures academic rigour in the development of the programmes.

The structure of the programmes is based on capabilities of the student, and focus on demonstrating key skills in work performance in a variety of areas.

The learning contract

The learning contract forms part of the 'Learning Development Plan' and is a detailed account of what the student's learning objectives are and what they are going to do to achieve their stated learning objectives. The contract establishes what is expected between all parties – the student, the industrial supervisor/manager and the WBL unit.

The contract included identification of when assignments were to be delivered and what would happen if the assignments were delivered late.

Student support

Each of the programmes included induction, and required the establishment of 'Learning Set' to enable the students to self-manage throughout the programme.

In the programmes, the students were encouraged to be supportive with each other in the 'Learning Set'. The tutor and industrial supervisor worked on ensuring everyone got through and passed the programme. The environment of learning was more camaraderie than competitive.

The students on the programme were encouraged to write their own business case to their own line manager. This ensured a level of commitment, motivation and dedication to completing the programme. If any student appeared to be flagging, they would be interviewed by two WBL university staff.

It was a requirement for every WBL student to have a Mentor at work and attend Continual Learning meetings, as a large portion of the WBL was concerned with the mentoring process and management of learning.

The industrial relationship

Background

In 1995, Yorkshire Water was ranked at tenth in the OFWAT ratings. Following a board change in 1995, Yorkshire Water looked to how they could improve business and management performance. They wanted to prepare leaders to head up the organisation. At the time, people development



was not focussed on, and the operation was very silo-based. There was little integration of managers and management development. By 1999 the workforce had shrunk by 20% (500 people) and leadership was being seen as more important than management.

Yorkshire Water employed Kelda to review Universities for corporate learning programmes. Subsequently, Leeds University was selected. YW explained that they needed a route through to higher level management qualifications. It was the tradition that people at YW became managers because of their technical skills and not their people management skills. It was their people management skills that needed improving. The junior to middle managers needed a post graduate diploma level programme in Management.

YW also needed a postgraduate programme in Asset Management, but it could not be examined, as the idea of exams and tests made management staff uncomfortable.

The WBL unit put forth their academic framework to identify what needed to be undertaken academically to constitute the receipt of the postgraduate award. YW then placed into the framework their own learning requirements. The focus was not to make the learning too prescriptive, however it was important to show that it wasn't just the YW process showing best practice but the best way to do a process using knowledge of that process in the wider context. The framework afforded the opportunity to give the learning relevance in terms of YW practices, processes and procedures, but also attributed a broader context that may not have been apparent had the learning just been focused on YW activity.

The PgD in Management was entirely work based and assessment was not examined. Five of the modules were selected from the existing MBA module, together with a customised induction and evaluation module.

Assessment and Feedback

The Graduateship programme required a number of assignments to be undertaken, that built into a project report. A presentation to the group and to the tutor was also required. The students had to include a reflective report, to reflect on what they had learnt and how they had learnt it.

The students were required to create a 'Learning Development Plan' at their induction stage, and this would monitor on a monthly basis what they were doing in terms of learning and the learning objectives associated with each activity.

Accreditation and Value Add

A City and Guilds Licentiateship qualification is offered on Graduateship, Postgraduate Certificate and MSc.

Motivation for WBL

The University has used WBL to meet a need in the business community, instead of just offering a prescriptive programme, the WBL academic framework enabled the 'picking and mixing' of taught modules with work-based assignments, projects and reports to create a customised programme focused on industry needs.

5.3 Learning at Work Approach

Both employers and employees see lack of training as the single biggest barrier to increasing employee productivity.⁴⁹ A DTI survey has shown that in engineering companies the number of days spent training existing employees and new recruits is directly related to company performance.⁵⁰ One third of workers say they could do their job better if they had more training.⁵¹

In the context of learning *at work*, employer and the employee learners often share similar values such as the common occupational focus.

During the course of this research, the learning *at work* WBL approach was mainly confined to the Open University (OU) provision.

The OU has had a huge impact on pedagogic practice across the higher education sector, its learning materials are used widely in developing curriculum and its Associated Lecturers are members of staff in universities throughout the UK. In addition, the OU runs a network of regional student support centres backed up by national call centres of specialist advisors.

The OU is already engaging with WBL agenda in a number of contexts, including the development and delivery of a large national Foundation Degrees, accreditation of workplace learning and the outputs of corporate universities, and in constructing pathways from level 3 to level 4 learning.

The OU in partnership with a consortium of HEIs, has created a partnership arrangement to support the enhancement of teaching of strategically important and vulnerable subjects including opening up access to science and

technology courses at traditional universities by creating new entry routes through a 2+2 degree model.

Through its Credit Transfer programme the OU is helping employers to quality assure their own training and education programmes as well as offering transferability of credit for the employees who take them. This, coupled with the expertise of the OU Validation Service, could provide the foundation for a national qualifications framework that would overcome the comparability problems that would result from working on qualifications frameworks only at regional level.

In the area of Continuing Professional Development, the OU's pioneering work in the aggregation of CPD short courses for the purpose of credit award could provide a strong model for other HEIs generally, and engineering and technology departments particularly. Accreditation of Prior Experiential Learning (APEL) is another area in which the OU's systematic approach could help other institutions to build more efficient and scaleable APEL procedures.

The research evaluated the Foundation Degree in ICT (Code: G04), where WBL forms 25% of the course. This FD has been written specifically for students in the workplace and as such all course activities and assessments are integrated into

⁴⁹ Productivity & People, Investors in People/NOP World, 2001

⁵⁰ DTI 1997 / 2001
<http://www.hm-treasury.gov.uk/media/F76/F3/257.pdf>

⁵¹ MORI, A Nation Ready to Learn? 2002



their workplace. Learners receive pre- and post-registration information which they show to their employers. Learners must be employed such that they work with ICTs for at least 8 hours per week for the duration of the course. No workplace visits are made. Learners negotiate with their employer prior to registration on the course. Once registered, they identify a 'Confirmer' who acts as a critical friend throughout the course. The OU Tutor undertakes a telephone survey with a sample of 15% of the Confirmers.

Generic skills are built into the Foundation Degree programme and are also highlighted on all course activities and assignments.

The motivations of most learners to study on this course were primary related to career rather than personal development opportunities. Some perceived that their studies would help get them a job. Some thought the knowledge and skills gained would enable them to carry out their current post more effectively. Others saw the potential of gaining a qualification would provide them with the opportunity to 'change direction' and embark on a new career altogether.

When learners were asked about how they felt before beginning the course many have expressed doubts about their ability to cope with studying. This anxiety often manifested itself through learners questioning whether they would be 'clever' or 'academic' or 'good enough'. Some learners failed to identify themselves as a 'student', regarding their course as almost an extension of their job.

The study highlighted several difficulties with regard to managing competing demands of

study, family, work, and social commitments. All learners sacrificed time with their partners and/or children in order to study and felt guilty about it. Learners from all groups reported that they would have benefited from more information, advice and guidance relating to the amount and level of coursework, financial and time commitments involved before they started their course.

Learners tended to receive support and encouragement from a variety of sources. These included peers, the course tutor(s), partners, children and other family members, friends and colleagues at work.

Learners also felt that the 'soft' outcomes of their learning, such as increased self-confidence and self-esteem were considered just as significant for them than 'hard' outcomes of credits and qualifications.

5.4 Summary of Think-Tank / Focus Group Responses

The participants have considered the initial findings from the Interim Report and have highlighted the following issues:

Definition of WBL

The working definition of WBL used in this study is generally accepted. The think-tank has stressed the need to have a 'shared understanding' of WBL across all stakeholders.

The role of HEFCE and QAA

The role of HEFCE is seen as that of providing funding and direction to the HE sector, as well as challenging HEIs to respond to economic and societal needs in a timely and effective manner. Three points that were identified as crucial to the development and uptake of WBL by HEI are:

1. 'Bite sized' learning units for the HE sector.⁵²
2. Funding rules to enable part award or learning credits to be funded.
3. Transferability and recognition – The credits and indeed degrees, have to have transferability in terms of recognition. It was generally accepted that this is the most difficult challenge. However, the opportunity for getting a series of more generic units jointly recognised as a first step is considered to be more realistic. The HE Academy is expected to play a key role in this development to ensure a sector approach is applied.

Initiatives that could promote WBL should be considered for funding under the 3rd leg activity. HEFCE is encouraged to develop a set of

Performance Indicators for HEIs in dealing with employers.

QAA is expected to provide clearer guidelines of what they are seeking. In doing so, creativity should be inspired and potential obstacles should be removed. It was recognised that QAA is currently reviewing its Code of Practice. The review aims to cater for future learners such as employees and mature students, as well as the traditional 18 years old student-entrants to HE. In this context, the HE sector has to 'adjust' its understanding and expectation of where future students will be coming from, as the supply of students is dramatically changing and in many places is diminishing.

Employer-university links

The role of HEIs in developing systems to facilitate WBL was strongly criticised by the participating industrialists. Two major problems were identified: firstly, the portability of part qualification and that each HEI has its own credit accumulation scheme. Secondly, the credit units HEIs award (120/240/360) are not suitable.

They are too large and are mainly designed for long awards that are primarily undertaken at the HEI. The industrialists have highlighted the tension between the 'off-the-job' training (primarily, undertaken at an HEI) which may amount to 5 days a year, versus the specific and generic experiential learning that takes place at work.

The participating academics have highlighted the annual model of 120/240/360 as a system that

⁵² The Burgess Group Report on Credit in England published on 14 December 2006 proposes national credit arrangements for higher education in England which should be structured as a Framework that is linked to the Framework for Higher Education Qualification (FHEQ).



enables students to transfer at the end of an academic year. They stressed that a smaller credit system presents great difficulties with the way programmes are planned and funded. At a foundation degree level, participants were more hopeful about the development of a national framework for FDs in Engineering that will enable a more effective credit transfer between awards at a given level.

There was also criticism about the lack or limited willingness of employers to be involved in academic development including WBL. Representative employer organisations need to do more to raise the level of understanding by employers of the “value” of WBL.

The responsibility of assessing WBL presented a challenge that was shared by both industrialists and academics.

There was a recognition that there is a need for training the industrialists to make them more aware of the educational and quality assurance requirements in HE thereby making the industrialists’ input (which may include a form of assessment of WBL activities) more effective. There was also a general acceptance that HEIs do not have the capacity of academic staff with the necessary industrial experience to provide the level of support required by students in the workplace. Some industrialists suggested that HEIs could harness the capacity of research students by training them to undertake a level of workplace supervision and assessment.

Engaging small businesses in further learning and training remained a fundamental challenge.

In addition, the aspect of equivalence and value of a WBL degree to that of an academic degree remained a big issue.

Some of the critical success factors that were discussed during the think-tank event are given below:

- Need for structured partnerships between employers and HEIs.
- Better gathering and analysis of employer requirements.
- Employer-centred marketing functions in HEIs.
- The demands of WBL activities will need to match the capability of HEIs that deliver such programmes.
- Need for simple and accessible systems for WBL.
- Refocusing the role of employer associations to get at small businesses.
- Government to promote WBL as an investment and not as a cost to business and industry.
- Engineering and technology academics need to be encouraged to get involved in learning through work. HEIs will also need to embrace the concept of ‘facilitators of learning’.
- The credit accumulation framework is very fundamental to the future development of WBL.
- The quality assurance framework needs to be more flexible, innovative and reflective of the current and future needs of WBL.
- The need for finding champions that can demonstrate exemplary practice in WBL in engineering and technology and then replicate the characteristics and attributes of such a practice across the sector.



6. ANALYSIS OF RESEARCH



This research paper provides a comprehensive overview of development activities in WBL within British higher education. While there have been many other reviews of WBL in the last few years, none have focussed on the engineering and technology sector.

This is an omission for two reasons; firstly the sector can be seen as particularly well suited to some of the methods and underlying principles of WBL as has been evidenced by studies in the USA, and the work with Higher National Diplomas; secondly, the research has established that, while there are examples of good WBL practice the sector has been slow to respond to this approach to delivery, and that the majority of HEIs are not engaged in WBL, as has been defined in this research.⁵³

The starting position of this paper is that WBL is a good thing – the evidence from both employers who have fully engaged with a WBL process and from students as recipients of this approach to learning is strikingly positive. The paper has identified a range of research evidence to support the benefits, albeit within fairly small research samples. On the other hand it is recognised that the purer forms of WBL which are embodied in the concept of *learning through work* has its critics. Among the most prevalent of the criticisms, academics expressed concern about the quality assurance issues and the logistics of assessment.

There was also a frank admission from some teaching departments that they were not equipped in

⁵³ D Portwood & J Naish, HEC Journal 94, ISSN 1355-0667

terms of their industry experience to undertake the task of designing and delivering these programmes. The research found that the majority view was that the value of work experience within a degree programme per se is axiomatic but that it should be seen as a distinct activity which may or may not be formally assessed, but where this assessment would be adjunctive and articulated separately from the degree.

The key headlines of the research are:

- There are real problems over the definition of WBL which have made difficult the determination of a common set of rules and procedures which will underpin WBL practice. Current definitions from QAA in particular are narrow and conservative and do not address the concept of assessing learning through work.
- WBL, as defined here, is very much a minority activity with less than ten universities incorporating work related training into the formal degree assessment process.
- The value to the students of the work experience as a part of the academic process – primarily in developing generic, but transferable, skills in self-management, teamwork, time management etc. has been clearly evidenced in the research. It was not possible to make judgements about the respective merits of degrees with and without integral WBL components in respect of the students' knowledge acquisition and breadth and depth of the academic content.

The range of generic skills described is not normally addressed within a taught academic programme, although there is some evidence that this is changing in some degrees. Given their perceived impor-

tance by employers when assessing potential graduates as employees, and the values placed in their development within their work experience by the students, this is an area worth further investigation.

- In the institutions that offer learning through work WBL programmes, the assessment is packed into credits that can be transferable amongst other academic programmes. We have found that their main method of operation is to link specific learning objectives of an individual or cohort to a dedicated programme of study (both taught and online) and APL assessment.
- According to the definition of WBL used in this research, the majority of universities are *either not involved or are somewhat limited* in their WBL activity. There were a range of solutions to the validation of work experience - one year sandwich, bolt on accreditation such as: Professional Institution Accreditation for Incorporated engineers, or offering licentiate-ship – but these all started from the premise that the work related elements of the course were not assessed as part of the overall credits towards the degree.
- QAA guidelines are not clear or helpful about the assessment process where WBL needs to be assessed, and therefore, do not support any move towards WBL.⁵⁴ This feedback was a reflection of the views collected from many of lecturers that have the responsibility for industrial placements, and participated in the 360-degree evaluation. Their main concern was about the interpretation of the QAA precepts for workplace learning and ensuring equivalence to those programmes that are based on learning at the university. Where HE is delivered in FE colleges, there are also cultural and



operational issues concerning FE colleges being made fully familiar with the expected QAA audits and reviews.

- The HEFCE funding regime with its emphasis on research, and the poor development of third leg funding is providing disincentive to HEIs to engage in developing work related contracts. There is an initial development cost to promoting training and development services in what is a competitive market and in many HEIs there is not the support to move in that direction.
- A number of best practice models have been highlighted to validate learning in the workplace. These models demonstrate examples of employer led, flexible provision where the assessment is managed through building a portfolio of learning over a period of time.
- An important area for further investigation is this employer led focus – where universities can recognise and develop their role in meeting CPD needs of employers (and, of course, employees). In this regard, the role of the new SSCs will be vital as they are the formal representative voice of the employers within the various sub-sectors of engineering and technology, who not only define the standards for practice but will also determine the routes to learning. They need to be more proactive in communicating to employers the nature and value of WBL and in collaborating with a local educational provider.
- A critical success factor will be the conversion of assessment to a unit based or credit based model for recoding student achievements and for providing support for students and their progression into and within higher education.

The recently published Burgess Group Report on Credit in England proposes arrangements for a national credit framework for higher education in England. It is early days to measure the reaction and uptake to this proposed framework. However, this development is important for enabling growth in recognised workplace learning and training. It will also have a major impact on the development of the European Credit Transfer System (ECTS).⁵⁵

- Research has shown that universities that have good WBL (either learning for work or learning through work) are the ones that have a good track record in building and maintaining business relationships in a well co-ordinated and professional (as opposed to ad-hoc) way. In the HEIs researched there was little evidence of close working relationships between the academic department and the business development units. One has to ask where the responsibility lies for the development and fostering of employer relations. There does need to be some level of symbiosis between the two areas to ensure that the strengths of each complement one another. The current position is too frequently dependent on the

54 Currently, QAA is reviewing its Code of practice for the assurance of academic quality and standards in higher education (the Code of practice). It is anticipated that better guidance for WBL will be included.

55 European Credit Transfer and Accumulation System (ECTS) was introduced in 1989, within the framework of Erasmus, now is part of the Socrates programme. ECTS was set up initially for credit transfer to facilitate the recognition of periods of study abroad and thus enhanced the quality and volume of student mobility in Europe. Recently ECTS is developing into an accumulation system to be implemented at institutional, regional, national and European level. This is one of the key objectives of the Bologna Declaration of June 1999. ECTS is a student-centred system based on the student workload required to achieve the objectives of a programme, objectives preferably specified in terms of the learning outcomes and competences to be acquired.

motivation and ability of one academic member of staff or manager to build on the relations with employers. It is also the case that there is a high variance in the entrepreneurial cultures within the academic departments and it is equally important that when opportunities arise there is a commitment to take them and use them.

As it has been demonstrated, in a rapidly evolving society and globally competitive economy, the role of demand-led educational provision, through employer engagement, is fundamental to the creation of a high-value added, knowledge based economy. Higher education contributes to all drivers of competitiveness, particularly to innovation and skills development. Employer engagement, presents a broad range of opportunities for HEIs, including amongst others, the following:

- Widening participation and meeting the changing needs of learners particularly those who combine work and study in different ways (e.g. Lifelong Learning and CPD), including access to academic, administrative and pastoral support;
- Enhancing the employability of graduates, as well as, recognising the changing nature of 'graduateness' in HE (including those learners pursuing part-time, short, work-based and professional courses);
- Strengthening their knowledge transfer capability with business and the community at large.

In any future development, a key consideration that should be factored in is the need to meet the requirements of learners as independent decision makers in their learning.



7. SUGGESTED MEASURES FOR IMPROVEMENT



The research identified a number of limiting factors in the development and uptake of WBL programmes, particularly in engineering and technology. It is suggested that the following are the most important.

The needs of the learner from industry

The Government acknowledges that industrial subject relevance and flexibility are issues for students coming from industry. These issues HEIs need to address in their development of WBL programmes. Increasingly the proportion of part time degree and post graduate study will increase. These students will want flexible learning options to choose from a range of modes of study. In order to provide this, universities must offer far more online and associated services. Students who are working will want to have their prior experience taken into account and possibly use their job and work environment as the vehicle for the completion of their studies.

Confused WBL agenda

A clearer understanding of who leads and who supports in WBL initiatives is required at national, regional and sectoral levels. The concept of work related credits must be brought into the mainstream and a formula found for awarding a credit rating to within the majority of subject options.

Employer engagement

What kind of employer engagement framework and support processes should be put in place to overcome the reactive and incoherent approach taken by agencies and representative bodies? There is a strong move towards a regional or even a sub-regional strategy for employer

engagement which was supported by the Leitch Review, which involve the RDAs and the related SSCs in coming together to provide joined up planning for the funding of the work related initiatives.

Engaging small engineering and technology businesses

Much of the employer engagement strategies have been driven by mainly large engineering companies and by any regional imperative laid down by the Skills Partnerships in the RDAs. Sensitising small and micro engineering and technology businesses remains a major challenge for government departments and agencies. Should there be tax incentives for small companies and individuals to engage in high level and postgraduate learning? Further Education colleges seem to have a better handle on interfacing with small businesses than HEIs.⁵⁶

“SME employers within our sectors have by necessity become very “lean” in their approach to business, and will not always have resources necessary to engage with HEI, or organise effective Work-Based Learning for students. The costs of HE engagement and/or organising effective Work-Based Learning are considerable, and for the average SME are prohibitive.”

– John Harris, Higher Education Manager, SEMTA

Funding for WBL

There is a lack of clarity as to how WBL programmes are funded. Should they be costed as part of a part-time funding structure or not? Resource and support for WBL (looking at the opportunity, cost of workload, management, and developing bespoke provision) poses a

major challenge for HEFCE and its HEIs where resources are already tight). And how would one address the funding issues of ‘open’ and ‘closed’ industrially focused courses (i.e. how much could be attributed as HEFCE funding?) The development of WBL opportunities would be further enhanced by a greater emphasis on ‘third leg’ funding and the development of long term relationships with key employers locally and regionally.

Developing flexible provision

Employer feedback is clear – universities do not offer what they want when they want it. One large part of this problem surrounds the monolithic nature of the degree and the restrictions to achieving credits based on a 30 or 60 hour modular system. As the demographic dip starts, the growth in degree uptake will come now from those who are already in work.

Quality assurance

“We feel that quality assurance and support mechanisms need to be improved to take into account the different delivery and assessment methods required for WBL. In particular, academic staff will generally

56 Two comprehensive research studies conducted by the NEF:

- Knowledge and Technology Exchange in Further Education Colleges, September 2005: (<http://www.neweng.org.uk/uploads/KTT-Final-Draft-Report.pdf>)
- Assessing the needs of further education colleges in the management of intermediate and higher level engineering programmes, October 2006: (<http://www.neweng.org.uk/uploads/reports/Understanding-the-Needs-of-FE-Colleges06.pdf>)

These studies involved the participation of over 30% of all the colleges in England. They also included feedback from over 300 businesses and a number of key stakeholders at national, regional and local levels.



require a great deal of further training in WBL as there are different skills required if they are to operate programmes effectively and to the benefit of the learner.”

– *Automotive Skills*

This sentiment was also echoed by a number of professional institutions.

Capability and competence in delivering WBL

One of the main impediments to the development of work-related learning of any description will be the limited level of knowledge and experience in current industry practice. This impacts on both the level of interest that an academic member of staff might show in getting involved but also the ability that the individual would have in developing student projects, liaising with company staff, including those charged with supervision etc. If HEIs are serious about WBL as a route for learners they need to invest in getting key staff out into industry and to look at how current practice is reflected in what they teach.

The need for a WBL curriculum

While the evidence for good practice was found, the research also identified a profound lack of congruence or fit in delivery of WBL. This is due to the lack of central guidance or control by HEFCE, QAA or any of the other representative bodies. Given the universities closely guard their independence, any attempt to create a system which inhibited that independence will be resisted and, of course, WBL has not figured on the list of priorities to address. Nevertheless this research, combined with the government’s own pronouncements about employability and productivity, suggest that this has to change and that measure need to be taken to rectify the situation.

On the following pages are suggested measures that the research has identified for the various stakeholders to consider.

Government

Funding for WBL activities

The Government should consider funding initiatives to encourage and support WBL activities.

Promotion and communication

Promote more cohesive WBL strategies and policies to achieve a better understanding of what WBL is, and raise the esteem and profile of awards achieved through WBL amongst all stakeholders (employers, government agencies, HEIs and learners).

Corrective measures in the demand

Stimulating demand for higher level skills through the implementation of targeted communications activities based on effective market segmentation (this is an opportunity for central and regional governments to work with RDAs and employer representative organisations).

Learndirect – learning through work

Concerted effort to promote the use of Learndirect/Ufl – the learning through work Portal - to HEIs, employers and learners.

HEFCE/QAA

Better targeting

HEFCE could consider targeting initiatives that will enhance and support the development and sustainability of WBL programmes in engineering and technology. This should include a review of the role of Third leg funding.

Assessment methodologies

Defining better guidelines of 'how to' processes, roles and methods for collecting evidence of assessed learning outcomes from WBL elements. Such guidelines are also crucial if programmes were to secure professional accreditation.

A steering group led by HEFCE with representatives from government, professional bodies, SSCs, QAA, HE academy, fDf and lifelong learning networks is required. Such a steering group should have a remit for defining the academic standards, benchmarks and levels in an easily interpretable manner for employers to understand.

Support mechanisms

Establishing a range of effective support mechanisms will need to be investigated further. HEIs, particularly those which have Centres for Excellence in Teaching and Learning (CETLs) will need to work with learners and employers to develop these support mechanisms.



SSCs / Employer Organisations

Learning contracts

Many companies stated that they would favour a generically accepted learning contract for the engineering and technology sector. This is an opportunity for the SSCs in partnership with the Engineering Subject Centre and the EC(UK) to formulate.

One-stop-shop information

The Engineering SSCs could provide a 'one stop shop' for all information (including HE courses and grants) for companies and individuals interested in WBL. A joint information portal that focuses on WBL in engineering and technology should be considered to encourage the development of online communities of employee-learners. Such a portal should take advantage of the Web 2.0 tools such as wikis and blogs that support interoperability of learning tools and course content thereby making information sharing and user generated content publishing much easier. Building on the concept of distributed learning environment, the engineering and technology SSCs, RDAs, professional institutions, Engineering Subject Centre, Learndirect and other stakeholders should all participate in the development and promotion of the portal. This approach could create a unique engineering and technology learning environment.

Measuring effectiveness of learning at the workplace

There is an opportunity for engineering employer organisations to develop mechanisms such as the use of Kirkpatrick Model for Training Evaluation.⁵⁷

RDAs

Structured development of FDs

National Development of FDs through partnerships (regional or national) with a focus on 'local delivery'. Progression routes will need to be considered including those through WBL routes.

Better knowledge management systems

RDAs could consider strategies for providing transparency, avoiding replication of courses, enabling the re-use of courseware and resources amongst HE providers and the development of better information systems for employers and learners to access with a local and regional focus. A web-based Portal should be considered to be the single point of WBL activities within the region.

⁵⁷ Kirkpatrick and Beyond: A review of models of training evaluation, Tamkin P, Yarnall J, Kerrin M. IES Report 392, 2002. ISBN: 978-1-85184-321-3

HE Academy / Engineering Subject Centre

Sharing of good practice

The HE Academy could consider the promulgation and transference of WBL good practices from other disciplines such as those in the clinical based subjects to engineering and technology.

Professional development in credit based systems

There is a clear demand for providing training in credit based modular framework. The Engineering Subject Centre could consider ways of developing expertise within higher education including facilitating the provisions of events, resources and brokering networks.

Training to become a professional WBL mentor or coach

This is an opportunity for the HE Academy to consider, in partnership with staff development units in universities and other stakeholders

Generic and transferable skillsets.

There is a clear opportunity for the Subject Centre to lead the development of an engineering and technology framework that focuses on developing and assessing 'Generic Transferable Skills' on a WBL programme. There are many good examples that could be adopted and adapted to suite the sector. The professional bodies should also consider linking their initial professional training requirements to this framework. This framework could then be presented to QAA for mandating and being fed into their code of practice.

EC^(UK) / professional bodies

Guiding principles and advice

There needs to be a short set of Guiding Principles (Led by EC^(UK) and the professional institutions) on what makes effective and recognisable WBL activity.

This could be supplemented by signposting to developing good practice (undertaken by the Engineering Subject Centre).

Professional development for industrial supervisors.

The National Skills Academies could provide training sessions for Engineering Supervisors from industry to overcome the ambiguity surrounding issues of assessing Work-Based Learning to meet a particular educational level. This is an opportunity for professional institutions to work with the National Skills Academics in developing and delivering these sessions.

Information provision

There needs to be a coordinated approach by the professional institutions for the promotion of WBL to their memberships (both organisations and individuals).



Students / employees

Focus of learner

A better coordinated approach that blends employer needs with the needs of the employee / students within a sector or sub-sector. This could be handled through a joint board that brings together the SSCs, the Skills Academies and student representative bodies (e.g. NSU) to help with interpreting and validating the generic needs to enable HEIs to respond accordingly. This should be an annual process.

Student representative bodies should work with HEFCE to develop better mechanisms for capturing feedback from employee students that are registered on WBL programmes through for example the annual National Student Survey.

There is an opportunity for organisations such as Investors in People and the Manufacturing Advisory Service to provide guidance to employee learners on how to engage in Work-Based Learning through their promotional campaigns and information networks and web-portals.



8. CONCLUDING REMARKS AND RECOMMENDATIONS



There are no simple solutions to addressing the blocks to development identified in the previous section.

However, the research has highlighted a low level of commitment and adaptation to WBL policy and practice, and a funding and quality assurance infrastructure which hinders rather than helps its development. The research has pointed to some good practice examples both here in the UK, and in other countries such as Australia, which demonstrate that the approach can add real value to vocational degree programmes and to the student's enjoyment and progress towards professional competence. Given the current economic climate, the research suggests that there needs to be a far more concerted effort from all the stakeholders in Higher Education to create a more co-ordinated engineering-based WBL approach that aims to improve transparency, collaboration and support for WBL learners.

In conclusion, this research suggests a range of measures which can be adopted to improve the take up and practice of WBL in the HE sector.

1. Universities and employers must see WBL as an investment not a cost. The funding of provision has to support the development of WBL more effectively. It is recommended that the following measures be considered by HEFCE.

An incentive model be developed to increase the take up of employer engagement by:

- re-energising 'third leg' funding;
- supporting staff development to take

academics out into industry and foster wider and deeper employer relationships; and

- building the capability of the business development units to generate leads for the engineering and technology departments.

The funding model must address the **funding of part years** or smaller units of learning to support both APL and credit accumulation;

The funding model should recognise the **value of generic skills** and facilitate their inclusion into the modular subject framework.

This area of the research has great potential but more work needs to be done to create a viable framework within which to locate these generic employability skills alongside subject specific skills, in such a way that they can be assessed and accredited within the main degree system.

Secondly further work needs to be undertaken to take the Burgess Report recommendations forward and to translate them into a practical framework within which WBL assessment can operate.

2. There is a need for structured partnerships between employers and universities – it is recommended that the RDAs extend their efforts to develop strategic skills partnerships and proactively encourage the promulgation of good practice and the results of successful tailor-made solutions between large companies and university partners. RDAs should be able to find champions to demonstrate exemplary practice then copy it.
3. Employers must be engaged at national and regional level to contribute more fully to the design and development of WBL. It is recommended that targets are applied to the SSCs to facilitate the development of activities which support the delivery of degrees through all forms of workplace learning;
4. It is further recommended that Employer Associations, in particular the EEF (Engineering Employers Federation), are supported at regional and local levels by the SSCs to engage SMEs. Capacity issues with SME involvement in WBL mean that only through the support of larger companies and the local government infrastructure can this be achieved, as has been demonstrated by the *Train-For-Gain* initiative;
5. The most intractable issue may be that of persuading the academic community about the equivalence of a WBL degree to an academic degree. This could possibly be achieved by addressing quality concerns through the development of the Australian model for generic skills and its integration into the degree credit framework alongside subject-specific knowledge. There is an excellent opportunity here for some comparative research to investigate how this model works and where it is most effective, and to apply these findings to the UK environment;
6. WBL activity needs to match the university's capabilities. There needs to be a shift by the HEIs towards seeing themselves as facilitators for learning (e.g. design, support and assess learning), and not as repositories for



learning. Academics need to be encouraged to get involved in learning through work and there is a need for investment in staff who can deliver WBL effectively. It is recommended that further work be undertaken to develop staff development models and associated training to develop skills and strategies to enable teaching departments to effectively and efficiently make the transition to work based delivery.

APPENDIX A – List of universities contacted (as of October 2006)

Institution	Contact
Anglia	Professor Adrian Moore
Aston	Professor Ashok Kochhar
Bath	Dr Joss Darling and Prof Tony Mileham
Bradford	Professor Andrew Day
Brighton	Dal Koshal
Bristol	John Sims Williams and Bill Hadall
Bolton	Dr Peter Myler
Bournemouth	Dr Reza Sahandi
Brunel	Prof Savvas Tassou
City	Nicky Solomon
Coventry	Prof Ian Marshall and Mr Ian Dunn
Derby	Prof Freda Tallantyre
East London	Prof Roy Perryman
Exeter	Professor Ken Evans
Harper Adams	Dr Abigail Hind
Hertfordshire	Prof John Senior
Huddersfield	Prof Jim Yip
Hull	Prof Stephanie Haywood
Imperial College	Prof Julia King and Prof David Nethercot
Kent	Ursula Fuller
Kingston	Dr Peter Mason
Leeds	Margaret Gibbons and Prof Nigel J Smith
Leicester	Prof Sarah Spurgeon
Liverpool	Prof Peter Goodhew and Prof Gareth Padfield
Liverpool John Moores	Dr Ian D Jenkinson
Loughborough	Prof John Dickens and Dr Matthew Frost
Manchester	Prof Hugh McCann and Prof Peter Hicks
Manchester Metropolitan	Dr John Ainscough
Middlesex	Prof Jonathan Garnett
Northampton	Dr Nick Boutle and Alan Casey
Open University	Richard Seaton
Plymouth	Steven Donohoe
Portsmouth	Dr Dominic Fox
Reading	Chris Guy
Salford	Andy Turner
Southampton	Dr Neil Richardson and Prof Hammond
Solent	Alan Robinson
Sunderland	Professor Peter Smith
UCE- Birmingham	Prof Graham Rogers
University College London	Prof Nicos Ladommatos
UWE - Bristol	Dr Terry Davies
Westminster	Prof Chaz Choudrey and Dr Ian Locke
Wolverhampton	Dr Alison Halstead and Dr I A Oraifige
Warwick	Dr Tony Price

Total participants = 30; Not able to due to other pressures = 3; No response = 10

APPENDIX B – Questions to HEIs

Views and comments were sought on the following five points

- 1.** Is your School / Department involved in WBL programmes at higher education level (Foundation Degrees, Undergraduate and postgraduate diplomas and degrees as well as specialised continuous professional development –CPD modules)?
- 2.** If so, to what extent are you involved? (e.g. typical number of learners per year and type of study)
- 3.** What are the key issues and challenges that your department / school face in delivering a work-based-learning programme?
- 4.** How effective do you consider your collaborative arrangements with your partner employers?
- 5.** What suggestions would you make to help the development and delivery of future WBL programmes? (e.g. support mechanisms, use of e-learning, clearer university guidance on accreditation)

APPENDIX C – List of the 12 HEIs who have participated in the 360 degree evaluation

Bath	Parker Stirling QinetiQ
Brighton	Pyroban
Brunel	Cellbond Composites Icore International
Derby	Alsthom Power Bowman & Curtman Rolls Royce Tarmac
Huddersfield	DePuy International- A Division of Johnson & Johnson Corridor Arts (Music Technology)
Leeds	Yorkshire Water
Loughborough	AMEC JCB
Northampton ⁵⁸	Northhants Engineering Training Partnership ⁵⁹
Portsmouth	Portsmouth City Council Vosper Thorneycroft
Salford	Laing O'Rourke (Laing Group)
Sunderland	Nissan Bret-Oil CISCO
UCE, Birmingham	Cybamatic Limited Hydro-Logic Ltd TIC Production Unit

Note

The University of Westminster has also participated in a 360-degree evaluation that was centred on their BSc in Biomedical Sciences and was delivered in partnership with the NHS- the North East London Strategic Health Authority and accredited by the Health Professions Council (HPC).

58 The University of Northampton formally the University College Northampton and Nene College).

59 The Northamptonshire Engineering Training Partnership Limited (NETP) links the Engineering Division of Northampton University with a range of locally-based engineering employers including: Cosworth Engineering, KAB Seating, Cummins Engine Company, British Timken, Express Lift Company, Plessey Research – Caswell).

APPENDIX D – List of professional bodies, councils and institutions

Institutions

IET, Michelle Richmond
IMechE, Sir Michael Moore (No response)
IChemE, Neil Atkinson (No response)
ICE, Deborah Seddon
Royal Academy of Engineering, Dr Bob Ditchfield

Councils

Higher Education Council for England (HEFCE), Dr Liz Beaty and Wendy Staples
Quality Assurance Agency, Peter Williams and Nick Harris
Engineering Council (UK), Richard Shearman
Engineering Professors Council, Prof Fred Maillardet
Sector Skills Council
SEMTA, John Harris
Cogent, Ms Joanna Woolf and Ms Liz Rooney (No response)
Automotive, Robin Webb
Energy and Utility Skills, Mr David Hellier
EPSRC, Prof Randal W Richards
Knowledge Technology Partnership, KTP, Dr Deborah Buckley-Golder and Kevin Knappett (No response)

Employer associations

Engineering Employers Federation, EEF, Claire Donovan
Institute of Directors, Graeme Leach / Mike Harris

Government departments

DTI, Lord David Sainsbury, Minister for Science and Innovation
DfES, Bill Rammell, Minister for Higher Education
HM Treasury, Lord Sandy Leitch

APPENDIX E – List of companies contacted for their views on WBL

Name	Company	Name	Company
Mr Jimmy Johnston	GKN	Mr John Murphy	BAe Systems
Mr Tim Cawdron	Babcock Infrastructure Services	Ms Becky Smith	BNFL
Martin Stevens	Unimatic Engineers Ltd	Ms Nickie Heathcote	The Boots Group Plc
Ms Claire Hamlin	BP International Ltd	Ms Carole Willshre	British Gas
Mr Nigel Jeremy	Vodafone Group Plc	Mr David Hancock	BT
Ms Claire Alexander	BP	Ms Sue Acheson	ExxonMobil
Andrew Ness	Rolls-Royce Motor Cars Ltd	Ms Michelle Giles	FaberMaunsell
Mr David Edwards	The Honda Institute	Mr David Cayton	Ford Motor Company
Mr John Brown	VT Group plc	Ms Emma Tamblingson	GE
Mr John Derry	Goodrich Actuation Systems Ltd	Mr Roger Woods	Philips Electronics Ltd
Ms Norah Moss	AMEC	Mr Tim O'Rourke	Unilever
Ms Angela Borman	Siemens Industrial Turbo Machinery Ltd	Ms Elaine R Marron	Price Waterhouse Coopers
Ms Carol Harris	BOC Edwards	Mr Gary Argent	Logica
Maureen Constantine	GKN	Mr Jon Symonds	AstraZeneca PLC
Ms Morag McLeod	Philips Centre	Ms Dinah Alan-Smith	AstraZeneca PLC
Mr Martin Graves	Toyota Motor Manufacturing (UK)	Ms Laura K Walker	GSK
Mr Nigel Jones	NMUK Ltd	Mrs Leonie Dorkins	ExxonMobil
Ms Anne Minto	Centrica PLC	Ms Linsey Perry	RailTrack
Mr Richard Hamer	BAE Systems	Ms Lucy Shackleton	Barclays Bank PLC
Mr Mark Haisman	Airbus UK	Ms Nicola Steele	Tesco
Mr Ken Fulton	Rolls-Royce PLC	Ms Ruth Stokes	KPMG
Ms Erica Tyson	Rolls-Royce plc	Mr Tony Ward	BAA
Mr Roger Woods	Philips Electronics UK Ltd	Mr Walter Graves	Connectfree
Dr Martin Thomas	QinetiQ	Dr David Higgs	Malvern Instruments Ltd
Mr Ben Howard	Rapid Electronics Ltd	Mr Peter Harris	Lockheed Martin UK
Mr Stuart Derwent	Southern Water	Ms Lesley Castleton	Lockheed Martin UK
Ms Dawn Ohlson	Thales UK plc	Mr Roger Tingey	Marshall Aerospace
Mr David Pendlington	Unilever R&D	Ms Anne-Marie Sankey	Messier-Dowty
		Dr Nick Hall-Taylor	Chemtech International Limited
		Mr Alan Curtis	JCB

APPENDIX F – Think tank/focus group participants, 14 Nov 2006

Business and industry representatives

Peter Bowler, HR Director, Renishaw, Plc
Norah Moss, Learning Manager, AMEC Plc
Mike Pilbeam, Senior VP, Cisco
Debra Larkman, Head of Learning, Arup
John Attree, Director, London First
Tim Bridgman, Director of Learning, QinetiQ
Steve Dixon, HR Manager, Yorkshire Water

Academic representatives

Prof Freda Tallantyre, HE Academy (former Deputy VC,
Derby University)
Prof John Dickens, Director of the Engineering Subject
Centre and Director of the Engineering Centre for
Excellence in Teaching and Learning, Loughborough
University
Prof John Senior, Pro Vice Chancellor and Dean of
Engineering, University of Hertfordshire (Engineering
Professors' Council representative)
Dr Nick Boutle, Dean of Applied Sciences, University of
Northampton

The engineering profession

Richard Shearman, Deputy Director, EC^(UK)

Government departments/agencies

John Baker, DTI
Owen Fernandez, DfES
Sarbarni Bannerjee, HEFCE
Prof Derek Longhurst, Chief Executive, fdf
Charles Pickford, Director, fdf
Judith Saxton, Learning through Work Manager,
Ufi/Learndirect

Employer organisations

Claire Donovan, Senior Executive, EEF
Mike Harris, Head of Policy, IoD

New Engineering Foundation representatives

Prof Sa'ad Medhat, Chief Executive
Ashley Rowlands, Director of Education
Michelle Medhat, Director of Communications

APPENDIX G – Example of a Learning contract for Engineers (learndirect)

Learning Contract for Mr John Blundell

Contract identifier: *jblundell001*
Learner: *Mr John Blundell (jblundell)*
Printed: *13/11/2006 14:06*
Status: *Awaiting signatures*

Personal Details

Your name, contact details and date of birth

Mr John Blundell

Home address (preferred)

Work address

Home telephone number

*Alstom Power
Performance Projects*

Home email address

*Derby
Derbyshire
DE24 9GH
Work phone number*

Work fax number

Work email address

Preferred contact time:

Evening

Qualifications & Credits

Identify the award or qualification that will be the focus of your contract

University: *University of Derby*
Qualification/Award: *Masters Degree*
Levels & Credits: *Level 4/HE 1: 0 credits
Level 5/HE 2: 0 credits
Level 6/HE 3: 0 credits
Level 7/HE 4: 180 credits
Level 8/HE 4m: 0 credits*

Programme Focus: *Combustion, Fuels and Performance Modelling*

Purpose

Establish the overall purpose of your learning plan

Statement of purpose: *Increase my knowledge of boiler and combustion performance and build on my previous understanding and abilities. This will include a deeper understanding of combustion, burner and furnace design concepts.*

To understand and critically evaluate the use of mathematical models for coal combustion, to predict NOx and UBC.

Increase my opportunity to become a consultative Engineer within the Alstom organisation.

Another benefit to the company would be to maintain / increase our present strong technical ability within the Alstom Power group and it enables the company to project a competent technical profile to prospective new clients.

Aims

Set out your key learning aims

- *Develop my mathematical modelling skills and abilities.*
- *Improve and increase my computer programming skills and knowledge.*
- *Increase my knowledge of coal and its influence on boiler and plant performance.*
- *To utilise mathematical models and computer codes to critically analyse coal combustion.*
- *To gain recognition of the PG level of some of my existing Work-Based Learning.*
- *To critically analyse and undertake a detailed investigation into the impact of Overfire Air systems on performance.*
- *To devise a planned activity route to enable my current learning objectives to be achieved.*
- *To determine NOx and Unburnt Carbon performance with combustion systems.*

Programme components

Set out the components that will make up your programme

Title	Level	Credits	Start	Finish	Status
<i>Boiler design practice</i>	<i>Level 7/HE Level 4</i>	<i>60</i>	<i>15/01/03</i>	<i>29/07/03</i>	<i>completed</i>
<i>Mathematics</i>	<i>Level 6/HE Level 3</i>	<i>15</i>	<i>01/01/04</i>	<i>31/07/04</i>	<i>completed</i>
<i>Computing</i>	<i>Level 7/HE Level 4</i>	<i>15</i>	<i>01/09/03</i>	<i>01/06/04</i>	<i>completed</i>
<i>Design aspects</i>	<i>Level 7/HE Level 4</i>	<i>15</i>	<i>01/07/03</i>	<i>31/12/04</i>	<i>completed</i>
<i>Independent Study Project</i>	<i>Level 7/HE Level 4</i>	<i>60</i>	<i>01/08/04</i>	<i>31/10/05</i>	<i>completed</i>
<i>Programme Learning Contract</i>	<i>Level 7/HE Level 4</i>	<i>15</i>	<i>01/01/03</i>	<i>31/05/05</i>	<i>completed</i>

Boiler design practice

Component type <i>A claim for accreditation of prior learning</i>	Level <i>Level 7/HE Level 4</i>	Credits <i>60</i>	Start <i>15/01/03</i>	Finish <i>29/07/03</i>	Status <i>completed</i>
Objective:	<i>This is a claim based on my previous learning and professional competence as a boiler design engineer, to demonstrate that I have already undertaken significant work at Master's level.</i>				
Related Aims:	<i>To gain recognition of the PG level of some of my existing Work-Based Learning.</i>				
Activities:	<i>My claim covers the activities which have given me a wide range of understanding and experience in boiler design concepts, which I consider demonstrate that much of my work is at Master's level. My evidence draws on specific activities contributing to my professional duties.</i>				
Milestones:	<i>None</i>				
Learning Outcomes:	<i>1: Ability to evaluate and deal with complex design problems.</i> <i>2: Ability to investigate design aspects which are outside of my normal design activities.</i> <i>3: Ability to manage my learning and development at a professional level.</i> <i>4: Ability to apply design concepts and theoretical data to solve problems, including situations where there have been conflicts of opinion.</i> <i>5: Understanding and application of design and computer concepts learnt from courses or self-taught learning to solve design problems.</i>				
Evidence:	<i>Technical presentation – with support material outlining details of the background to the presentation to demonstrate working at Master's level.</i> <i>Computer spreadsheet program to demonstrate use of visual basic macros learnt from introduction to visual basic course</i> <i>Expert witness reports confirming work</i>				
Level Indicators:	<i>1: Full responsibility for methods, actions and immediate and wider impacts which extend beyond the immediate area of practice</i> <i>2: Understanding and acting on interrelationships between wider systems in which the area of practice is located</i> <i>3: Undertaking substantial investigation to address significant areas of practice, using methodologies which are consistent with their purposes and contexts</i> <i>4: Developing novel approaches to systems</i>				

Mathematics

Component type <i>A pre-designed course or module</i>	Level <i>Level 6/HE Level 3</i>	Credits <i>15</i>	Start <i>01/01/04</i>	Finish <i>31/07/04</i>	Status <i>completed</i>
Objective:	<i>To develop and improve my mathematical modelling skills by studying and solving partial differentiation equation problems. In addition, to investigate the use of differential equations in mathematical modelling.</i>				
Related Aims:	<i>Develop my mathematical modelling skills and abilities.</i>				
Activities:	<i>Complete the mathematical distance learning module.</i>				
Milestones:	<i>None</i>				
Learning Outcomes:	<i>1: Demonstrate my understanding of the use of differential equations in mathematical modelling and be able to obtain and evaluate solutions to problems modelled by differential equations. 2: Ability to select and apply suitable methods to obtain the analytical or numerical solution to problems modelled by partial differential equations.</i>				
Evidence:	<i>Coursework - 50% weighting - This will assess my ability to formulate and solve models which are described by differential equations. Examination - 50 % weighting - A three hour unseen closed book examination.</i>				
Level Indicators:	<i>1: Understanding the implications of different issues and courses of action 2: Developing and evaluating a range of practical theories, ideas and models, including to find ways forward in problematic situations 3: Evaluating the actual and potential effects of theories and actions, including impacts outside of the immediate context</i>				

Computing

Component type <i>A pre-designed course or module</i>	Level <i>Level 7/HE Level 4</i>	Credits <i>15</i>	Start <i>01/09/03</i>	Finish <i>01/06/04</i>	Status <i>completed</i>
Objective:	<i>To improve my computing ability. To support my activity and responsibility for the technical computer programs within the engineering department of the company. To learn a new computer language (Java).</i>				
Related Aims:	<i>Improve and increase my computer programming skills and knowledge.</i>				

Activities:	<i>Complete a distance learning computer course.</i>
Milestones:	<i>none</i>
Learning Outcomes:	<i>1: Understand and use fundamental programming concepts and constructs 2: Design, develop and test programs using a programming tool</i>
Evidence:	<i>Coursework - 80% weighting Examination - 20 % weighting</i>
Level Indicators:	<i>1: Developing thought-through courses of action which take into account issues beyond the immediate area of practice 2: Using mastery of knowledge relating to, and extending into the wider context of, the area of practice.</i>

Design aspects

Component type <i>Something you have created yourself</i>	Level <i>Level 7/HE Level 4</i>	Credits <i>15</i>	Start <i>01/07/03</i>	Finish <i>31/12/04</i>	Status <i>completed</i>
Objective:	<i>To critically evaluate and investigate Overfire Air systems. To utilise information and knowledge gained from Leeds University MSc module.</i>				
Related Aims:	<i>To critically analyse and undertake a detailed investigation into the impact of Overfire Air systems on performance.</i>				
Activities:	<i>Investigate and study Overfire Air system design concepts. To develop computer models to analyse the interrelationship between different Overfire Air designs for coal firing in a typical furnace configuration, including utilisation of a CFD computer package (CINAR) to critically analyse complex problems and situations. Follow the programme of study of Leeds University Msc module in "Combustion in Boilers and Furnaces" and to apply the basic jet theory to the area of study.</i>				
Milestones:	<i>None</i>				
Learning Outcomes:	<i>1: To critically evaluate the effect of Overfire Air systems on furnace performance. 2: To evaluate the feasibility of applying mathematical modelling to different over-fire air scenarios. 3: Critically analyse the relevance of jet theory to overfire air systems.</i>				
Evidence:	<i>Produce a report detailing my findings, which utilises data and results from the mathematical modelling (equivalent to 2500 to 3000 words). Certificate of attendance on Leeds University Msc Module course including a list of the course content.</i>				
Level Indicators:	<i>1: Understanding alternative implications of different issues and courses of action 2: Understanding and managing dilemmas and value-conflicts 3: Developing innovative ways forward in complex and unpredictable situations</i>				

Independent study project

Component type <i>Something you have created yourself</i>	Level <i>Level 7/HE Level 4</i>	Credits <i>60</i>	Start <i>01/08/04</i>	Finish <i>31/10/05</i>	Status <i>completed</i>
Objective:	<i>To utilise the information and knowledge gained from the previous programme components, in particular the mathematics and computing components. This will enable assessments to be made relating to the impact of coal combustion on performance.</i>				
Related Aims:	<i>Increase my knowledge of coal and its influence on boiler and plant performance. To utilise mathematical models and computer codes to critically analyse coal combustion. To determine NOx and Unburnt Carbon performance with combustion systems.</i>				
Activities:	<i>Undertake a literature search pertinent to the study. Identify and collect relevant test data. Undertake a review and use a simple mathematical model to predict coal combustion. Utilise mathematical computer code models to predict coal combustion. Comparison of results from test data and mathematical models which where appropriate will involve investigation of models and codes. To utilise and unify knowledge and abilities gained from previous programme components.</i>				
Milestones:	<i>None</i>				
Learning Outcomes:	<i>1: Investigate an issue or problem relevant to the area of study. 2: Review literature pertinent to the study. 3: Consider and apply appropriate methodology consistent with the area of study. 4: Record and discuss data and information generated in the investigation. 5: Draw conclusions to highlight the outcomes of the investigation consistent with the area of study.</i>				
Evidence:	<i>Dissertation equivalent to between 10000 and 12000 words. Certificate of attendance on Leeds University MSc module course including a list of the course content</i>				
Level Indicators:	<i>1: Working effectively in problematic contexts which contain value-conflicts and uncertainties which extend beyond the immediate area of practice 2: Developing and critically evaluating a range of practical theories, ideas and models, including to overcome dilemmas and find ways forward in problematic situations 3: Researching, analysing and evaluating information to identify inter-relationships between wider systems in which the area of practice is located 4: Critically evaluating thinking, action and structural factors operating in the area of practice, including underlying assumptions, and identifying implications for wider systems beyond the area of practice</i>				

Programme learning contract

Component type	Level	Credits	Start	Finish	Status
<i>Something you have created yourself</i>	<i>Level 7/HE Level 4</i>	<i>15</i>	<i>01/01/03</i>	<i>31/05/05</i>	<i>completed</i>
Objective:	<i>To describe, rationalise and contextualise previous learning achievements. To identify next learning objectives and devise a route to enable these objectives to be achieved.</i>				
Related Aims:	<i>To devise a planned activity route to enable my current learning objectives to be achieved.</i>				
Activities:	<i>Systematically follow an appropriate structural programme consisting of suitable prescribed course modules and self defined activities at Masters Degree level.</i>				
Milestones:	<i>None</i>				
Learning Outcomes:	<i>1: Provide an appropriate response to all sections of the full learning contract. 2: Analyse and comment on personal development and relevant prior experience to date. 3: Articulate a rationale for my proposed programme, locating it within the context of current thinking within the relevant field of study.</i>				
Evidence:	<i>Printed Learning Contract equivalent to 2500 words.</i>				
Level Indicators:	<i>1: Developing thought-through courses of action which take into account issues beyond the immediate area of practice</i>				

Employment

Your employment details

Occupation category:	<i>professional occupations</i>
Employment status:	<i>employed, full time</i>
Industry sector:	<i>Other: Design Office - Power Industry</i>
Organisation type:	<i>private</i>
Organisation size:	<i>500+</i>

Experience

Provide an account of your experience that is relevant to your contract

Review of experience

Although, I undertook an electrical technician apprenticeship and had a brief period teaching, I have spent the last 22 years working in the Power Industry. The company has changed name several times during this period and I have continued to progress from draughtsman to senior design engineer. During this time I completed an Open University degree in mathematics. In addition, I have been involved in various technology transfers, which included a period of 6 months working in Belgium. The majority of my ongoing learning has been through these transfers or self taught studies.

I have developed my knowledge in areas of boiler and furnace design, computer modelling, computer programming and fuel technology. The skills and knowledge learnt has enabled me to progress within the company organisation.

I often work on a wide range of project types and have to be flexible and able / willing to tackle these varying project groups. It is my responsibility to research areas / aspects where I lack knowledge. As an example recently I have been studying and gaining skills / knowledge in the CFD computer program CINAR, which was developed by Imperial College for analysing combustion performance in furnaces.

Where you are now

I consider that I am a confident and experienced design engineer able to respond to new challenges in the ever-changing Power Industry. Although, I have gained a large proportion of my experience and knowledge over my employment with the company I have no formal qualification for these increased skills. Therefore, I would like to develop this into a higher qualification

Relevant qualifications

- City and Guilds Full Technological Certificate in Electrical engineering 1975
- BA in mathematics (Open University) 1986
- Technology Transfer courses : [Heat recovery Steam Generators (including 6 months in Belgium) and Circulating Fluid Bed boilers (in Germany and USA)]
- Short courses : [Incineration Technology
- Computer software packages (SIMU / DYNA / Gatecycle / Visual Basic.
- CINAR (CFD - Self taught - although I am due to go on a course next year).
- Construction Design and Management regulations (CDM)
- ITB passport training - Construction site work.]

Signatories

Gain the agreement and signatures of those involved in your contract

Signatory type

HEI Tutor
HEI Tutor
HEI Tutor
HEI Tutor
HEI Tutor
Learner

Signatory

Ms Chris Newman (Newman)
Doctor David Young (Young)
Mr John Filimon (Filimon)
Mr Colin Davenport (Davenport)
Mr Kevin Edwards (kedwards)
Mr John Blundell (jblundell)

APPENDIX H – The questionnaires used in the 360 degree evaluation

- Dean / Head of Department
- Academic Tutor with WBL remit
- Industrial Supervisor
- Student / Recent Graduate



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