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Models of work-based learning with examples of practice in petroleum engineering: a university-employer partnership.

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Models of Work-Based Learning with Examples of Practice in Petroleum Engineering – A University-Employer Partnership

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Abstract
Work-based learning (WBL) is a collaborative tool employed by educational institutions and industry to educate and develop their students or workforce in all three strands of learning: for, at, and through work. This paper presents petroleum engineering WBL models designed using Merrill's First Principles of Instruction for university-employer partnership programmes to meet the specific needs of employers and individual students. These models integrated activities and assessment for learning and provided experiences where WBL is used as the principal means for bringing about change in the workplace and student competency as future engineers. The models are a learning approach that exposes students to a wider industry partner to build up client-facing experience throughout their degree. This is aligned with key employability skills, which are highly valued in the job market.
The results indicated that the WBL approach requires active involvement of students, educational institutions, and employers in course design, and that the WBL approach has increased professionalism and motivation among students, as well as significantly increasing graduate employability by addressing persistent skills gaps and meeting business needs.
In conclusion, the WBL models demonstrated positive implications, widening access to higher education and enabling employers to shape their workforce in line with business demands while offering a high-value, low-cost option to upskill staff.

Keywords: blended learning, employer, employability, institution, work-based Learning

1. Rationale for WBL Experience
Work-based learning (WBL) is a collaborative tool employed by educational institutions and industry to educate and develop their students or workforce in all three strands of learning: for, at, and through work. Students can gain exposure to professional practice through work-based learning, as well as gain job opportunities and future career prospects. This is aligned with key employability skills, which are highly valued in the current job market.
WBL is a learning model approach that transfers learning knowledge through the workplace. Clearly, the workplace differs from the classroom as a learning environment. By placing current theoretical concepts into practice, it expands students' knowledge and contribute significantly to their academic understanding (i.e., 'cognitive learning') (Balta et al., 2012).

Because it allows students to find academic activities meaningful and relevant, learning in the workplace has been shown to be an effective method of teaching (Lee et al. 2010). Students who have completed a structured work experience programme may perform better in their subsequent studies. Several studies have highlighted the benefits of student work experience and academic achievement. Internships or placements have been shown to have a significant positive impact on academic performance (Rawlings et al., 2006), and participating in a work placement year is associated with improved degree outcomes (Rushton et al., 2006). Mandilaras (2004) found that participation in the placement scheme increases the likelihood of receiving an upper-second or higher degree class, whereas Green (2011) found that completing a placement year raises students' final classification award from 2:2 to 2:1. Experiential learning is clearly at the centre of work-based learning, allowing students to improve their understanding through reflection and practical application of their skills in authentic environments (Boud et al., 1985; Eraut, 1994). It can be motivating because it encourages students to make sense of their academic studies by referring them to their own experiences, and it allows them to apply what they have learned in the classroom to the workplace, and vice versa. WBL allows students, employers, and higher education institutions (HEIs) to work together to enhance learning and workplace competencies, enhance student satisfaction, graduate employability skills, and identify career paths. It is an essential part of lifetime learning and continued professional development (CPD).

There is a need to bridge the existing knowledge gap between what is needed at work and what is learned through formal higher education (HE), one that is of interest to the HE sector and industry (Eraut, 2004; Brennan et al., 2006; Stenstrom, 2006; Tynjala et al., 2006; Piirto, J. 2011). Employability is a top priority for UK higher education institutions. WBL is inextricably linked to the employability initiative because it has the potential to improve students' employability skills. The same direction is also driven by government policies. The Framework for Higher Education Qualifications, created by the Quality Assurance Agency (QAA) in 2008, required that degree courses in all subjects have the transferable skills needed for employment, which encouraged the development of WBL initiatives. The UK Government's Green Paper on Higher Education (BIS, 2015) encouraged institutions to place a greater emphasis on graduate employability and proposed a Teaching Excellence Framework to recognise and reward teaching practices across all disciplines that improve students' knowledge, skills, and career pathways. Institutions are becoming more aware of the many advantages of including real work experience in the curriculum to increase graduate employability because students are more likely to expect a return on their investment, which is the possibility of a job at the end of their studies (Pegg et al., 2012). Furthermore, research has shown that WBL approaches are critical tools for creating job opportunities for graduates. According to Little et al. (2006), graduates with some type of work experience were significantly more likely to be in full-time permanent employment than those who did not have any work experience during their studies. Several companies are collaborating with HEIs to develop suitable WBL models that can be incorporated into course curricula to further enhance students' integration into the workplace and develop workplace learning experiences. In most workplaces, employee learning occurs informally. The informal learning at work or additional formal learning skills acquired at work must be accurately assessed. The Scottish Credit and Qualifications Framework (SCQF) is one system in the UK that will help

to achieve this. This type of formal framework should be used more widely as an academic standard tool for measuring and recognising the engineer's knowledge and skills. There is an increasing need for engineering degrees offered by universities to be industrially relevant (Lamb et al. 2010). According to the UK Royal Academy of Engineering, industry and HE must collaborate to design engineering degrees that meet industry expectations and students' needs (Broadbent and McCann, 2016a). Therefore, WBL courses should be designed to produce industry-ready graduates and be competitive.

In order to demonstrate how WBL can be integrated into theoretical degree courses or can incorporate the knowledge gained from students' current part-time employment, this paper discusses innovative practice examples of WBL models that have been implemented at Robert Gordon University, a higher education institution in the UK. The purpose of this paper is to provide an explanation for why WBL should be incorporated into the curriculum design as well as how it can be successfully implemented to enhance students learning experience.

2. WBL Concept

WBL is an educational strategy that exposes learners to both the educational institute and the workplace to gain client-facing experience throughout their degree. In the WBL curriculum, the work environment is incorporated as a key element. WBL provides structured learning experiences to learners by collaborating with employers, learners, and HEI. According to Levy et al. (1989), WBL is the integration of learning into the workplace, and the following three factors contribute to the learning process: this involves defining and structuring workplace learning, providing meaningful on-the-job learning activities, and identifying and providing acceptable off-the-job learning opportunities (Levy et al., 1989, p4). WBL is used to describe a wide range of educational situations. Among many models of WBL, Seagraves et al., 1996; Seufert, 2000; and Gray, 2001, highlight three strands: learning for work, learning through work, and learning at work. There is a distinction between learning for work (e.g., during a work placement as part of a degree course), learning through work (e.g., applying subject knowledge to a work-based project), and learning at work (e.g., in-house training within a company). HEIs and industries often use WBL as collaborative tools to develop their students' or employees' knowledge and skills in all three strands of learning: for, at, and through work. In HEIs, various WBL pathways and models are employed, as are the means by which students are engaged and assessed. With work reinforcement, Seagraves et al. found that the learner could benefit from learning at and for work. Ultimately, the WBL approach aims to combine conceptual knowledge with real-world experiences and to ensure that learners' job requirements are matched to degree learning outcomes. WBL can be incorporated into courses in various ways, leading to academic awards in HE. These range from one extreme of accreditation of prior learning, through short visits to industry, to a few weeks work-experience placement, to employment-based learning programmes.

3. WBL Characteristics and Models

In 2001, Boud and Solomon described a number of WBL varieties, including:(1) Collaboration between educational institutions (EIs) and organisations to foster learning; (2) Learning plans negotiated by learners at the design stage; (3) The development of courses

based on workplace requirements; (4) The learners engaged in a process of competency recognition before negotiating their course of study; (5) An important learning component of the workplace assignment can be integrated based-projects; (6) Assessments of learning outcomes are mapped against a framework of standards by EIs. As shown in Figure 1, many factors can influence an individual learner's WBL curriculum. Though the learner's needs are shown at the centre of the curriculum, they are tempered by the demands of the HEI (Brennan, J. and Little, B. 1996).

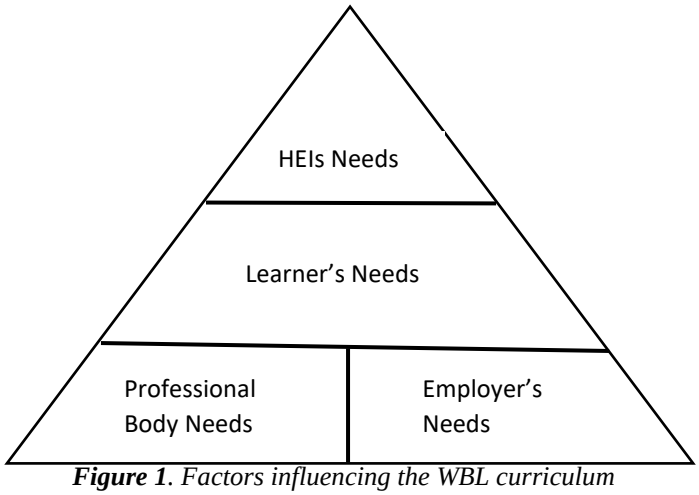

Figure 1. *Factors influencing the WBL curriculum*

Based on the WBL Guide (Morley, 2018), key characteristics of WBL courses and efficient preparation of students for successful transitions to the workplace are: (1) A qualified leader should coordinate the courses; (2) The course is designed to meet the needs and requirements of the learners; (3) A coordinator provides on-the-job training experiences for the learners. It is also important that: (4) Evaluation activities are designed to allow educators to monitor their courses. Using Edmunds' Model, Figure 2 shows the relationship between students, employers, and HEIs based on training (student employer relationship), education (student HEI relationship), and codification of knowledge (employer HEI relationship), to WBL. In order for the WBL to be successful, learners, industrials, and educational institutions must all be actively involved with mutually agreed curricula and benefits (Edmunds, 2007). Greater experience of the working environment can alter impressions of what is important, sometimes radically.

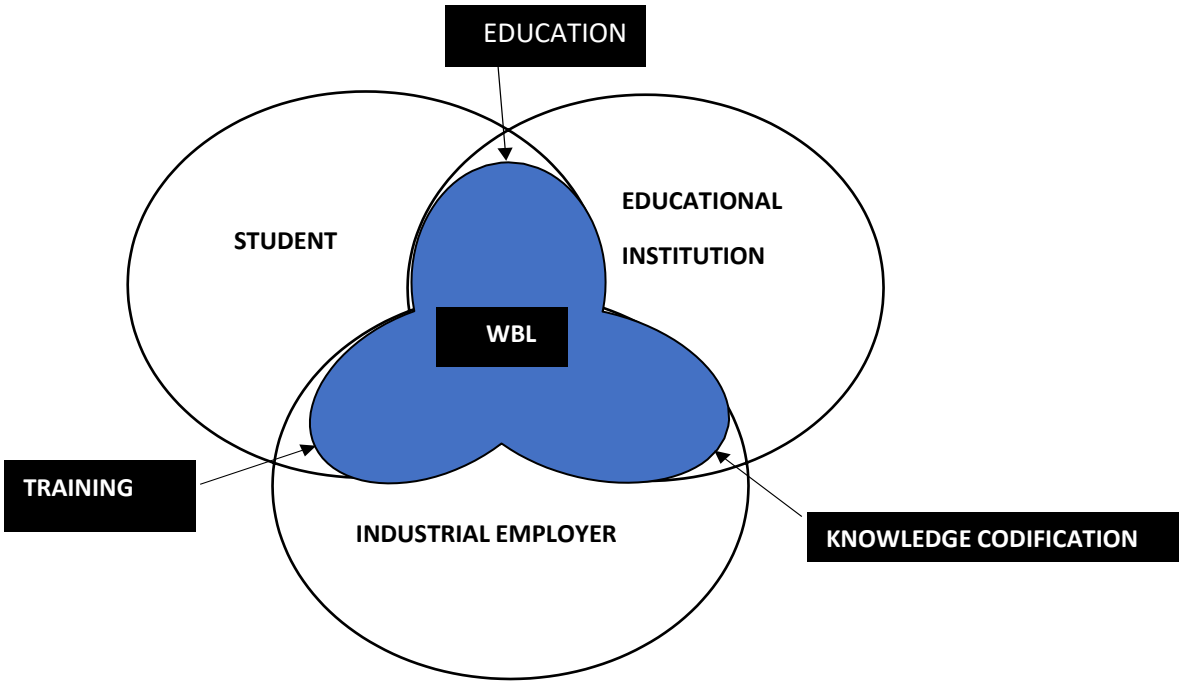

***Figure 2**. Modified from Edmunds' Model (2007)*

An illustration of this relationship between institutions and industry can be found in Figure 3. This model illustrates the relationship between institutions and industry that creates employees with the relevant productivity skills and the technology required by the workplace (Council of Ontario University, 1998). Collaboration between the university, industry, and students as active partners in students' education contributes to the development of the programmes to meet students' expectations, industry needs, and relevant professional and regulatory requirements. It is therefore crucial that institutions and industry have a two-way relationship that has mutual benefits for both, especially in terms of producing graduates and workers who are knowledgeable and meet industry requirements.

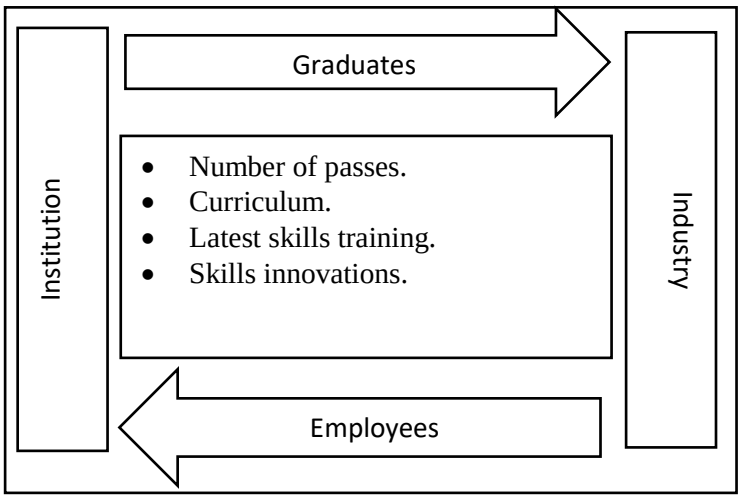

***Figure 3.** Ontario Relationship between Institution and Industry Model (1998)*

During Lineham and Sheridan's (2009) survey of seven HEIs, a total of 433 courses were evaluated: 221 were developed by the institution, 47 by the industry in collaboration with the institution, and 10 by the industry itself. The following factors should be taken into consideration by both HEIs and employers when implementing WBL modules and courses: (1) HEIs must recognise that prior learning is a key component; (2) Employers and industry should work closely together to design the course, including assignments and projects based on the employer's business; and (3) In order to meet both employer and employee expectations and needs, emphasis must be placed on the development of customised and bespoke courses. Learners should also be provided with regular feedback on their progress.

4. The Petroleum Engineering WBL Development Models

Although there are numerous WBL frameworks and guidelines for course design and evaluation in the literature (Achtemeier, Morris, and Finnegan, 2003; McInnis & Devlin, 2002; Merrill, 2002; Young, 1993), none of them fully represent the specific type of blended learning that combines formal and informal learning through technology and reinforces work-based activities. This is due to a number of factors, including: either they assume that all instruction is face-to-face or that it is all online. Through a variety of learning activities and resources, flexible and distinctive WBL programmes were designed to build a strong, effective two-way relationship between educational institute (EI) and the industry, as shown in Figure 4 and in agreement with Otala (1994), Skills Development Scotland (2017), and Edmunds (2007). In the Handbook of WBL, according to Cunningham, Dawes, and Bennett (2004), strategies and methods are needed to implement WBL. The WBL programmes developed in this study are intended to provide WBL degrees, increase graduate level skills, generate, and commercialise innovation, and strengthen connections between industry and education. As part of the WBL framework, key emphasis was placed on WBL centered around business innovation and employability skills, aligned with company workplace tasks, to enhance the learning process and progression of students and produce globally competitive students.

Figure 4. *WBL implementation model*

The term "development of WBL models" in this study refers to the various practice types of WBL models that have been designed and principles that have been applied to a percentage of theory and practice. The WBL learning elements have been designed in such a way that

they are coordinated and integrated with the curriculum and the assessment system in the classroom and workplace. The following examples of the practice of petroleum engineering models of WBL have been developed and successfully implemented in the Robert Gordon University School of Engineering courses:

Model 1 - Accreditation of Prior Learning: This is probably the most common type of WBL model used by HEIs, as it can be used to allocate a student to the right level in a standard course (though it can, of course, be used for entry to models like the ones discussed below). It is where a learner's work experience is considered by the HEI as an alternative to formal qualifications to allow entry into the first stage of a programme, exemption of specific elements of a programme or advanced entry into a programme. The model aims to allow access to HE qualifications for employees at an appropriate stage or level of entry through the accreditation of prior and experiential learning. It is recognised that employees undertake professional learning in the workplace. It is therefore important to be able to accurately value the informal "on the job" learning or more formal learning skills acquired at work. Recognition of Prior Learning (RPL) is the process of recognising experience, formal and non-formal learning contexts. Two types of prior learning are normally recognised by HEIs - certificated (RPCL) and experiential (RPEL).
An RPCL is a form of structured learning for which a certification or assessment has been given. The RPEL involves skills, knowledge, and experiences gathered through participation in the subject's work or other life experiences and does not require prior certification. In both systems, evidence must be based on learning rather than experience (Nyatanga et al., 1998).
A common method for the assessment and accreditation of prior learning at universities requires the employee/learner to provide an in-depth portfolio of evidence showing their progress and skills acquired. Due to the formal nature of certification training programs, this mechanism may be easier for prior arranged learning.
Model 2 - WBL integrates a period of work placement experience into HE programmes that enables students to observe theory applied in a real-world context and enables them to develop competence in technical areas to qualify for future employment and vocation. These include in-house programmes (both face-to-face and distance learning) and partnership programmes, where the theory training is conducted at the company's premises (e.g., the Sonatrach partnership programmes of blended learning held in Algeria).
As part of this model, students participate in industry work placements that reflect business requirements and help them prepare for careers in the workplace, alongside pedagogy and classroom management concepts taught through the institution. The programmes create a learning environment suitable for independent study. As part of the model, each learner is required to assemble a portfolio of evidence throughout their time at the workplace.

In-house programmes
Its purpose is to provide students with high-quality, employment-driven programmes that help them become independent, industry-ready engineers who can contribute to a variety of fields of industrial practice. In this model, where 75% of the syllabus is theoretical and 25% is practical, students are taught specialised knowledge regarding their field of study, either through distance learning, face-to-face instruction, or blended learning supported with

technology. Programmes include industry visits, geology trips, lab projects, state-of-the-art software, collaborative group projects, work placements, and Master of Science (MSc) industry-based projects, with cumulative assessment conducted through a portfolio of evidence that includes skills and work or a formal report and oral presentation (Figure 5). The educational experience is enriched and informed by research culture, hands-on experience, and industry visits and events) to engage students with the wider industry partners and build up client-facing experience throughout their degree. This is aligned with key employability and digital skills, which are highly valued in the evolving job market.

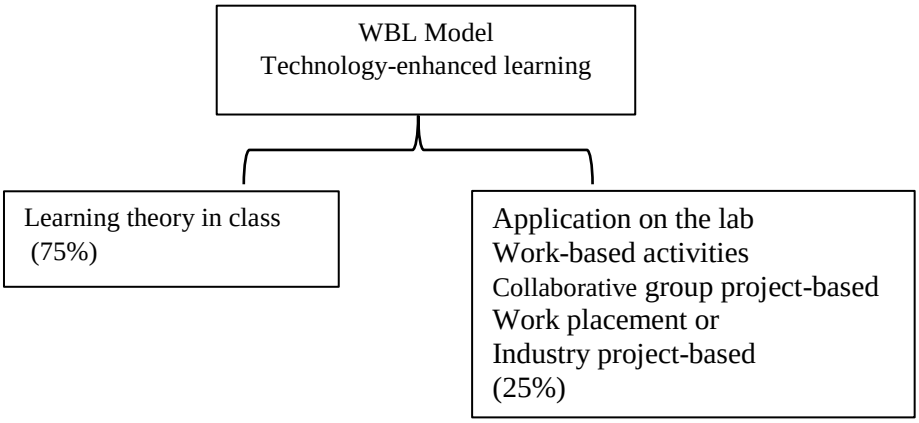

Figure 5. *WBL Model Development (in-house programmes)*

Sonatrach partnership programmes, blended learning, Transnational Education

The university (Robert Gordon University) - employer (Sonatrach) partnership WBL model is aimed at promoting attractive employment-driven programmes that transform students into independent, industry-ready engineers who will be able to contribute to a range of industrial careers. The model integrates informal work-based activities with formal classroom-based learning and creates a flexible learning environment to support effective collaboration.

The programme's design criteria were developed based upon Merrill's expanded First Principles of Instruction. In this model, with the percentage of theory at 50% and learning practice activities at 50%, the students are taught the formal classroom learning knowledge, through blended learning designs with a mix of the various forms. There were also industry visits, a geology trip, lab applications, cutting-edge software, collaborative group projects, work placements, on-the-job applications, and an MSc project-based learning focusing on organisational issues, with the cumulative assessment taking the form of a skill-based and work-based evidence portfolio or an oral presentation (Figure 6).

The Sonatrach extended Master WBL framework incorporates:

a) MSc Drilling and Well Engineering programme.
b) MSc Reservoir Engineering programme.
c) Industry work-based project.
d) Oil and gas field familiarisation package (14 CPD short courses).

e) Wellsite practical experience (work placement): this cumulative logbook recording of on-the-job application of learned skills is the true measure of effective training.
f) Mentoring and coaching (academic staff and company supervisors).

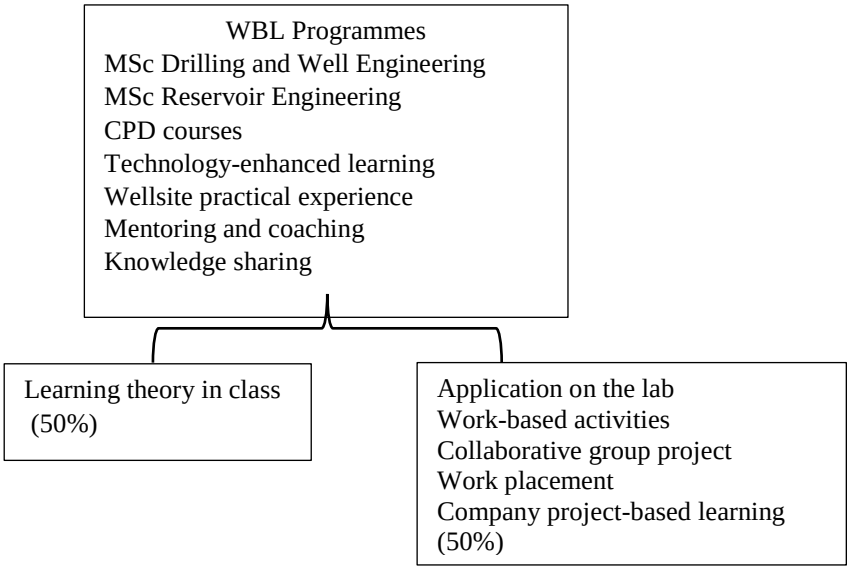

Figure 6.*WBL Model Development (Sonatrach partnership programmes)*

The programmes helped improve and enhance the learning skills and employability prospects of students. Through WBL's extended Master, teaching quality was enhanced by introducing a variety of effective learning activities. Through reinforced theory and work placements where students could observe theory in action in a real-life environment, these programmes enhanced performance with maximum progression to success (Eraut, 2004). This learning approach exposes students to a wider range of industry partners and builds up client-facing experience throughout their degree. This accelerates the development of professional and technical competency and teaching techniques to meet various learning styles, preferences, and needs (Boud and Felltti, 1997). For example, recognising such diversity, working closely with the staff, and adopting a "learner-centred" approach to foster richness in learning, require careful consideration of module content, and mapping to authentic workplace tasks, allowing students to practice skills through hands-on experience activities. CPD oil and gas familiarisation training courses (classroom and workplace application) are designed and embedded to contextualise information (Liz et al., 2015). This actively engages the students in interactive learning styles, helping them become independent learners (Laurillard, 2010). Students gain confidence and self-motivation, due to the continuous source of education and training, that produces management professionals. The technology enhanced teaching and learning for students (Howland, 2012), in particular by demonstrating complex theory and applications using Citrix Thin Client technology, and engaging them in industry software simulation practice. Students' feedback clearly indicates that using the technology approach has helped them deepen their knowledge of advanced topics in a way that would otherwise have been difficult.

Model 3 - WBL is a form of study that takes place primarily in the workplace for full-time employees. This is supported by HEIs. An example is the Institution (Robert Gordon University) – Company (Shell International Exploration and Production, Shell EP) partnership. Shell EP has a system of programmed learning activities linked to competency development.

Based on this model of WBL, supported by the university, the learners are able to learn on-the-job, acquiring practical and transferrable skills in addition to their subject knowledge. This includes practical worksite rigs and platforms experience, workplace integrated assessment, coaching/mentoring, formal learning events, and competency assessment through coursework and exams. The project must be related to workplace tasks and add value to the company's business, with the involvement of experienced supervisors from both the HEI and the workplace. Shell WBL and mentoring strategy incorporates major elements of the Wells Distance Learning Package (WDLP), central and regional blended learning events, wellsite practical experience, local mentoring and coaching, cumulative coursework, and centrally administered exams. The Shell WDLP blended learning programme was reviewed, and a series of recommendations were made prior to the programme validation event. This aligned the WDLP with the SCQF credit rating system (which in turn links to UK and international qualification levels). Two Master of Science degree courses were created to link the completion of Shell's learning programme to university degree awards. The programmes take the major components of Round II of the WDLP and represent these modules at Master's level. In addition, the programmes allow staff to progress further within Shell, both locally and internationally. Both programmes are accredited by the Energy Institute for further learning for Chartered Engineers (CEng).

Based on expanded Merrill's First Principles of Instruction, the programmes design criteria were developed, and the SCQF was used to raise quality assurance and academic standards for both recognising employer learning and accurately measuring engineer knowledge and skills. Shell recognised this as an effective long-term approach for improving the knowledge and skills of current and future workers by providing a continuous source of accredited education. The WBL model route combines principles of pedagogy and classroom management with specific subject-specific work in the establishment to help in learning for work, and industry work activities that reflect business requirements. The programmes create a learning environment suitable for independent study. Learning in the workplace is accompanied by the requirement to compile a portfolio of evidence. As a result of this model with 20% theory and 80% practice, the learners are taught the niche knowledge relating to their industry through blended learning designs, as well as a mix of various forms. The programmes encompassed worksite rigs and platforms, lab applications, and formal learning events. In addition, a company-based project has to be conducted through an in-depth analysis of a particular organisational issue, with the cumulative assessment to be achieved through a portfolio of evidence based on the skills and work performed and a more formal report (Figure 7).

The university-employer partnership integrated informal work-based activities with formal classroom-based learning and created a flexible learning environment to support collaboration.

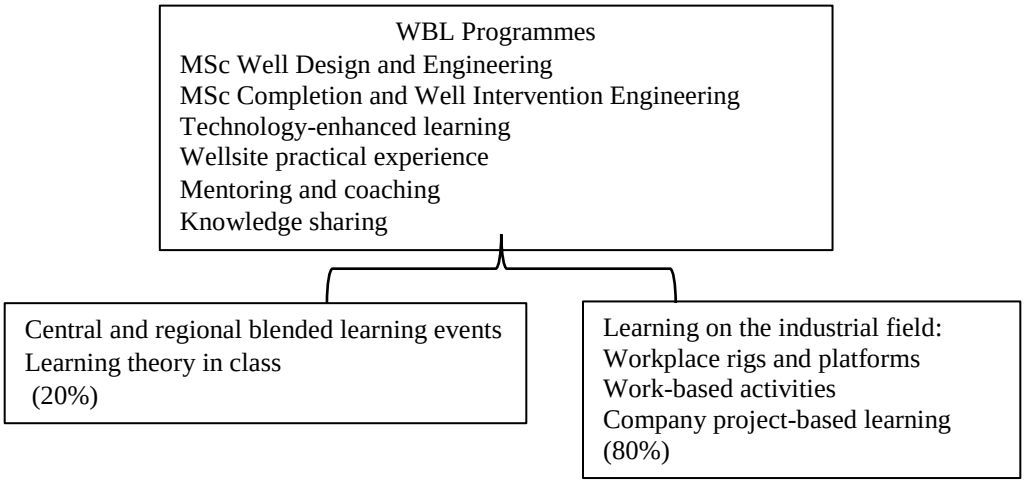

Figure 7.*WBL Model Development (Shell EP partnership programmes)*

Discussions and Results of WBL University-Employer Partnership Models 2 and 3

Using the First Principles of Instruction as defined by Merrill, 2002 (problem-based theory), the WBL framework of the partnership programmes' structure design criteria were developed. There are four phases to this design (activation, demonstration, application, and integration): (1) Students engage in solving real-world workplace problems, (2) Existing knowledge is used to develop new knowledge; (3) new knowledge is introduced to the learner, (4) the learner applies the new knowledge; and (5) new knowledge is integrated into their world. While these principles are focused on workplace-oriented programmes, they should be extended to take into account the employer-university partnership context and help learners use the blended learning technology environment. University Campus Moodle (CM) is a learning environment platform that provides educators with tools and resources to help them facilitate and improve both teaching and learning. It is an example of a platform on which different pedagogical activities can be carried out online. Discussion forums and other CM features are used to promote communication and teamwork between educators and students. Additionally, external applications with comparable functionality are used instead of those that are built-in. As a part of the partnership programme design, the university and company should agree on MSc projects that address practical and economic work-related problems. It helps the company's assets and promotes issues within the programme. To assist in work-based assignments and industry-based projects, the focus should be on using in-house facilities and experiences. Academic and employer-related staff will be involved to facilitate knowledge sharing and transfer, including using technology for module delivery, support, resources, activities, discussion, and assessment related to workplace tasks. This accelerates the development of professional technical competency and teaching techniques to meet various learning styles, preferences, and needs (Boud and Felltti, 1997). The modules' content was formulated and mapped to authentic workplace tasks, allowing learners to practice skills through hands-on experience activities, and training courses (classroom and

workplace application) are designed and embedded to contextualise the information (Liz et al., 2015). This actively engages the learners in interactive learning styles, helping the students become independent learners (Laurillard, 2010). Employees gain confidence and self-motivation, due to the continuous source of education and training, that produces management professionals. Technology is incorporated to enhance the quality of the teaching and learning process (Howland, 2012) more specifically for demonstrating complex theory and application, and industry software simulation practice.

Learners are able to participate in WBL programmes by completing modules that are informed by theoretical lectures in the classroom and lab that are supported by central and regional blended learning events. The students will then be assigned to on-site work experience. Learning takes place in the laboratory and wellsite using technology that supports learning by providing learners with knowledge and subject matter relevant to module topics and workplace tasks. A local mentor and coach are appointed to a group of learners to guide them in carrying out laboratory and workplace tasks. The learners are allocated to an industry-based project related to workplace tasks and add value to the company's business, with the involvement of experienced supervisors, both academically and within the workplace. The lecturers and subject-matter experts will regularly evaluate learners, with the cumulative assessment being based on a portfolio of evidence based on skills, or a more formal report and oral presentation, with most of the weighting placed on the final report. By developing an academic assessment strategy, engineers' knowledge and skills can be accurately assessed, as well as their technical competency monitored (Boud, 2000). The employer should make the workplace a place of knowledge production, encourage employees to develop their skills, and assign workplace coaches/mentors to assist learners in their learning development, so they can take charge of their own professional development. Employers should help employees develop work-based projects and assignments. During the development of specialised partnership WBL programmes and modules, these considerations provide a foundation that university and employer partnerships can build on.

Model 4 - WBL equips students with the skills and competencies needed to generate and commercialise innovations in the oil and gas industry (e.g., the MSc Oil and Gas Innovation Partnership program).

WBL is a project-led master’s programme that provides students with the knowledge, skills, and competencies to be able to develop, evaluate, and commercialise oil and gas innovations. A set of five universities from Scotland have collaborated on the programme with the Oil & Gas Innovation Centre. Graduates as well as those with industry experience or those with innovative ideas for the oil and gas sector are able to participate in the programme. The programme will help them develop technologies for exploration, production, processing, and decommissioning. The business and innovation modules (i.e., commercialising innovation, emerging technologies, business essentials for innovators, project scoping, and product development) comprise 25% of the programme and are taught through blended learning via a Virtual Learning Environment and partially via face-to-face teaching. A unique element of the Oil and Gas Innovation MSc is the Innovation Industry Project. It comprises 75% of the programme. This MSc project enables students to put their newly acquired knowledge and skills to use in a practical and innovative manner. The project includes a critical literature

review with a detailed innovative design, analysis of results, and an oral presentation. The assessment in this WBL model (Figure 8) includes formal testing of the taught modules and a report on the industry-innovative project, which contributes to a high percentage of the final grade.

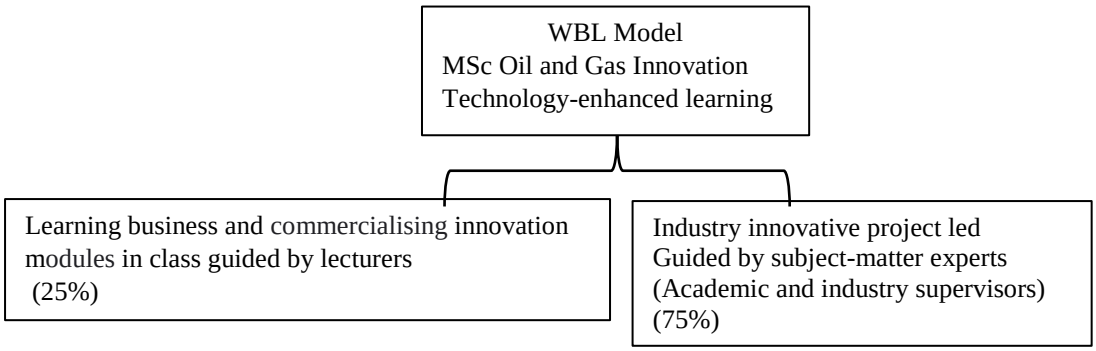

Figure 8.*WBL Model Development (Innovation partnerships programme)*

5. Conclusions

WBL engineering models were developed using Merrill's First Principles of Instruction for university-employer blended learning partnership programmes. Through work-based activities, the models integrated formal learning with workplace needs and work tasks supported by technology. Workplace resources were integrated with coaching from workplace supervisors and subject-matter experts, along with a devoted academic professional leader who helped make connections between theory and practice. WBL was a structured and pedagogically supported experience with a strong emphasis on critical reflection in order to maximise learning for employability and the academic subject. Both the university and the employers were involved in the development of a coherent framework for learning support, and an integrated approach to explicitly recognising the learning was gained in order to design high-quality WBL experiences. Students, educational institutions, and employers were all effectively involved in the design and delivery of the WBL approach so that professionalism, motivation, and graduate employability were improved, persistent skills gaps were addressed, and the needs of business were met. WBL models applied to industry research projects provided an opportunity to contribute technically and economically to the assets of their partners, as technical issues were addressed through the research. WBL models had positive implications as they enabled employers to shape their workforce to meet business demands while offering a high-quality, low-cost option to retain and upskill their workers, and they broadened access to higher education. In addition, employees have the opportunity to progress within the company (on a local and international level).

Overall student outcomes showed the effectiveness of WBL in enhancing learners' experiences and collaboration with industries in the UK and Algeria. However, future studies

should investigate best practices outside the UK when implementing WBL in university courses.

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List of acronyms

Acronym	Definition
WBL	Work-Based Learning
HE	Higher Education
HEI	Higher Education Institute
CPD	Continuing professional development
QAA	Quality Assurance Agency
RPL	Recognition of Prior Learning
RPCL	Recognition of Prior certificated Learning
RPEL	Recognition of Prior experiential Learning
EP	Exploration and Production
SCQF	Scottish Credit and Qualifications Framework
WDLP	Distance Learning Package
CM	Campus Moodle
MSc	Master of Science
CEng	Chartered Engineers

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