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New Pedagogical Models Facilitated by Technology

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Abstract

This paper discusses the outcome of research conducted to assess the effectiveness of Work-Based Learning (WBL) from the perspective of stakeholders. WBL has increasingly become an area of interest for the higher education (HE) sector. It can support the personal and professional development of students who are already in work. The focus of the learning and development tends to be on the student's workplace activities

Previous research has mainly considered only two stakeholder contexts namely the learner and the academic institution. The significance of the study stems from extending the stakeholder contexts to include the employer and the professional body. The aim of this study was to assess the effectiveness of delivery of WBL from the perspective of a range of stakeholders including students,

programme leaders (PLs), tutors, university support services, employers and representatives of professional bodies.

Case study research methodology was adapted with mixed method research techniques for data capture and analysis using both qualitative and quantitative approaches. The study examined five (5) WBL programmes at Northumbria University in the UK. The three most influential factors in the effectiveness of WBL were found to be: quality, access and support.

The contribution to new knowledge in WBL research is through a "Four-Pillar model" which has been developed to reflect the stakeholder contexts. Consideration of this model helps ensure WBL programmes cater for the current demands from the labour market. The findings of this study include factors which facilitate and/or obstruct the effective implementation of WBL programmes whilst identifying feasible strategies to overcome those challenges and share them with all stakeholders of WBL. Recommendations are made on resolving the identified issues and to extend and improve the effectiveness of WBL. Finally this paper looks at how these results could apply to encourage WBL uptake in a third world developing country like Sri Lanka where you are starting from a zero base. Sri Lanka is yet to embark on WBL formerly although online distance learning is more of a reality.

1. Introduction

Work-Based Learning (WBL) is the term used to describe a class of university programmes that bring together universities and work organisations to create new learning opportunities in workplaces [1]. Such programmes meet the needs of learners, contribute to the longer-term development of the organisation and are formally accredited as university courses. According to Durrant,

Rhodes et al. [2, 1] WBL focuses on learning in and from the workplace where work, rather than a set curriculum, provides the focus for the learning programme [3].

A paradigm shift has taken place in Sri Lanka with the leap from traditional print based distance learning to technology enabled online learning within a short period [4]. The National Online Distance Education Service (NODES) which was launched in 2007 has a large potential that has yet to be realized in servicing the education sector, employers and employees to meet their WBL needs [5].

2.   Problem Statement of the Research

Although the WBL concept has been in practice for some time, a review of the literature highlights a focus on the learner and the tutor with some consideration of the employer [6] [7] [8]. This study aims to contribute new knowledge of the WBL process by considering all four stakeholder contexts in one model: the learner, academic, employer and professional body.

3.   National Online Distance Education Service (NODES)

The Distance Education Modernisation Project (DEMP) funded by the Asian Development Bank was launched by the government of Sri Lanka under the Ministry of Higher Education to modernize the distance education system in the country in 2004. The National Online Distance Education Service (NODES) [5] established by DEMP is intended to provide all online distance education services to the nation.

NODES on one side supports online programme development for universities and any other public or private sector post secondary educational institutions through its Content Development Unit (CDU) which has been staffed with experts in online content development [9]. NODES also facilitates the delivery of programmes through its state-of-the-art high speed network running on IP/VPN technology.

Lessons learnt from the current study of WBL programmes in the UK could be usefully applied to NODES to extend its application to WBL.

4. Methodology

The approach applied in this research is case study methodology with mixed method research technique. According to Pickard [10, 85] a case study can be both the process engaged in to investigate a phenomenon and the written output of that investigation. Yin [11, 1] further explains that case studies are preferred as the research strategy when the investigator has little control over events. This is true with this study as the investigator has no control with the delivery of WBL programmes at Faculty of Engineering and Environment (FEE) at Northumbria University being an individual researcher.

Five (5) WBL programmes of disciplines of Professional Engineering (PE), Information & Communication Technology (ICT), Records Management (RM), Information & Library Management (ILM) and Librarianship at Northumbria University have been selected. The first four of these disciplines are post graduate programmes whilst the fifth is an under graduate programme.Firstly, students on the WBL programmes were surveyed using an online questionnaire. This was an appropriate technique given the relatively large number of students. The resulting data analysed using statistical analysis techniques. Secondly a range of stakeholders involved in the WBL process were interviewed and this data was analysed qualitatively.

The details of the selected programmes are given in Table 1.

Table 1 The details of selected programmes

Professi-onal Engineer -ing (PE)	MSc Professional Engineering has been developed as part of a UK Government funded initiative and on behalf of The Engineering Council with the programme wholly taking place in the workplace and is directly relevant to what students are working on, for example as practicing mechanical, electrical, manufacturing or building engineers, whilst furthering their education and working towards professional body recognition and eventually chartered engineer status.
Informat ion & Commu-nication Technol-ogy (ICT)	This MSc course is suitable for students in employment seeking to gain a solid grounding in a range of skills and techniques that are relevant to the computing and information technology industry. These include learning SQL with the Oracle RDBMS; the Java programming language; (X)HTML, CSS and PHP for web development; and the Unified Modelling Language.
Records Manage-ment (RM)	This MSc programme balance of the knowledge demanded and the immediate skills needed for managing information and records in the increasingly complex electronic environment and dynamic organisational contexts. Subjects studied cover contemporary theory and practice of managing records in the digital environment as well as broader management, risk, legal and ethical contexts.
Informat ion & Library Manage-ment (ILM)	This distance learning PG Dip./MA/MSc programme is aimed at people working within an information environment, who wish to professionally qualify at postgraduate level. It is designed to produce information professionals able to take leading roles in the rapidly developing world of information and library management, by developing the knowledge and skills needed to handle effectively the storage, retrieval, analysis and communication of information.
Libraria n-ship (Lib)	The BSc in Librarianship is a work based learning programme aimed at people working in libraries who wish to take the first step on the career ladder by obtaining a degree level qualification in the subject area. Entry is normally at level 5, and admission is normally based on substantial experience in libraries, and an ACLIP/portfolio.

The results from quantitative and qualitative analysis were triangulated for final outcomes. Triangulation is achieved within the case study by using multiple data collection techniques 'to pick

triangulation sources that have different biases, different strengths, so they can ''compliment'' each other' [11]. It also serves another purpose as Yin [12] claims 'to collect information from multiple sources but aimed at corroborating the same facts or phenomenon'. Therefore, interviews, questionnaires and their analysis were able to achieve triangulation. As Pickard [10, 95] further explains, survey research can include qualitative and quantitative research hence *mixed methods* was adopted as the *methodology*.

5. Quantitative Analysis

The details of the online student questionnaire results are given in Table 2.

Table 2 The details of the online student questionnaire results

	MA/MSc in ILM	MSc in PE	MSc in ICT	MSc in RM	BSc in Librarianship	Grand Totals
Total no. of students	76	14	40	25	33	188
No. of responses	36	06	11	07	12	72
% of responses	47	43	28	28	36	38

The current study uses three variables as main building blocks or enabling factors for a good learning experience:
   • Quality (learning materials, delivery, teaching/tutoring, Acceptance /credibility)
   • Access (programme content, Programme leader, Tutors, Mentor at workplace, peer students, university services)
   • Support (University, Employer, Professional Body, family, peer students)

The collected data were subject to univariate and multivariate statistical analyses including Frequency analysis, Spearman correlations, Factor analysis, and Classification Analysis of Regression Tree (CART).

6.   Qualitative Analysis

The qualitative analysis was carried out with the data obtained from interviews conducted with a range of stakeholders involved in the WBL process: students, programme leaders, module tutors, and support services staff of the university, mentors and supervisors from workplace and representatives of professional bodies. The interview sample is shown in Table 3.

Table 3 Summary of stakeholders interviewed

Category of stakeholders	Number of Interviewees
Programme Leaders	05
Tutors	07
Employers	06
Representatives of Professional Bodies	04
Students	11
Support Staff	07
Total	**40**

8 main themes and 3 sub themes which emerged from qualitative analysis as shown below.

6.1 Use of Technology in Learning

Liyanage, Pasqual [13] illustrate that the use and expectations of various stakeholders in a technology-based learning environment are very different from each other yet are rarely addressed. The following areas emerged as most important from the data.

6.1.a   Use of Virtual Learning Environments (VLEs)

Based on a Blackboard VLE, the eLearning Portal (eLP) is the main mechanism for supporting the delivery of learning and teaching and is used to replace the physical classroom environment for these learners. Students and tutors had contradicting views on the user friendliness of the eLP. Among students 62% were happy about the user-friendliness of the eLP while a further 27% were neutral. This contrasts with the results of the interviews held with

academic staff that generally held quite negative views on using the eLP which included: *"I wouldn't say it's perfect: it's clunky and too many functionalities, which takes a lot of time."* and *"It's tedious to upload attachments because you cannot upload more than one at a time"*

One reason for this is students primarily access the eLP as users to contribute to online activities and study content. Academic staff access the eLP to set up modules, populate and manipulate them to provide online content and activities for the students. Their views reflect the difficulties in using the eLP from a control and management viewpoint rather than as a learner.

6.1.b Quality of Online Content

The quality of content at the outset is a crucial element of any online WBL delivery. The following view from the Students' Union reflects this "*How WBL students could benefit is to have good quality interactive study materials on the VLE by lecturers across modules and across schools*". Strother [14] in her paper describes *"Another way of approaching the attempt to guarantee better results in online learning programs is to look at content quality measures, i.e., the quality of the online education product itself"*. How students feel about it is *"There was very little multi-media stuff in the content. I felt I lack the online interactivity which could have been easily embedded using today's available technologies"*.

However using technology for technology's sake could detract from the real learning content, frustrate users by creating slow download times and require them to have high-spec PCs and a range of helper applications to be able to access the materials [15]. One of the tutor comments also reinforced this *"Technology should not drive pedagogy but pedagogy should drive technology"*.

6.1.c Equality of Online Standards across the Board

A key finding from the study was the observation of large differences in the standards of delivery of WBL among the programmes. This was seen in online content, tutoring, delivery, assessments as well as support. For example tutors had different

views on the response time for student queries: *"I normally work from 7.30-5.45pm on weekdays and usually respond to students during that time window. I do check emails sometimes at weekends."* and *"I usually give Monday 11-12 for DL students to contact me online live but I reply to them during the week but not during weekend".*

6.2 Tailoring of Learning Contracts

The tailoring concept is one of the unique features of WBL and is a main attraction for employers and employees. The students' learning contracts are customised to their work role and responsibilities. One tutor comments *"The tailoring concept is great but when numbers are high it would be difficult with the time and resource limitations. Another important aspect of this would be quality control because students' tailor made curricula have to be equally balanced/standardised according to the programme benchmark levels"* which reminds us to be cautious in trying to tailor curricula.

6.3 Student Isolation

Student isolation is one of the main critiques against distance learning and grievances from distance learners [16]. However, WBL differs slightly by being learning at the workplace as there is often a mentor/supervisor present. This was observed in the study but not for all programmes. A student comments *"Occasionally I felt isolated and less motivated so in those types of occasions it's better to have some face-to-face contact/advise from someone. I visited the university twice once for induction and just before the project which I found very useful. Had I missed them, it would have been difficult to establish the relationship with academics and colleagues which is very important irrespective of mode of learning and I would have found it very hard to keep motivated and even it could have affected the completion of the program".*

6.4 Effectiveness of Delivery Mode

The contextual variations are much wider in WBL where each student's working environment is different compared to traditional learning environments [17]. A comparison between face-to-face learning, 100% online learning and blended/hybrid learning was analysed in terms of university support, performance of students, learning content, tutor performance and preferences, student collaboration/interactions, etc. The majority of students favoured face-to-face meetings, i.e. blended learning as much as possible to enhance the understanding, collaboration, inclusiveness and ownership. As one student comments *"In face-to-face, you always get the opportunity to correct yourself when you meet up with someone but in online self-learning you don't know whether you are on right path"*

6.5 Accreditation of Prior Learning (APL)

Accreditation of Prior Learning (APL) is one of the innovative and radical inclusions in WBL [18]. The students view this positively: *"I benefitted out of APL immensely which led the university to exempt me from first year due to my other relevant qualifications and also number of years of experience. I think it's a great concept for people who couldn't pursue HE due to various reasons but are capable and experienced enough in the latter part of their lives to acquire higher qualifications."* A tutor commented on the negative side of it: *"loathe doing it because it is very difficult to assess and compare what they have done in order to exempt them from a module or a year".* [19]

6.6 University Support

It is vital that universities recognise the importance of this mode of education and provide due recognition and technical support wherever possible. As one tutor remarked *"University provides loads of training but I don't have time. Would like to use Podcasts and video clips in my materials but the time is the constraint again."* It was apparent that a lack of confidence,

technical expertise and other priorities interfere with academics' ability to do this.

6.7 Employer Support

WBL is directly related to the employer and workplace hence employers' support in many ways can impact on students' learning and performance. As one tutor commented "*without supervision in that level of professional context student wouldn't know what to learn and also what's the best way of doing certain things. Also, the student would need supervision from a person in the workplace who has certain level of authority to reflect and evaluate the actions student would perform*".

6.8 Professional Body (PB) Support

The active involvement of the PB in the process is a key requirement for the success of WBL delivery. The universities should proactively work with PBs. As one PB highlighted "*what candidates should do when they plan to start WBL MSc programmes is to inform us about their learning contract through the university so that we can approve it which makes them feel comfortable that once completed it would satisfy academic requirement for professional registration.*"

7. Triangulation

Triangulation is achieved not only between qualitative and quantitative outputs but also between different quantitative analysis techniques mentioned above. Table 4 below shows the independent themes/sub themes that emerged from this triangulation.

Table 4 Triangulation between qualitative and quantitative analyses

Quality	Support	Access
• Quality of online content	• Tailoring of learning contracts	• Use of VLEs
• Use of technology in Learning	• University support	• Student isolation
• Equality of Online	• Employer Support	• Effectiveness of

standards across the board	• Professional Body support	Delivery Mode
		• Accreditation of Prior Learning

8. Original contribution to knowledge

Figure 1 Suggested Four-pillar Model

This study looks at four pillars of WBL: the learner, the academic environment, the workplace and the professional body which is called the four-pillar model in WBL (Figure 1). The findings from this study show that a number of factors facilitate and/or obstruct the effectiveness of WBL including the remoteness of the learners. The rapid development of ICT in the 21st century offers a successful means to address some of these issues but the pace of professional development of learners and academics in these technologies is much slower and thus pose a challenge in exploiting technology to its full potential.

Recommendations from the study

Accordingly, recommendations as a way forward for a new pedagogic model for all the stakeholders who are involved in the WBL four-pillar model are proposed. Due to the limitations in terms of this conference paper, only the main key recommendations per stakeholder are presented.

1. **Learners**
   i.   WBL is a totally self-driven exercise hence the self-belief, commitment, dedication and motivation are essential ingredients
   ii. Setting up the learning contract between the student, employer and the university needs careful attention to foresee student's work role and align those activities with the academic standards and learning outcomes with some scope for flexibility
   iii. Before committing to a WBL programme, obtain consent of the PB for the learning contract to align with the PB's accreditation benchmarks

2. **Academic Institutions**
   i.   Appreciate and timetable staff appropriately for WBL
   ii. Institutions should enhance central technical support for WBL support
   iii. Improve ease and speed of online access to university resources
   iv. Establish quality assurance and monitoring systems

3. **Employers**
   i.   Assess the company's training/development requirements before embarking on WBL programmes for employees
   ii. Conduct cost benefit analyses to assess the best option for the company between in-house WBL and out-bound short-term training
   iii. Provide inputs for the employee's tailored learning contracts
   iv. Assigning a mentor for the employee
   v.   Establish a monitoring mechanism at workplace

4. **Professional Bodies**
   i.   Accredit, approve and formalise the various academic and training endeavours of potential candidates

ii. Intervene early in the WBL delivery process with the employer, employee and the university and indicate any due requirements for employee's professional registration

iii. Streamline policy framework and standards so that WBL qualifications are fairly treated across the board

Recommendations for Sri Lanka to embark on WBL

The following recommendations are derived for Sri Lanka from the UK study.

1. In general, education authorities and employers should realize the importance of WBL and formulate new policies and / or strengthen existing policies to promote online WBL in Sri Lanka.

2. A strong commitment by the Government is required to make policies and procedures that recognise online distance learning credentials as being at least equivalent to credentials earned in traditional ways.

3. Problem of lack of elementary computer literacy throughout the country must be addressed in the online WBL planning process together with rationalised bandwidth distribution. This is a key difference between the two contexts where the UK being a developed country, is far ahead of Sri Lanka in terms of IT infrastructure facilities and computer literacy of the population.

4. More rigorous marketing is essential for this by all potential stakeholders including NODES, Universities, employers, and professional bodies.

5. Quality assurance systems must be established and monitored right through in order for this system to stabilize and sustain. This is also necessary in the UK context as students and academics had negative views on the quality of content and support from the university.

6. Tutors are required to provide timely, and constructive feedback which should be monitored from time to time. This was seen a problem in the UK context as well.

7. Institutions should also make a rigorous effort to develop quality multimedia-rich online content to create interest among students. It is important to provide technical support/expertise to enable academic staff to fully utilise what is available such that the content is left for academics, but the technical aspects be left to those with the technical skills. However this requires investment in support staff.

8. The use of Virtual Learning Environments (VLEs) in WBL compensates the problems of distance delivery. The tools, such as the Discussion Board, chat rooms, digital drop box for submission of assignments etc in VLEs optimise the use of technology. Also, video streaming and conferencing & simulations can be used to make students feel as if they are physically together. Nevertheless, blended learning is preferred by students in the UK which could be same in Sri Lanka.

9. The difference between a tutor-learner based existing online learning model in Sri Lanka and the proposed WBL model is the active involvement of employers, and professional bodies in the latter to encourage employees to take up WBL actively. This gap can be bridged by recognising and accepting the WBL model nationally such that universities and other stakeholders could collaborate in initiating industry-oriented WBL programmes in Sri Lanka.

Future Work

The post-study aims to develop a technology toolkit to benefit all four stakeholders in the four-pillar model to improve the pedagogical process. In recent years there have been increasing developments in technology to support educational provision but this is usually focused on the learner and/or tutor. Less research has been conducted on the use of technology to support other elements of the learning process. Therefore, the four pillar model and findings from the current research project will be used as a basis to evaluate how technology can be used to support the WBL process for the range of stakeholders: learner,

academic institution, workplace and professional body. The JISC funded Lifelong Learning and Workforce Development Programme launched a similar toolkit [20] to support the HE/FE sectors in enhancing WBL provision. Institutions are able to use this WBL maturity toolkit to:

- Assess their current performance in WBL
- Identify a vision for WBL
- Identify the "enablers" and "barriers" to achieving the vision
- Develop recommendations for actions and change management

Similarly, the tool kit should be expanded to cater for all other stakeholders involved in the WBL process. So the idea of extending the WBL kit could form the basis for one that could be used globally including in developing countries.

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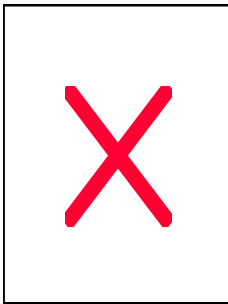
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