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Leadership in Implementing Technology-Enhanced Learning in Educational Institutions

John Wall

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Abstract

Conventional designs of educational programs are usually based on implicit instructional design approaches that look equally at all learners. However, research indicates that learning is a complex activity involving a number of different aspects. Using technology to deliver and support learning adds another layer of complexity. In a rapidly changing environment a template to map the implementation of blended learning is proposed to contribute to the ongoing debate in higher education in implementing blended learning approaches. In a challenging economic environment, some of the key strategic leadership challenges that institutions must address are articulated. Much of the research into deploying e-learning initiatives suggests that it is a complex undertaking and that educational institutions are at various stages in the development and deployment of technology-facilitated initiatives. A number of key leadership challenges are outlined that academic leaders must address in delivering the curriculum using technology. A proposed framework for deploying blended learning coupled with a template for educational managers to embrace in their strategic deployment of technology in delivering the curriculum is presented.

Keywords: E-learning, blended learning, leadership

1. Introduction

While higher education has traditionally been slow in implementing change, external changes are challenging higher education's resistance to change [1]. More educational providers are being encouraged to move towards more online and blended courses to meet existing students' needs and reach new students [2]. As stated by Folkers [1] coupled with these external changes, higher-level institutes face the continued growth of Internet use, decline in governmental support for education, and the emergence of a new student population. As highlighted by

Hirshon [3] the nature of education is changing in terms of (i) what higher-level institutes do and (ii) the financial resources available to perform their role. There are three themes that are influencing strategic planning in higher education: (i) population demographics, (ii) the increased importance and changing characteristics of non-traditional students on college campuses, and (iii) the economics of higher education [4]. As acknowledged Bradwell [5], the forces now confronting education in many respects represent a "perfect storm" of institutions expected to offer a more varied provision to a growing number of students in an era where funding is reducing. These are key strategic challenges that institutions must address in order to sustain the delivery of learning opportunities in the medium to long term. One of the leadership challenges that educational institutions face is maximizing the effectiveness of technology to underpin the support and delivery of the curriculum.

One of the most significant levers of changes in higher education will be technology. More programs are incorporating Web sites, more staff and students are using e-mail for in-depth communication and more high-level institutions are facilitating their students in transacting administrative requirements via the Internet [6]. Technology has begun to change the relationship between knowledge boundaries, creating new types of communications and underpinning work in novel ways [7].

2. Successful approaches to integrating Information and Communications Technology (ICT)

E-learning is not only an application of technology to teaching but it is also a new business model for higher education [8]. As highlighted by Chan and Welebir [9] e-learning not only creates new opportunities but also introduces new obstacles for the traditional higher-level institution. The Internet is facilitating new competition from both profit and non-profit competition to enter the higher education market free of traditional institutions' on-going requirements to invest in capital assets and personnel that reduce the capacity to affect and manage change to deliver e-learning programs [10].

It is insightful to review examples of successful educational institutions that have embraced many components of technology in the delivery of e-learning. Table 1, taken from [11], illustrates an effective strategy by comparing two educational institutions that have successfully engaged technology in the delivery of learning within a typical large US university. The key message that this highlights is the flexibility that exists within both the Open University and University of Phoenix models that may not exist in traditional US third-level institutions.

The greatest advantage which non-traditional providers of education have in their deployment of learning to remote participants is their financial and administrative model of operation [11]. The profit for educational institutions is that they do not educate those whom they find too expensive to educate on account of the demands of discipline which require investments in faculty and facilities to educate to a higher standard [7]. In 2003, while many virtual learning providers were experiencing challenging times, the University of Phoenix enrolments were

Characteristic	University of Phoenix	Open University	Composite of typical large US university
Total enrolment / Distance Learning (DL) enrolment	230,000 / 115,000	220,000 / 170,000 (many classes offer varying DL options)	10,000 / 1,000
Number of full-scale DL degree programs	20 undergraduate; 37 masters; 6 Phd	Over 200 degree options / combinations	Typically, none or one
Full-time cadre for DL (professors and staff)	1,500 (for DL and traditional)	1,120 (for DL and traditional)	50
Part-time DL instructors	9,600	8,000	5–50
Cost per credit hour	$570	$70–$200	$200–$500 public $500–$1,200 private
Student support infrastructure	Excellent (135 centers)	Excellent (352 regional / study centers)	Fair (most local campus facilities)
Sophistication of courseware	Excellent	Excellent	Fair (varies by course and instructor)
Teaching model	Part-time instructor / materials provided	Part-time tutors / comprehensive materials provided	Full-time instructor / individualized training material
Typical per course salary	Adjunct $1,500–$2,000	Adjunct $1,500–$2,000	Full-time $10,000; adjunct $2,000
Program offerings	Undergraduate through PhD plus certificates	Undergraduate through PhD plus certificates	Undergraduate and graduate primarily plus certificates
Placement success of DL graduates	Good	Good	Good
Typical class size for DL graduate courses	12 (classes are 5 or 6 weeks in duration)	20	30+

Source: Ruth [11] (page 24, 2006).

Table 1. Comparison of e-learning program characteristics

rising at a compound yearly rate of approximately 20% and had enrolments of over 100,000 [12]. By 2005 this number was over 200,000 [13]. Wilson [14] states that the University of Phoenix is now the second largest higher education institution in the US with over 450,000 students. It is also insightful to note that neither the University of Phoenix nor the Open University use the online model exclusively but offer a range of options along the blended learning continuum [11]. Wilson [14] states that the University of Phoenix has 200 campuses in 39 states including Canada, Mexico, the Netherlands, and Puerto Rico.

It has been argued that electronic education should not attempt to replace traditional education but to support both staff and students through the provision of services that facilitate teaching, learning, and education-related administrative tasks [15]. The drivers of greater flexibility required by participants, third-party competition, and further rivalry among educational institutions mean that technology will play an ever-increasing role in the delivery of learning.

3. Challenge for educational management

Technology has to be taken seriously as a strategic asset and should be harnessed as a solution and a tool for the way educational institutions will support learning and research into the future [5]. Since 2002, the Sloan Consortium has surveyed chief academic offices with respect to the strategic importance of online learning to their institutions. Since the 2005 survey, the percentage of institutions agreeing with this statement has reached a plateau of approximately 60% [16].

A potentially useful framework, identified by the Higher Education Funding Council for England [17], suggests that there are benefits of using technology at three levels in educational institutions:

i.   Efficiency – existing processes can be carried out in a more cost-effective, time-effective, sustainable, or scalable manner

ii.   Enhancement – improving existing processes and the outcomes

iii.   Transformation – radical, positive change in existing processes or introducing new processes.

The design, development, and implementation of e-learning in the delivery of learning can represent a significant investment without any guarantee of success. Therefore, it is vital that a strategic approach is embraced in deploying any initiative using technology. Embracing a strategic approach can result in the successful deployment of a blended program meeting the needs of participants and other external stakeholders.

A study by the Association of Public and Land-Grant Universities (2009) [18] identified a number of key leadership and policy issues for institutions leaders to consider. These include the following:

i.   Leaders need to understand the characteristics of the online teaching populations in their institutions and use communication strategies that engage all faculty members

ii.   Leaders should maintain consistent communication with all administrators and faculty regarding the role and purpose of online learning programs as they relate to the academic mission and academic quality. Faculty, administrators, and managers must work together to improve the quality and perceived quality of online learning outcomes

iii.   In a climate where financial resources are declining, educational leaders need to regularly re-examine institutional policies regarding faculty incentives

iv.   By better understanding what motivated faculty to teach online, leaders of educational institutions have the potential to expand faculty engagement in online instruction.

McPherson and Nunes [19] suggest that the role of academic leadership is to balance the dramatic effect that the political and social changes have had on teaching and learning within

higher education institutions and guide institutions through the development of sound strategic change. Their research suggests that if "top-down" strategies are devised to implement e-learning strategies, it is the duty of academic leaders to ensure that appropriate levels of staffing and support are put in place. The critical success factors to facilitate this are captured in Table 2.

Provideinspirationalleadership	Examplesofissuesforconsideration
Realize agreed strategy · Involve staff in change processes · Focus on changing role of educational professionals	Have issues of ownership and Internet protocol been clarified? Have issues of culture/class/gender been resolved? Opens up options for students but may be threatening to tutors – could a slow and gradual transition be put in place? Is it possible to encourage a culture of open and evolving commitment?
Understand motivation for engagement · Offer recognition for staff commitment · Appreciate motivation of learners	Have motivational factors of the educational staff been determined? Is there a way to acknowledge dedication of teaching staff? Is motivation of virtual learning environment providers and developers the same as delivery staff? Are there incentives for the application of an e-learning framework? Has it been determined whether students are sufficiently independent and motivated to able to undertake computer-based learning? Can students see the benefits? Where e-learning is deemed desirable, are targets and customers well-defined? What are motivational factors for learners, i.e., rewards for learners?
Understand what is deemed acceptable and usable	Can academic staff be convinced that e-learning will work, i.e., do they have a wish to use and develop new tools? How are teaching staff going to use it? Do students' users want it and will they use it?
Ensure sufficient resourcing · Create (or at least measure) the demand for e-learning as a method of learning · Guarantee sufficient funding	Can teaching staff be persuaded of the need for convergency and flexibility to enhance students learning experiences? Can a move away from expectation of two lecturers, one lab, one tutorial, etc., per week be encouraged? Have issues of affordability and viability been determined? Has time resourcing, e.g., more time to teach online, been taken into account?

Source: McPherson and Nunes [19].

Table 2. Criticalsuccessfactorontologyfore-learningdelivery: Leadershipissues

The challenge for educational institutions is to get the best from the available resources and ensure that the program meets the objectives of participants in the context of the resources

available. Even when the financial resources are available to invest in e-learning content, it does not ensure the success of the program. In the absence of resources to develop sophisticated e-learning content, the instructor must be empowered to embrace blended learning and acknowledge that his or her role must change. This presents significant strategic challenges for leaders in educational institutions.

4. Blended learning

The term blended learning has been widely adopted to depict combinations of face-to-face and technology-based learning [20]. Blended learning is a balanced learning design with this balance achieved by the combination of classroom instruction with self-paced instruction that is delivered over the Internet [21]. No two blended learning designs are identical, which introduces the great complexity of blended learning [22].

Blended learning, therefore, potentially offers the advantages of both traditional instruction and online learning. There is a need for a more formal approach to the development of policies and operations required in supporting blended learning approaches [23]. As stated by Pailing [24], blended learning may bring about major changes in the way educational material is designed, developed, and delivered to people who want to access learning but have other constraints that affect the process of learning. Blended learning, therefore, potentially offers the advantages of both traditional instruction and online learning.

5. Implementing technology-facilitated learning

Garrison and Kanuka [23] suggest that for academic administrators and leaders, the successful adoption of a blended learning approach requires the following:

1. Creation of clear institutional direction and policy

2. Frame the potential, increase awareness, and commit

3. Establishment of a single point of support, quality assurance, and project management

4. Creation of an innovation fund to provide the financial support and incentives to faculty and departments to initiate blended learning course transformation

5. Strategic selection of prototype projects that prove to be exceptionally successful exemplars of effective learning

6. Development of formal instructional design support available through a blended format

7. Systematic evaluation of satisfaction and success of the teaching learning, technology, and administration of new course

8. Create a task group to address issues, challenges, and opportunities as well as communicate and recommend new directions for the higher education community.

Delivering distance learning can involve a host of teaching and learning practices that can offer convenience for students but may be far more labor intensive for staff in higher-level institutes. For staff it includes (i) creating courses, (ii) maintaining chat rooms, (iii) responding to students queries by email around the clock, (iv) the new expectations of students on these programs including "anytime, anyplace learning," "round-the-clock availability of instructors," and "24/7 advising" [24, 25]. Newton [26] in an analysis of funded research by the Learning and Technology Support Network – Information and Computing Studies Group identified the following barriers to using technology in teaching and learning within the academic community in the UK: (i) increased time commitment, (ii) lack of incentives or rewards, (iii) lack of strategic planning and vision, (iv) lack of support, (v) lack of training in use of the technology, (vi) lack of support for pedagogical aspects of developments, and (vii) philosophical, epistemological, and social objections.

At an institutional level, the Higher Education Authority report [27] titled "Open and Flexible Learning – HEA Position Paper" suggested that matters such as innovative and imaginative timetabling, off-campus and workplace provision, etc., need to be addressed in encouraging staff involvement and facilitating greater engagement from learners. Research by the Joint Information Systems Committee [28] highlighted through a series of case studies that the tangible benefits of integrating technology in program delivery can be categorized as (i) cost savings / resource efficiency, (ii) recruitment and retention, (iii) skills and employment, (iv) student achievement, (v) inclusion, (vi) widening participation and social equality, and (vii) other benefits. Some suggestions as to how this can be capitalized upon within higher education institutions are proposed in Table 3.

Benefit	Explanation	Possible strategy to deploy in institutions
Cost savings / resource efficiency	Probably the most readily quantifiable cost savings were identified in the area of e-assessment where automated marking of exams for large cohorts of students now takes seconds rather than hours. Other savings resulted from the ability to cope with larger numbers of students, perhaps geographically spread, and the use of e-portfolio solutions for Personal Development Planning (PDP).	Investigate use of online assessment on modules and programs. Integrate e-Portfolio solutions (i.e., Mahara) as part of centrally project including industrial placement integration.
Recruitment and retention	The possibility of offering online courses has opened up new markets abroad. Technology has enabled institutions to support additional student numbers and improved personalization and mentoring has helped students who might otherwise feel isolated. E-Assessment has led to greater student satisfaction with their program of study.	Use of technology to delivery blended programs - leverage the expertise gained further within the Institute. Integrate technology further as part of assessment. Further offering of programs on an international basis.

Benefit	Explanation	Possible strategy to deploy in institutions
Skills and employment	Many of the initiatives studied were aimed at equipping graduates to be "fit for purpose." The broad skills agenda features across the full spectrum of examples but employability and employer engagement were specific features of many developments.	Build capacity through delivery of core foundation modules across all programs using technology to support learning. Identify key modules that will enhance employability of students and support using technology. Capture best practice on work placement models ensuring consistency across an institution.
Student achievement	There is clear evidence that e-learning offers increased opportunities for formative assessment leading to real benefits in terms of student retention and achievement. There was evidence of improvements in pass rates and overall marks and a high degree of student engagement with the process.	Build capacity to integrate technology to build in formative assessment, improving retention rates.
Inclusion	E-learning offers opportunities to support learners with a range of learning difficulties in ways which would simply not have been possible in the past. Many case studies explored how this was achieved, and again, e-assessment and flexibility were significant factors.	Learning resources to support students with learning difficulties such as dyslexia can be developed. The archiving of audio files can assist participants who may have visual impairments.
Widening participation and social equality	Case studies demonstrated that the use of e-learning has undoubtedly widened participation in UK higher education, be this participation by overseas students who would not previously have been able to attend courses in the UK, by professionals who need to fit study into a busy working life, or by the groups of "non-traditional" learners who form the target of government widening participation strategies.	Support resources such as language learning facilities for non-English speakers might be developed. Through strategic partnerships, use technology to deliver programs remotely, the capacity exists to build this further into postgraduate programs in particular. Reach a new student cohort who value flexibility.
Other benefits	Other benefits which may appear less immediately tangible, but nonetheless significant, include the external (international) recognition of the quality of UK higher education, the professional development of staff, improved pedagogic approaches, and beneficial effects on the development of research communities.	Capturing of best practices through the use of technology and using exemplars to further integrate technology into curriculum delivery.

Source: JISC [28]– Column 3 is proposed strategies to build capacity in an Educational Institution in Ireland.

Table 3. Potential tangible benefits of e-learning within higher education

It is incumbent on management in higher education to make a strategic decision on the role of technology in the delivery of learning. If the strategic decision is to embrace technology in the delivery of learning, then budgets need to be dedicated to resourcing appropriately the technological infrastructure, support and training mechanisms, and appropriate rewards and recognition systems for staff involved in the programs.

6. Evolution of E-learning content

Bruce [29], when discussing the evolution of technology, states that there are three scaling laws that apply: (i) Moore's Law – processor capabilities double every eighteen months, (ii) Saltzer's observation – solid-state and rotating memory double every twelve or so months, and (iii) Metcalfe's Law – the price of commodity bandwidth decreases by 50% every nine months. With the continued evolution of the Internet, providers of training and learning continue to integrate new technologies to improve the learning experience for the learner. Web 2.0 technologies have increased the availability and accessibility of content for both learners and instructors. Web 2.0 has enabled both instructors and learners to produce content, blurring the line between the instructor and the learner.

The range of initiatives and options available in the use of technology in the delivery of learning has promoted the option for educational institutions to collaborate in the development of content. Repositories of digital materials are now available in many disciplines to access e-learning material [30]. Some of the more established initiatives in this field in the sharing of experiences and creation of communities of practice in the delivery of learning content are Multimedia Educational Resource for Learning and Online Teaching (MERLOT) in the US, JISC in the UK, and National Digital Learning Repository (NDLR) in Ireland. This trend towards repositories is an attempt to share knowledge and reduce the cost of learning content development. It also offers the advantage of shared experiences and collaboration allowing for shared risk and rewards in content development. There is evidence that developers of content are creating learning material referred to as reusable learning objects and are sharing them by placing them in learning object repositories [31]. However, Cormier and Siemens [32] suggest that the significant number of high-profile open courseware initiatives from elite universities suggest that content of itself is not a sufficient value point on which to build the future of higher education.

7. Looking to the future

A report titled "Enhancing Learning and Teaching through the Use of Technology – A Revised Approach to HEFCE's Strategy for e-Learning" [17] has developed a framework to assist institutions in maximizing the strategic benefits of technology outlined in Table 4. Underpinning this report is recognition of the diverse institutional missions and strategic priorities meaning that it would be counter-productive to prescribe institutional activities. The intention

of this HEFCE report is to highlight those strategic areas where institutions may see a benefit from investing in technology and to help institutions map those benefits to specific institutional goals, strategic plans, or internal documents.

The framework is designed to help classify priorities for development. The implementation scaffolding is designed to be flexible, and HEFCE anticipate that institutions will adjust this framework to suit their specific requirements. In order to plan effectively for enhancement, institutions will need to convert these into specific goals, development pathways, and measures of success.

Activity area	Strategic priorities	Harnessing technology for strategic gain – examples of development goals
1. Pedagogy, curriculum design, and development	Enhancing excellence and innovation in teaching and learning Enhancing flexibility and choice for learners Enhancing student achievement Improving employability and skills Attracting and retaining learners Supporting research-based or enquiry-based learning Engaging employers (or other stakeholders) in curriculum design and delivery Improving efficiency of curriculum design and delivery processes	Tutors have access to a wide range of tools to support teaching, and a wide range of high-quality resources to engage students. Innovative uses of technology for learning are supported by the curriculum design process. Technology is used to enhance the responsiveness and flexibility of curriculum offerings. Technology is used to help identify learners with specific aptitudes or needs. Information and information systems are used effectively to support curriculum planning. Web 2.0 technologies are harnessed to support communities of learning and research. E-assessment technologies are used to support innovative practices such as just-in-time assessment and peer review. Students are developing their digital and learning literacies throughout their studies. Technologies for teaching and research are joined up in ways that support scholarship across the institution.
2. Learning resources and environments	Enhancing flexibility and choice for learners Enhancing student achievement Improving employability and skills Widening participation and improving access Effective management of learning resources Designing and maintaining effective environments for learning	Students can access information, support, expertise and guidance, and communicate with each other, wherever they are studying. Students can access personalized services within institutional environments, and use personal tools to suit their individual needs. Tools for scholarly communication are widely used, for example for feedback, collaborative research, and peer review. Tutors are collaborating in subject communities to produce high-quality, reusable learning resources.

Activity area	Strategic priorities	Harnessing technology for strategic gain – examples of development goals
		Tutors have access to relevant learning resources, and support for adapting, integrating, and enhancing them. There is continuity across learning, teaching, research, and administrative environments to support joined-up processes.
3. Lifelong learning processes and practices	Improving employability and skills Enhancing flexibility and choice for learners Widening participation and improving access to learning opportunities Supporting diverse learners' needs Retaining learners and meeting learners' expectations Co-operating with other institutions, colleges, and campuses	Students can record, access, reflect on, and present their achievements in ways appropriate to a variety of situations. Assistive and personal technologies are used effectively to support students with diverse needs and aptitudes. Local and regional communities are involved with the institution via electronically supported networks, for example, through lifelong learning networks. Students can access information online to make informed choices about their programs of study including choices about how and where to access learning. Technology is used to help students connect formal study with other aspects of life and work. Joined-up information systems support students in transition or while studying at more than one location or institution.
4. Strategic management, human resources, and capacity development	Enhancing excellence in teaching Enhancing excellence in research Workforce development Business/community links Improving efficiency and effectiveness of institutional processes	All staff have opportunities to develop and practise skills for enhancing learning through the use of technology. Staff skills for technology-enhanced learning are recognized in their roles and responsibilities and in reward structures. Technology is being used to join up and make more efficient the administrative and information management processes of the institution. Content resources are managed in an integrated way, allowing institutional assets to be exploited effectively for learning, teaching, and research. Institutional strategies (for example, for learning, teaching, and assessment; widening participation; learning spaces; information management; and human resources) include consideration of potential enhancements through technology. Staff and student time are used effectively through appropriate technical interventions.
5. Quality	Institutional quality processes can support objectives and enhance benefits in all the other areas	Institutional quality processes are agile enough to respond quickly to learners' and employer's needs.

Activity area	Strategic priorities	Harnessing technology for strategic gain – examples of development goals
		Streamlined quality processes allow institutions to feel confident in the quality of their provision at a reduced administrative burden.
		Enhancements through use of technology are taken into account in quality assurance arrangements.
6. Research and evaluation	Enhancing excellence in learning and teaching	Staff have access to research, evidence, and scholarship to inform curriculum development and research-based teaching.
	Enhancing excellence in research Enhancing understanding of learning and teaching processes Enhancing institutional processes (especially quality assurance and review)	Staff engage actively with the scholarship of teaching and are involved in innovation in using technology for learning and teaching. Institutions have effective mechanisms for evaluating learners' experiences of learning, including learning with technology. Learners, and staff involved in teaching, participate actively in strategic decisions about technology in the learning environment.
7. Infrastructure and technical standards	Enhancing flexibility for learners Supporting diverse learners' needs Enhancing efficiency of institutional processes Enhancing the technical infrastructure Enhancing the information environment Ensuring effective ICT investments and effective use of existing ICT resources Sustainability ("green" computing)	Technology is being used to join up and make more efficient the core administrative and information management processes of the institution. Due to more coherence and collaboration, technical issues have been addressed to give better value for money. Institutions are making good technology investments and finding the right balance of commercially developed, open source, and bespoke solutions. Institutions are providing technical support at an appropriate level to staff and students as users. Institutions are taking an informed approach to adoption and implementation of standards to support system interoperability and coherence. Institutions are making effective use of the network services and resources invested in by the sector as a whole.

Source: HEFCE [17].

Table 4. Enhancing learning and teaching through the use of technology: A suggested framework for institutions

8. Proposed strategy for educational institutions

As Taylor [33] states, the Internet can be a wonderful tool for instructors. Creating a new course or transforming a traditional instructor-led program to an online format involves much more

than converting notes to HTML pages. Howell et al. [34] suggest seven strategies to be adopted and applied in facilitating the delivery of distance learning using technology. These are as follows:

- Enable higher-level institutes and departments to accept more responsibility for distance education activities

- Provide faculty with more information about distance education programs and activities

- Encourage faculty to incorporate technology into their traditional classrooms

- Provide strong incentives for faculty to participate in distance education

- Improve training and instructional support for distance education faculty

- Build a stronger education faculty community

- Encourage more distance scholarship and research.

Source: Howell et al. [34].

9. Proposed strategic deployment model

If one considers the delivery of blended learning to include (i) e-learning content, (ii) virtual learning environment (VLE), (iii) instructor-delivered content, instructor support for students, (iv) student engagement, (v) student support, (vi) assessment and evaluation, and (vii) accreditation similar to a supply chain, the key strategic decisions that need to be made are with respect to what can be potentially outsourced, where collaboration may be possible, and what elements should remain in the domain of educational institutions.

One possible model of the redefined supply chain could be as outlined in Figure 1.
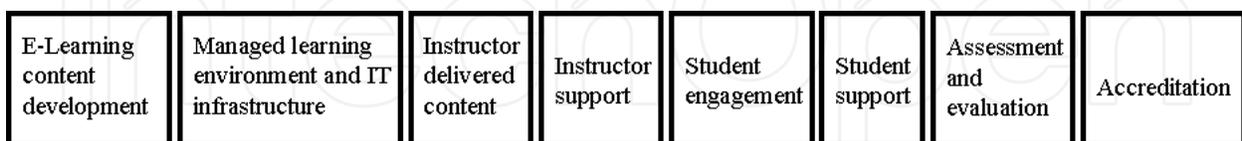

Figure 1. Supply Chain Model of Education

As technology has become ubiquitous, having the capacity to manage the IT infrastructure to support learning is an element in the delivery of learning that educational institutions should continue to develop a competency in house. Outsourcing content delivery and creation or collaborative approaches to develop content may result in potential saving for institutions. Educational institutions are best placed to support students, engage in the assessment of learning and accreditation of participants learning. This module is illustrated in Figure 2.
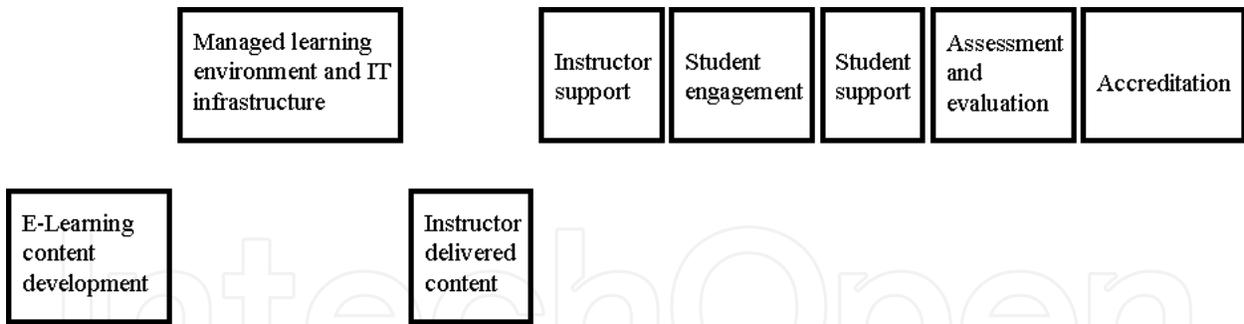
Figure 2. Proposed supply chain model for e-learning deployment

Socialization is a key reason for participants engaging with traditional models of education. It may be useful to construct a framework that will assist in deploying lifelong learning using technology. This framework, outlined in Figure 3, is constructed around four key parameters:

1. Participants

2. The delivery of the instruction

3. Online learning

4. Traditional instruction.
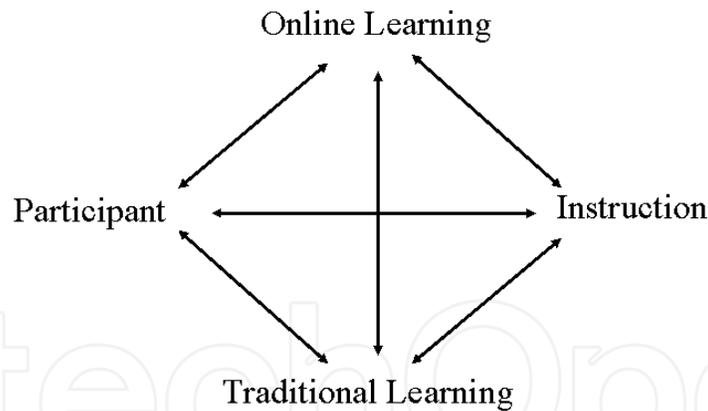
Source: Wall [35].

Figure 3. Framework of parameters in blended learning

There should be a balance between online learning and traditional learning and between the participant and the relationship formed with the instructor as part of any module to be delivered. A change in any one of these parameters has consequences for any other elements of the framework. The emphasis on instruction method, the balance between online and traditional instructions, and the degree of directed and independent learning will change, based on the individual's learning preferences, the material to be learned, the skills, ability, and instructional methodology of the instructor and the prior experience of the individual.

Blended learning offers institutions the opportunity to engage in using technology in conjunction with traditional delivery to offer learning. The issue then becomes how to configure this blend? There are often clear differences between the various subject disciplines in terms of technological and pedagogical innovation and what appears well embedded in one subject area may be quite innovative in another. Institutions are challenged to identify appropriate strategies for the various subject discipline areas.

On the basis of detailed research carried out in Waterford Institute of Technology in Ireland, where the deployment of a blended learning initiative was evaluated from both participants' and instructors' perspectives, a proposed framework for deploying lifelong learning is outlined in Table 5, identifying milestones, looking at key aspects of each milestone, suggesting possible activities to be undertaken to address the key aspects identified, and identifying the possible benefits as a result.

Milestone	Aspect	Key considerations	Potential benefits
1	Appreciate the learning process	Appreciate that everyone learns differently, so use multiple instructional methodologies. Recognize that a "one-size-fits-all" approach will not work. Individuals have different prior learning experiences. Use Learning Style Profiling Tool(s).	Instructors are aware that various instructional methodologies in both the classroom and online environment can enhance the learning experience. Can plan for instructional methods to capture peer learning.
2	Learning Management System (LMS)	Investigate current LMS system in organization. Invest in LMS, either purchase or use open sources system.	An established protected environment with a series of resources, administrative functions, and tools that can act as the platform for more sophisticated development and integration of resources over time.
3	Agreed standards in the delivery of material	Posting notes on LMS. All communication through LMS. Assignments posted through LMS. Use a voice over Internet Protocol (IP) communication platform.	Consistency from the participants' perspective. Different possible communications platforms that address learners' needs, increasing flexibility, overcoming any sense of isolation and ensure that participants are continuously engaged.
4	Agreed breakdown of classroom and online elements	Once module has been designed and learning outcomes agreed, agree on elements that will be delivered in a traditional setting and the elements that may be delivered online.	Overcomes the sense of isolation that participants may experience.
5	Assessment	Agreed breakdown of assessment methodologies.	More engaged with work / improved work performance.

Milestone	Aspect	Key considerations	Potential benefits
		Attempt to integrate assessment with work.	Can encourage work-based learning.
6	Agreed dates for traditional delivery and program of work at the commencement of the program	Appoint a leader to coordinate the scheduling of assignments, dates for delivery of traditional instruction, and online instruction and collaboration.	Participants can plan both work and private life, as they are informed in advance, for the times when formal traditional instruction takes place.
7	ICT infrastructure of participants	Survey participant's ICT ability and infrastructure at both work and home. Consider including purchase of laptop or distribution of a CD with requisite course material and software loaded.	Understanding of IT ability and infrastructure of the participants may help in tailoring some elements of the instructional methodologies to better meet participants' needs and circumstances.
8	Provide adequate induction	Develop guides Using of LMS Voice over IP communication Relevant software packages Library infrastructure / remote access facilities	Less administrative and communication challenges once program is up and running.
9	Use of multiple methods of communication with participants	Email (both work and student email) LMS Mobile devices Voice over IP communication	Emails to work act as a reminder to participants. Voice over IP allows for collaboration and collaborative learning to take place. Use of video and audio presentations where appropriate can facilitate collaborative learning. Discussion boards or blogs can be an effective learning resource.
10	Plan in social events	Informal get-together for meal or drinks events at commencement and throughout the program.	Breaks down barriers. Participants may find it easier to contribute particularly in the online environment as barriers have been broken down. Allows for further networking opportunities.
11	Creation of online resources	Can be costly and staff delivering the program may not have the expertise to develop sophisticated online resources.	Can enhance the learning experience when instructionally effective resources are developed.

Milestone	Aspect	Key considerations	Potential benefits
		Strategic decision to set aside funding on a continuing basis to facilitate online resource development and training.	Research integration of existing available resources.
12	Look at new / novel methods to focus on active learning	Use of problem-based learning; integrate existing developed resources such as games / simulations as part of modules / assessment.	Encourages collaborative and peer learning. Allows for informal learning to take place.
13	Recognition of the effort of staff delivering modules	Provide adequate training. Allow staff sufficient time to develop resources. Provide adequate reward scheme. Staff required to be more flexible in dealing with participants.	Staff more motivated. New skills sets developed. Broadens the institution's reach into industry.

Source: Wall and Ahmed [36].

Table 5. Proposed framework for deploying blended lifelong learning

This framework builds on the literature review and analysis of the formal blended learning program in Waterford Institute of Technology (WIT). It is fundamental at the outset to appreciate the learning process. By acknowledging that learning is complex, instructors and educational institutions should be open to new ideas / increased flexibility. The use of a learning style profiling tool such as Kolb Learning Style Inventory can assist in making instructors aware that there are many learner types and plan for a variety of instructional strategies, ensuring the benefits of understanding the variety of learner types. Establishing the appropriate infrastructure and standards of delivery will ensure a minimum standard of consistency. This still recognizes that instructors may be at different levels of confidence and experience in the use of technology in the delivery of learning. It will also encourage instructors who gain confidence to become more sophisticated and advanced in their use of technology over time.

By agreeing the breakdown of classroom and online elements prior to the commencement of the program, instructors know what is expected and participants can plan how to integrate formal continuing professional development (CPD) into their work and personal life. It helps plan dates and times for traditional delivery in advance. By focusing explicitly on assessment at the outset, instructors can plan a coherent assessment strategy and an evenly distributed workload can be achieved. Recognizing the ICT infrastructure of the participants' highlights at the outset of any potential problems, allowing for these challenges to overcome/mitigate early during the program. This will help in providing an appropriate level of induction, ensuring a smooth delivery and administration of the program. The use of multiple methods of communication allows the integration of both asynchronous and synchronous communications and also acknowledges the variety of possible learning styles as mentioned earlier. The

usefulness of social events should not be underestimated. As regards breaking down barriers, it can help build community morale on the program.

Identifying the creation of online resources as a discrete milestone challenges institutions to take a strategic approach to deploying blended learning. Searching for new/novel methods to encourage active learning helps build on the experiential learning of the group and encourages a continuous search for new instructional approaches. Finally, recognizing the key role of staff will ensure the initial and ongoing level of success or otherwise of the blended approach.

10. Conclusion

Current methods of working in educational institutions will be difficult to sustain in an environment where (i) the funding to institutions is reducing, (ii) demand for services is increasing, (iii) the demographics of students are changing, (iv) students are becoming more technologically literate and demanding, (v) the requirements to broaden access are growing, and (vi) there is an increasing need to provide flexible lifelong and work-based learning opportunities while maintaining the reputation for excellence in teaching, innovation, and research.

As funding mechanisms continue to change and rapid advances in ICT continue to transform the way education is delivered, developing a framework to deploy learning to address the diverse learning needs of future learners presents many challenges to higher education. The adoption of ICT to support and facilitate the development of educational programs can be at various stages of the technological adoption cycle in higher education. In many cases, it remains unknown and as such carries significant risk in terms of costs if not deployed successfully. Higher education institutions are under pressure to find new strategies and delivery models to enhance student learning. There is no unique formula to apply for the successful development and delivery of blended learning. Deploying blended learning is a complex and demanding undertaking from pedagogical and technological perspectives, which places new roles and responsibilities on both the participant and the instructor. Recognizing the rapidly changing landscape of education challenges, leaders in higher education institutions need to respond in a proactive manner. The frameworks proposed in this paper are put forward as a "roadmap" that may assist institutions plan the "route" to further integrating technology in both curriculum development and delivery.

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