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The evolution of eLearning

Background, blends and blackboard...

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ABSTRACT

This review of eLearning is divided into three sections: the first charts the evolution of eLearning from early correspondence courses to the current computer mediated approaches to distributed learning. The second section deals with the concept of blended learning; combining best practice in face-to-face and online learning. The final section focuses on current platform technologies in eLearning and outlines the strengths and weaknesses of learning management systems such as Blackboard.

Keywords: *dLearning, eLearning, mLearning, blended learning, learning management systems*



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Introduction

The story of distance education spans three centuries and involves a journey from the vocational training of factory workers to academic degree programs for professionals¹. The common thread linking these two extremes of the academic spectrum is an instructional mode in which teacher and student are separated by space or time, or both.

Traditionally there existed two perspectives as to the core function of distance education: one contends that distance education is a teaching mode in and of itself, while the other views it merely

as a vehicle of instruction. The currently accepted dictum offered by Keegan² blends both perspectives, defining distance education as the quasi-permanent separation between teacher and student in which instruction is facilitated by technical media: print, audio, video, or computer. Indeed, the US Department of Educational Research and Improvement defines distance or distributed learning as “*the application of telecommunications and electronic devices which enable students and learners to receive instruction from some distant location*”³.

Herein, I review some of the most significant milestones which punctuate this fascinating journey from *Letters to Learning Management Systems* in the development and delivery of distance learning courses. I focus on the relatively new development of Blended Learning – a fusion of the traditional face-to-face and computer mediated distance approach, and discuss the relative merits (and demerits) of the supporting platform technologies which have evolved to facilitate this new learning environment.

Background

The origins of distance learning can be traced back to a 1728 advertisement in the Boston Gazette from Caleb Phillips a “*teacher of the new method of short hand,*” advising that any “*persons in the country desirous to learn this art, may by having the several lessons sent weekly to them, be as perfectly instructed as those that live in Boston*”⁴. However, it wasn’t until the development of a modern postal service in the 19th century that commercial correspondence courses began to flourish. One of the first of these mail based correspondence courses was the Pitman Shorthand training program, established in the United States in 1852. Self-taught secretaries enrolled in this program would mail their work to the Phonographic Institute (based in Cincinnati, Ohio) and, upon successful completion of the course, were granted a certificate of expertise in stenographic shorthand skills⁵. Not all distance courses focused on secretarial work however, as other sectors quickly realised the potential benefits of this new approach to education and training. 1890 saw the development of the Colliery School of Mines (CSM), a correspondence course designed to teach mine safety. While in 1892, two years after the establishment of CSM, distance learning finally achieved academic recognition in the US when the University of Chicago created the first third level distance learning program.

By 1923, the CSM had evolved into the International Correspondence School (ICS), an enterprise which targeted iron and railroad workers as well as miners and by 1923 boasted over 2.5 million enrolled students⁶. However, by the early 1920s a new technology—radio broadcasting—began to threaten the dominance of the postal service as the medium of choice for distance learning⁷. Live educational radio shows revolutionised distance learning by reducing instructional delivery time and increasing classroom immediacy by allowing distant students to hear their instructor for the first time^{1,8}. Indeed, by 1923 over 10% of all broadcast radio stations were owned by educational institutions which delivered educational programming. By 1946 the Federal Communications Commission (FCC) had granted educational radio licences to over 200 third level institutions¹.

However, by the mid to late 1930s radio's dominance of the airwaves was itself challenged by a new technology with even greater potential as an educational medium—television; a platform which allowed the distant student to see as well as hear their instructor⁹. As early as 1934 the University of Iowa began broadcasting courses by television and by 1963 the FCC had established the Instructional Television Fixed Service (ITFS), a band of 20 television channels available to educational institutions¹⁰—the first to subscribe being the California State University system. Significant advances in satellite communication technology in the early 1980s continued to improve the utility of television as an effective educational delivery platform. By 1985, the National Technological University (NTU) employed satellite transmission to deliver both degree and post graduate courses to distant students using a combination of real-time broadcast and video. A significant advantage of the real-time approach was that students could, for the first time, engage in a two way dialogue by telephoning the instructor during the broadcast and having their questions answered live on air¹¹.

The 1990s saw the dawn of the *world wide web* and with it the seemingly limitless potential of the internet—the information super-highway—as the ultimate educational delivery platform¹². The development of high-speed broadband connectivity and the affordability of the personal computer (PC), coupled with new and improved software systems, referred to as learning management systems (LMS; discussed below) have helped to place online or elearning at the forefront of the instructional frontier¹³. Indeed, 1993 saw the first fully internet based 'virtual' third level institution, Jones International University, open its virtual doors with five



Fig. 1 Timeline and major technology platforms in the evolution of eLearning.

bachelors and 24 masters degree programs. Sporting the tag line ‘*the gold standard online university*’, Jones International was the first online university to be accredited by the Higher Learning Commission (HLC). For a synopsis of timelines see Figure 1.

An overview of eLearning institutions worldwide

From 1964 to 1968 the Carnegie Foundation funded the Articulated Instructional Media Project (AIM); an initiative developed by the University of Wisconsin-Madison’s Charles Wedemeyer to provide direction on how best to create and incorporate multimedia instructional packages for the independent/distant learner¹⁴. It is widely accepted that the US AIM project provided the template for the design and development of the British Open University (now referred to as the UKOU, to distinguish it from other open universities). Established by Royal Charter in 1969, the UKOU used television and radio, the most up-to-date technologies of the time, as its primary delivery methodologies, placing it at the forefront of applying emerging technologies to learning. Today, the UKOU provides 21% of all higher education in England and is considered a model of distance learning in higher education. Indeed, the Open University model has expanded to a number of countries worldwide, with more than a dozen of them growing to become ‘mega-universities’, a term coined to denote institutions with more than 100,000 students¹⁵.

Spain’s Universidad Nacional de Educación a Distancia (UNED), a state-run distance learning university, founded in 1972 is an

example of such a mega-university. With a current enrolment of circa 180,000, it is the largest university in Spain. In 1974, Germany's answer to UNED was the FernUniversität; the country's only state-run distance learning university. Offering more than 1,700 courses in several traditional disciplines such as Engineering, Law and Economics, the FernUniversität has additionally created an institute devoted specifically to the study of distance learning as a discipline.

Two of Canada's leading distance education providers are Open Learning of Thompson Rivers University (TRU-OL) and Athabasca University (AU). With over 400 individual courses and more than 57 programs available for completion by distance and online learning, TRU-OL students can take a variety of programs to degree level. While AU offers over 700 courses in more than 90 undergraduate and graduate programs.

Today it is estimated that the total elearning market, including all education and training, is worth approximately €25 billion, and is continuing to expand¹. Indeed, the elearning approach is not only restricted to virtual campuses, as more and more 'bricks and mortar' institutes of education are opting to deliver courses using a blended approach (outlined below), where conventional face-to-face (F2F) lectures are supplemented with online teaching and learning approaches facilitated by LMS. Indeed, the Sloan Consortium reported that more than 96% of the largest US colleges and universities offered online courses and that almost 3.2 million US students were enrolled in at least one online course during the Autumn semester of 2005¹⁶. Thus, from vocational training of secretaries and factory workers in the mid 1800s to today's academic degree programs tailored for professionals, distance learning in its most modern guise of elearning is here to stay.

Blended learning

In 2002, the president of Pennsylvania State University declared that the convergence of online, computer-mediated (CM), instruction with traditional, classroom based, F2F learning is “*the single-greatest unrecognized trend in higher education today*”¹⁷. The following year, the American Society for Training and Development identified this new approach of *blended learning* as one of the top ten trends to emerge in the knowledge delivery industry.

Herein, I review the *What*, *Why* and *How* of Blended Learning (BL), and investigate the underlying challenges and future prospects of this new approach to teaching and learning.

What is blended learning?

While there are a variety of plausible answers to this question¹⁸, these can be further distilled down to three primary definitions:

- (i) *Combining instructional modalities (or delivery media)*
- (ii) *Combining instructional methods*
- (iii) *Combining online and F2F instruction*

Although accurate and appropriate in their own right, both (i) and (ii) define BL in such broad terms as to encompass virtually all learning systems, and in effect fail to capture the essence of what BL actually is, or why this new concept is so powerful and indeed prevalent in today's society. By contrast, the final definition—*combining online and F2F instruction*—more accurately reflects the historical emergence of BL, which is in effect the combination of instruction from two previously separate models of teaching and learning: traditional F2F learning and distant learning systems. Thus, BL is, in essence, part of an ongoing convergence of two archetypal learning environments. In the past, these two learning environments remained largely separate; divided by different media/method combinations. The distance learning approach emphasized a student directed *place and pace of learning*, typically occurring in an asynchronous, low fidelity (text only) environment, while traditional F2F learning on the other hand involved person-to-person interaction in a live synchronous and high fidelity environment.

To a large degree, the media available (*i.e.* the technology platforms discussed above) placed the most significant constraints on the nature of the instructional methods that could be used in each environment. In the distance learning environment in particular, it was difficult, if not impossible, to facilitate synchronous or high fidelity interactions. However, rapid advances in technological innovations (particularly digital technologies) have had a significant impact on the possibilities for learning in the distributed environment. Indeed, modern computer mediated LMS' have enabled synchronous distributed interactions to occur in real-time with comparable levels of fidelity to those of the F2F environment. Furthermore, an increasing focus on facilitating human interaction in the form of computer-supported collaboration,

virtual communities, instant messaging, blogging, *etc.* has meant that distributed learning environments are increasingly encroaching on instructional territory that was once the sole preserve of F2F environments. Indeed, this widespread availability and adoption of digital learning technologies, particularly LMS such as Blackboard, has led to increased integration of CM instructional elements into the traditional F2F learning experience¹⁹. The result of this technology mediated marriage of traditional F2F with modern CM learning is BL.

Degrees of blend

BL can be divided into a number of different levels (outlined in Table 1).

In addition to the four primary organizational levels, BL can be further divided into three distinct categories, based on the primary purpose of the blend (see Figure 2):

- (i) *Enabling blends*—Focus on accessibility and flexibility, *enabling* learners to chose the approach which best suits their needs in terms of time and cost constrains.
- (ii) *Enhancing blends*—Increased incorporation of technology (*e.g.* LMS) to facilitate and *enhance* the teaching and learning experience.
- (iii) *Transforming blends*—Radical transformation of the pedagogy; facilitating a move from traditional passive learning to teaching for understanding (TfU) and active learning, such as the mixed-reality and problem-based embedded training described by Kirkley and Kirkley²⁰.

Why blend?

Having answered the *What*, we must now consider the *Why*?

The most common response in the literature is that BL combines “*the best of both worlds*”; mixing instructional strategies from F2F and CM, capitalizing on the strengths of both strategies while avoiding their weaknesses²¹. Delving deeper, the appeal of BL may be attributed to the following:

- (i) *Improved pedagogy*—The literature is replete with examples of how BL increases the level of active, peer-to-peer and student centered teaching and learning strategies^{22,23}.

Table 1 *Organizational levels of blended learning*

Level	Description	Examples taken from Bonk ²⁰
<i>Activity</i>	A learning activity contains elements of both F2F and CM delivery.	Jung and Suzuki describe how technology can be used to bring experts at a distance into the classroom creating a simultaneous F2F and CM experience.
<i>Course</i>	A combination of distinct F2F and CM activities used as part of a course.	Owston, Garrison, and Cook describe eight different cases of blending at the course level across universities in Canada.
<i>Program</i>	A mix of F2F and CM mediated courses at the degree level.	Salmon and Lawless describe a business program which can be completed online or online with F2F tutoring sessions.
<i>Institution</i>	An organizational commitment to blending F2F and CM instruction.	The University of Phoenix provides F2F classes at the beginning of a course with online activities in between.

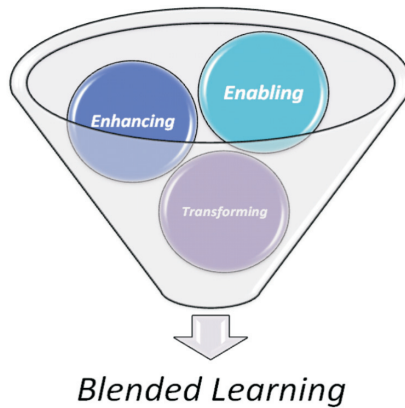


Fig. 2 Blended learning consists of three distinct categories, depending on the primary purpose of the blend.

- (ii) *Increased access/flexibility*—Ease of access, coupled with increased flexibility in terms of the *place and pace* of learning are key factors for *lifelong learners*, many of whom are limited by external commitments such as work or family²⁴.
- (iii) *Increased cost effectiveness*—BL offers significant cost reductions in terms of physical infrastructure and improved scheduling efficiencies; reaching a large, globally dispersed audience, in a short time-frame, with consistent, semi-personal content delivery²⁵.

The advantages of the BL approach are obvious to both student and educator—providing increased flexibility for students (experiencing the advantages of both F2F and CM mediated tuition) while allowing the teaching institutions to access a much larger audience in a more cost effective manner²⁶.

Effective blending

A number of factors must be considered when designing an effective BL system:

- (i) *Live interaction*—The impact on the learning process of F2F interaction between students (and indeed student and teacher) in the live classroom environment is still open to debate. When F2F and CM elements are combined, several studies have shown a preference for the F2F components of the BL experience among a significant proportion of students. However, in spite of this, some observers claim that the F2F components are largely unnecessary,

in terms of the learning experience, and are primarily used for socialization reasons²⁰.

- (ii) *Learner choice/self regulation*—While the BL approach *enables* students to control their *place and pace* of learning to a much greater degree than traditional F2F methods; consideration must also be given to providing adequate guidance about how different blends might impact their learning experience (either positively or negatively). Online learning components generally require significant self-discipline on the part of the learners, and so BL systems must be designed to facilitate student maturity—helping them to make the right choices, thus improving the efficacy of self regulation²⁷.
- (iii) *Support and training*—This is necessary at all organizational levels; from student to instructor to the Institute itself—changing organizational culture to accept BL approaches.
- (iv) *The digital divide*—As the technology which facilitates BL continues to expand and develop, so too do the associated costs, thus making this learning strategy less and less accessible to those at the lower end of the socio-economic spectrum²⁸.
- (v) *Cultural adaptation*—While an advantage of the BL approach is its ability to distribute uniform learning materials to a diverse global population, there is often a need to tailor materials to make them more accessible and culturally relevant to the local audience. There is thus a need to modulate the BL approach to find a balance between local and global requirements²⁹.
- (vi) *Balancing innovation and production*—Due to the ever changing nature of the information and communications technology (ICT) sector, balancing innovation (the development of new platform technologies, outlined below) with production remains a significant barrier to those designing and developing BL technologies³⁰.

As traditional F2F (chalk and talk) and CM (online only) teaching strategies continue to converge, driven by a desire to create more effective learning experiences, to increase access and flexibility, and/or to reduce the cost of learning; future learning systems will involve a blend of both F2F and CM experiences. Indeed, upwards of 77% of US educational organizations currently employ a BL approach, which accounts for 16.1% of all training in the US³¹. This observation led Ross and Gage (referenced in Bonk²⁰) to predict that future learning systems will be differentiated not on the basis of *whether* they blend but rather *how*, and to what extent, they blend.

Learning management systems—a platform technology for blended learning

Learning Management Systems (LMS; also variously referred to as “distributed learning systems”, “learning platforms”, “portals” and sundry combinations thereof) are integrated computer based learning systems which emerged in the 1990s from a range of multimedia and internet based developments³². The ideal platform technology for the BL approach, LMS combine a range of course or subject management and pedagogical tools to provide a means of designing, building and delivering online learning environments³³. Furthermore, LMS are scalable systems which can be applied not only to individual blended or distant courses but also have the potential to drive entirely virtual institutions³⁴.

A briefing in the *Observatory on Borderless Higher Education* (cited in Coates *et al.*,³³) provides an overview of the spread of the two primary commercial LMS packages (Blackboard and WebCT, identified respectively by Falvo and Johnson³⁵ as the first and second most widely used LMS in the US, before their amalgamation in 2005³⁶). In just five years these two products grew from in-house developments in North American universities to highly commercial LMS packages in an international educational market. Indeed, in Australia, the United Kingdom and Canada, more than 70% of academic institutions hold licenses for at least one of these products³³. Indeed, Bell *et al.* (cited in Coates *et al.*,³³) found that approximately 54% of all subjects delivered in the Australian third level system contain an online component (with 60% of postgraduate and 25% undergraduate subjects involving the use of online technology).

Learning management systems

While *access*, *cost* and *quality* are undoubtedly the most significant drivers of successful integration of ICT in higher education, a more nuanced analysis uncovers a number of additional factors (*good*, *bad* and *ugly*), which need to be closely monitored and evaluated as the technology develops.

The good...

- (i) *Increased teaching efficiencies*—Despite a significant initial capital investment, LMS facilitate improved economies in course design and delivery. Indeed, LMS have the potential to create new relationships between academic and administrative staff—enabling institutions to significantly lower the levels of costly academics, who create content, with the support of larger numbers of less expensive student support staff.
- (ii) *Enriched student learning*—LMS reinforce and enhance a diverse suite of constructivist pedagogies³⁷; by providing students access to a much greater range of resources than would be possible using traditional approaches. LMS can be used to make course contents more cognitively accessible to individual learners, providing multiple entry points each tailored to a different intelligence³⁸.
- (iii) *Meeting learner expectations*—A recent study by Hawkins and Rudy³⁹, revealed that the vast majority of US third level students own their own computers. Furthermore, this new generation of computer literate college students have developed, what Frand⁴⁰ refers to as, an “*information-age mindset*”—where ICT permeates every aspect of their lives. Indeed, 79–95% of all American college students regularly use social networking sites such as Facebook and MySpace⁴¹. Thus, in the increasingly competitive higher education marketplace, where colleges must compete for students⁴²; these expectations need to be matched, or indeed exceeded, in order to protect and maintain future enrollments. LMS enable institutions to compete to meet these expectations on an equal footing.
- (iv) *Agent of change*—Increasing demand for third level places has put significant pressure on traditional academic institutions to reassess and restructure both their physical and intellectual infrastructure³³. The development of virtual learning environments (VLE), mediated by LMS, on the one hand provides an efficient means of overcoming access limitations resulting from a lack of physical infrastructure⁴³. While on the other hand providing a valuable opportunity to quantitatively reform traditional institutions⁴⁴, so that they are better placed to deal with new challenges in an educational environment which they no longer dominate.
- (v) *Improved regulation and standardization of teaching*—By providing templates that assure order and consistency in course delivery across the entire institution (or indeed between institutions); LMS offer a means of regulating pedagogical activities, thus facilitating the implementation of stringent quality control measures.

The bad...

While the technological, economic and pedagogical benefits of LMS, as listed above, are immediately obvious, a deeper analysis reveals a number of important questions which still need to be addressed.

Until recently little research has been conducted into how LMS affect student engagement, both at an intellectual, emotional and practical level. One dimension of this engagement is the broad out-of-class interactions students enjoy with the academic community within the institution³³. Do LMS affect students' feeling of inclusion, of being part of the party? A second dimension of engagement concerns students' interaction with the LMS itself. It has been suggested, for example, that the very act of teaching can be compromised once pedagogy is coded and compiled into software⁴⁵. However, this too may be changing as the next generation of students (the so called Generation Y-ers⁴⁶) continue to display an "*information-age mindset*"⁴⁷. While "academic-free" teaching still remains a distant prospect, the "*academic-lite*" model supported by LMS also raises some legitimate concerns. By seeking learning assistance from technology support staff as opposed to academics, for example, are students still exposed to the same level of academic support and supervision as they would enjoy in a purely F2F environment? Furthermore, the improved standardization of teaching offered by LMS, while advantageous in some respects, can also be severely limiting; often forcing academics to adhere to the imposed structures of a set template (irrespective of whether it is a 'good fit' or not).

The ugly...

Without ultimate institutional control over the source code that runs the program (a particular concern for institutions using commercial packages, such as Blackboard), pedagogical content may no longer be in the hands of individual academics, or indeed academic institutions, but may technically be the property of the program developer or commercial company⁴⁸. This continuing corporatization of academic knowledge, if left unchecked, may lead to a loss of identity or indeed academic freedom⁴⁹, with institutions becoming homogenized franchises as opposed to independent seats of learning.

Future prospects

In conclusion then, the evolution of distance or distributed education it appears is inextricably linked to the prevailing technologies of the day. The first distance courses were made possible by the development of an effective postal service during the industrial revolution of the late 18th and early 19th centuries. The electronics revolution of the late 20th century further changed the nature of education (leading to the emergence of eLearning). This new medium, facilitated by powerful computer mediated technology platforms, made it possible for the first time to teach F2F at a distance, to restore eye-to-eye contact electronically, and to teach groups as well as individuals at a distance. So what does the 21st century hold? It appears that the challenge for distance systems at the dawn of the third millennium is to develop mLearning⁵⁰ – didactic environments for mobile devices, as the air interface (WiFi) replaces the wire interface. The mobile telephone (of which there are over one billion users) is a trusted, personal device with internet access, smart card usage, and a range of possibilities for allowing the distant learner to remain constantly in touch with the institution, learning materials and fellow students, while at home, at work, or travelling.

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