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Blended Learning for Quality Higher Education:

Selected Case Studies on Implementation from Asia-Pacific

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Education 2030

Blended Learning for Quality Higher Education:

Selected Case Studies on Implementation from Asia-Pacific

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Foreword

Throughout Asia and the Pacific, there are growing demands for more flexible pathways to accessing quality higher education and lifelong learning opportunities for all. Technology offers unprecedented opportunities to meet the needs and expectations of the next generation of learners. Building on increased internet access and mobile platforms, blended learning – i.e. *the fusion of online and face-to-face contact time between teaching staff and students* provides a means to enhance quality, equity, and access to lifelong learning opportunities, which is a key goal for UNESCO and the scope of this new book.

Together with The Education University of Hong Kong, UNESCO Bangkok gathered experts from higher education institutions in the Asia-Pacific region to explore the potential of blended learning, including its impact on the role of teachers, the relationship between teachers and students, and the nature of educational institutions themselves. Issues about the quality of education are at the heart of the Sustainable Development Goals, which were adopted during the United Nations Sustainable Development Summit in September 2015.

Sustainable Development Goal four, known as Education 2030, aims to ensure inclusive and equitable quality education and lifelong learning opportunities across all modes of formal and non-formal learning. In this way, blended learning is a valuable approach for UNESCO to help promote inclusive education, including reaching those who are marginalized or in vulnerable situations. This is especially important in Asia-Pacific – the world's most populous and most disaster prone region – so that learners can continue to study without a physical classroom or campus.

In all settings, we need to address essential questions such as: Blending what? Learning what? In other words, how does

blended learning work in practice? And how can policymakers and institutional leaders promote effective governance and sustainability of these emerging systems to support lifelong learning? Despite promising practices, the sustainability and scalability of blended learning has been an enormous challenge. Therefore, this book aims to explore how leading institutions in Asia-Pacific build capacity through a holistic approach to drive, sustain and scale their blended learning practices. This new resource is a compilation of case studies from a range of experienced higher education institutions in the Asia-Pacific region where they showcase promising practices and lessons learned. It serves as a sounding board for institutional leaders and policymakers to drive and support blended learning based on current and future needs.

We learn that in the process of implementing blended learning strategies, that we need to pay more attention to learning inputs, processes and assessments and how to measure personal development overall. To implement this holistic approach, teachers and administrators should be well prepared, motivated, and given the resources and time required. To succeed, students need learning opportunities to be creative with guidance from well-supported faculty in dynamic learning environments. Institutional leadership must also be attuned to the needs of their staff, students, and the overall demands of a cross-cutting strategy to improve learning experiences both online and in person.

Since governments have the fundamental responsibility for promoting access to quality education and the Education 2030 agenda, UNESCO must also provide relevant policy advice and technical support. Building capacity for more transparent governance, upholding the right to participation of all stakeholders, efficient data collection mechanisms, and monitoring implementation of inclusive education policies remain at the forefront of UNESCO's vision and mandate.

UNESCO Bangkok would like to thank The Education University of Hong Kong and all contributing authors for their insights and detailed case studies. This collection illustrates what is possible when higher education institutions become the leaders of a blended learning movement, which can be a foundation for expanding access through mobile and other modes of learning to higher quality education. UNESCO will join you on this timely journey towards quality education.

Gwang-Jo Kim
Director
UNESCO Bangkok

Foreword

We are thrilled to work with UNESCO and the group of collaborating universities for this groundbreaking book on blended learning for higher education leaders, policymakers and practitioners. This book is important to us for three reasons.

First, its purpose flows directly from UNESCO's goal to promote and support the use of ICT to advocate quality access and life-long learning. This dovetails neatly with our own agenda to bring meaningful and productive educational experiences to all in East and Southeast Asia.

Second, this book pulls together exemplary practices from leading regional institutions about how and why they enact a holistic approach to drive and support blended learning within their own institutions. As we strive to improve our own practice and impact in this area, we can learn much from the experience of others. Too often, knowledge, experience and key lessons remain locked inside individual institutions. We believe the form of sharing exemplified in this book is a great way to showcase the values and power of ICT to make change happen in higher education – we applaud this.

Third, the fact that this book provides pragmatic guidance for institutions throughout the region and beyond to build their own capacity to drive and support blended learning is where its true value lies. The more we can help each other to find better ways to spread the wealth of knowledge around ICT in education, the sooner we can extend and enrich the educative and social experiences of young and adult learners alike. We believe the power of ICT will not only improve the learning experience of our own learners, but that it will also affect the communities our learners engage with. For this to happen, we need to know where we can improve, where we can go for assistance, and that our work is of the highest standards.

This book will help us and many others achieve this.

It has been our pleasure to partner with UNESCO on the development of this volume. We hope that the collected practices and the values underpinning them will help to impact both the practical capability and the mindsets around the region about the place and power of ICT for higher education. We look forward to witnessing this in our own work and that of others.

Allan Walker

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Preface

The 2030 Agenda for Sustainable Development was announced in 2015 for all countries and all stakeholders, acting in partnership, to align their development efforts to this agenda. The set of 17 Sustainable Development Goals (SDGs) is a universal, integrated, and transformative vision for a better world. SDG 4, known as Education 2030, is a single global goal for quality education, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Technology is a fundamental driver of that vision to create equitable, dynamic, accountable and sustainable learner-centred digital learning ecosystems that are relevant for the 21st Century. Rapid advances in technology are revolutionising the way in which teaching and learning is conceptualised, designed, and implemented in higher education. These developments play a key role in delivering quality education for all.

Blended learning, the deliberate synthesis of online and face-to-face contact time between teaching staff and students, has been particularly appealing to an increasing number of higher education institutions (HEIs) in recent years. While many of the advantages of blended learning are well established, its adoption in practice can pose enormous challenges for HEIs, especially in terms of sustainability and scalability. Although blended learning design and implementation may be context-dependent, an institution-wide systematic consideration and strategic planning of blended learning may be necessary for all HEIs to bring about transformations in teaching and learning practices. This book aims to build the capacity of HEIs for blended learning through providing a framework and a self-assessment tool developed by a team of blended learning experts and leaders. It incorporates case studies from selected leading HEIs in the Asia-Pacific region to demonstrate how the

framework and its dimensions are operationalised, and how the gaps identified in the self-assessment exercise may be addressed.

This book consists of ten chapters. In **Chapter 1**, Cher Ping Lim and Tianchong Wang present a framework developed from a holistic view of building institutional capacity to drive, sustain, and scale up blended learning. Eight strategic dimensions are included within the framework: *vision and philosophy; curriculum; professional development; learning support; infrastructure, facilities, resources and support; policy and institutional structure; partnerships; and research and evaluation*. The framework outlines a holistic approach to the implementation of blended learning, including a self-assessment tool to help guide HEIs in their reflection on the existing institutional blended learning strategies (if any), identify gaps and issues in these strategies, and plan how these gaps and issues could be addressed. As HEIs engage in this process of reflection and planning guided by the framework and supported by the self-assessment tool, they are then more likely to drive, sustain and scale up blended learning practices in their institution.

In **Chapter 2** Xiaoqing Gu presents a case study conducted at East China Normal University (ECNU) in Shanghai, China with a focus on examples of blended learning practices from the micro to macro levels. Three blended learning cases, representing the class, course and programme levels, are showcased as good exemplars. The associated strategies and common challenges found are also discussed.

In **Chapter 3**, Grace Oakley pays attention to institutional-level structures, strategies and supports that have been changed or initiated to enable and encourage transformation in teaching and learning and enhance the student experience at The University of Western Australia (UWA). The chapter also reveals how UWA has attempted to transition from implementing a diffusion model of pedagogical change to a more concentrated

institutional level strategy aimed at 'exploding' the traditional lecture and encouraging the rapid transformation of learning and teaching.

Chapter 4 examines the blended learning policies and strategies adopted by Universiti Sains Malaysia (USM). By looking at Malaysia's Education Blueprint and the e-learning policy in the country's higher education institutions, Termit Kaur Ranjit Singh discusses the current blended learning situation at USM and explains how eLearn@USM has become the integration portal for teaching staff and students to access course information online. The chapter also explains the blended learning policies and strategies adopted by USM in relation to the other dimensions in Lim and Wang's framework.

Taking a technological perspective, Thanomporn Laohajaratsang introduces how the infrastructure, facilities and resources of Chiang Mai University (CMU) in Thailand have effectively supported blended learning practice in **Chapter 5**. Three initiatives of technological readiness development under the CMU's 'Digital University' strategy are described in detail, and the university's new model of investment in wireless network provision is highlighted. The chapter ends with the lessons learned, focusing on the formulation of a systemic approach to blended learning practices.

Chapter 6 by Daniel T.H. Tan discusses the outcomes of the various blended learning initiatives introduced by the Centre for Excellence in Learning and Teaching (CELT) at Nanyang Technological University (NTU) in Singapore from 2000 to 2013 and the role of organisational support in scaling and ensuring high and useful implementation and successful learning outcomes. The chapter concludes that an integrative campus-wide approach, wherein different systems and tools seamlessly complemented and supported one another, as well as the 'professor-friendly' philosophy, are key factors influencing the high adoption and usage rates of blended learning.

Cher Ping Lim and Tianchong Wang in Chapter 7 examine how teaching staff professional development for blended learning has been driven and implemented in the Faculty of Education and Human Development (FEHD) at The Education University of Hong Kong (EdUHK). Besides equipping teaching staff with the technical know-how, they had a rethink of the existing technical-driven professional development approach, and introduced a new faculty-driven approach for professional development in FEHD. This approach included pedagogically-focused capacity building strategies that aimed to enhance learning engagement and outcomes, and to scale up blended learning practices in the faculty. The chapter also presents the concerted efforts that have been made at both the institutional and faculty levels for creating a conducive environment that support blended learning.

Cheolil Lim, Young Hoan Cho and Sunyoung Kim in their Chapter 8 showcase how Centre for Teaching and Learning (CTL) at Seoul National University (SNU) in Republic of Korea secured systematic and organic partnerships with internal and external institutions. These partnerships have enabled SNU to develop an infrastructure for online and blended learning, provide pedagogical and technical support to teaching staff and conduct research and development to build a smart campus. The chapter also describes the tensions between CTL and partners due to the differing motives and perspectives on blended learning. The authors point out that SNU must strive to decrease these tensions and develop sustainable partnerships that can lead to the growth and diffusion of blended learning across the campus.

Chapter 9 by David Gibson, Tania Broadley and Jill Downie describes how the vision of blended learning at Curtin University in Australia is empowered by an ecosystem involving three organised subsystems – a model of converged resources and

processes for global influence; policy entry points for advocating continuous improvement and change; and the core services of the university. The chapter explores the complexity of this model and presents the notion that blended learning within the university context must now be considered as an interrelated web of policies, practices and principles to successfully achieve whole-of-institution change.

In the final **Chapter 10**, Xibin Han, Yuping Wang, Binfeng Li and Jiangang Cheng report a longitudinal study investigating institutional roles in the adoption and implementation of blended learning at five universities in China. These roles are examined based on the key components of the framework proposed in Chapter 1. The chapter concludes that in the unique context of Chinese higher education and in view of the present blended learning development in Chinese universities, the institution is instrumental in the transition from awareness/exploration stage to adoption/early implementation and mature implementation/growth stages. It is pointed out that a clearer institutional vision, stronger support of teaching staff and students and increased research and evaluation may be the next step in preparing teaching staff and students for blended learning in Chinese universities.

We hope that this compilation of the framework, self-assessment tool and case studies would benefit HEIs and provide insights to institutional leaders, policymakers, scholars and teaching staff to realise the full potential of blended learning to promote quality higher education and lifelong learning opportunities for all.

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1. A Framework and Self-Assessment Tool for Building the Capacity of Higher Education Institutions for Blended Learning

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Abstract

Higher education institutions (HEIs) have adopted a blended learning approach to enhance the quality of learning and teaching in their institutions. Although the impacts of blended learning on student learning engagement and outcomes at the classroom and course level have been well documented, its implementation faces sustainability and scalability challenges. This chapter presents a framework and self-assessment tool for building the capacity of HEIs to drive, sustain and scale up their blended learning practices. The framework includes eight strategic dimensions: vision and philosophy; curriculum; professional development; learning support; infrastructure, facilities, resources and support; policy and institutional structure; partnerships; and research and evaluation. Based on these dimensions, the self-assessment tool can be adopted to support HEIs in their reflection of the necessary and sufficient conditions to sustain and scale up blended learning practices in and across programmes and courses within the institution.

1. Introduction

The ubiquitous use of technologies in our daily lives has profoundly changed not only the way we live but also the construction, distribution and reconstruction of knowledge. Many of the current assumptions about what and how students learn in higher education institutions (HEIs) have been challenged by these technology-driven developments. Today's HEIs must prepare students to continuously 'learn, unlearn and

relearn' (Toffler, 1990) through engaged learning experiences that involve constructing and understanding knowledge with technologies. Students are expected to be highly competent in technology-rich environments, with the abilities to arrive at creative solutions to complex problems and collaborate by communicating effectively with peers from diverse backgrounds.

Blended learning, the deliberate fusion of the on-line (asynchronous and/or synchronous) and face-to-face contact time between teaching staff and students and/or between students in a course, has been promoted and encouraged in an increasing number of HEIs (Graham, Woodfield, & Harrison, 2013). Blended learning provides HEIs with opportunities to achieve the aforementioned and other learning outcomes required to meet modern-day demands in a globalised and technology-driven world (Dziuban, Hartmen, Cavanagh, & Moskal, 2011; Means, Toyama, Murphy, Bakia, & Jones, 2010; Overbaugh & Nickel, 2011).

Despite the potential of blended learning for HEIs, there are challenges associated with its implementation (Owston, 2013; Porter & Graham, 2015; Sayed & Baker, 2014; Tshabalala, Ndeya-Ndereya, & van der Merwe, 2014). For instance, front-line teaching staff may not share the institution's vision for blended learning practices to enhance learning and teaching (Bohle Carbonell, Dailey-Hebert, & Gijselaers, 2013). There may be gaps between teaching staff's capacity for blended learning and the expected level of engagement in blended learning practices (Fishman, 2005). Limited institution-level support may decrease the motivation of teaching staff to transform a course into a blended format and discourage their commitment to change (Kenney & Newcombe, 2011). Although the concept of blended learning may be simple in theory, it is complex in practice (Wang, Han, & Yang, 2015). The effectiveness of blended learning depends highly on the

context in which it is adopted and how it is implemented (Garrison & Kanuka, 2004).

Given the challenges faced by HEIs, blended learning has limited sustainability and scalability within and across programmes in an institution. This chapter presents a holistic framework and its associated self-assessment tool to support leaders of HEIs in the Asia-Pacific to revisit and refine their strategic planning processes and plans for blended learning systematically; and hence, building the capacity of HEIs to drive, sustain and scale up their blended learning practices.

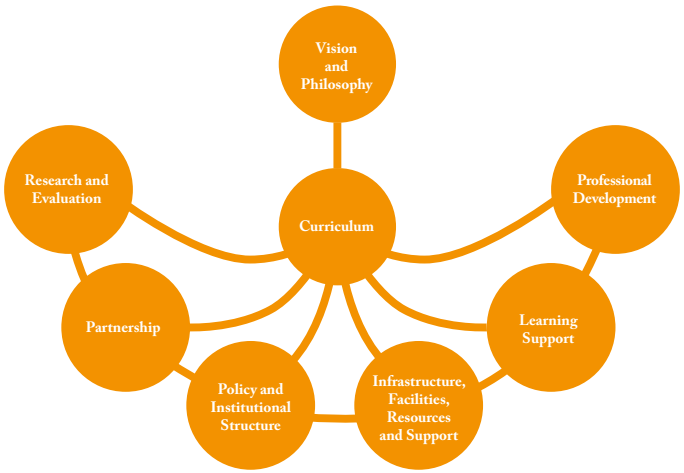
2. The Framework

The framework presented in this section consists of eight strategic dimensions (see Figure 1):

a. Vision and Philosophy;
b. Curriculum;
c. Professional Development;
d. Learning Support;
e. Infrastructure, Facilities, Resources and Support;
f. Policy and Institutional Structure;
g. Partnerships; and
h. Research and Evaluation.

These dimensions are identified and explained based on the lessons learned from the practices and challenges associated with blended learning as raised in the literature reviewed. By considering these strategic dimensions, HEIs are more likely to formulate and implement coherent internal and external processes that optimise the learning potential of integrating blended learning into their programmes and courses.

Figure 1: A holistic framework for building the blended learning capacity of HEIs.



2.1 Strategic dimension 1: vision and philosophy

A vision is a descriptive picture of the potential future of an institution. The successful implementation of blended learning in HEIs requires a clear vision grounded in the institutions' philosophies for learning and teaching in blended learning environments. Using educational arguments that are clearly articulated and uniformly accepted in support of blended learning, teachers have the ability to push their institutions' vision and philosophies forward and thus offer students learning experiences that are more engaging and meaningful to them.

2.1.1. Institutional vision for blended learning in higher education

First, the institution must create a shared institutional vision for how it can transform technology-enhanced learning environments for the purposes of student engagement and the development of twenty-first century competencies (Bates & Sangra, 2011). In order for this to occur, institutions can

start with envisioning the ultimate goals and outcomes they want to achieve from institutional, student and teaching staff perspectives (Moskal, Dziuban, & Hartman, 2013). A complete rethinking and redesign of the learning environments and experiences supported by the concerted efforts of all staff within the institution is needed.

2.1.2. Underlying philosophy for learning and teaching in blended learning environments

The modern world requires students to possess competencies for identifying problems and inquiring after solutions (Levy & Murnane, 2005). Student inquiry, which is at the core of meaningful learning experiences, may be nurtured by two inextricably linked components: reflection and discourse (Garrison, 2011). Asynchronous on-line learning experiences provide students with opportunities for meaningful reflection. Most campus-based classrooms with their large class sizes do not provide students with an environment conducive for reflection. When learning is provided in two modes, the full potential of the learning experience is realised and provided by both. To put such thinking into practice, blended learning in higher education must be about learning first and enhancing learning through technology second. Learning outcomes decide which, how and to what extent technology can be used to meet students' learning needs.

2.1.3. Reconsidering the role of blended learning in HEIs

Since the 1950s, HEIs have reinvented themselves from merely preparing students for academia, which involves developing, conserving and transmitting academic knowledge, to giving students professional knowledge for the purpose of employment. In today's information economy and knowledge society, HEIs must focus on the development of students' *twenty-first century competencies*, the set of essential competencies qualified

graduates must possess to survive and work in the knowledge society of the twenty-first century (Ananiadou & Claro, 2009). As such, blended learning practices must be aligned to meet the aforementioned educational focus (Laurillard, 2014).

In addition, the new possibilities brought about by emerging technologies mean that blended learning may need to develop new interpretations of its *blending* and *learning* in HEIs, including the types of activities and proportions of courses taking place on-line (Sharpe, Benfield, Roberts, & Francis, 2006). For instance, the introduction of online virtual laboratories beyond the limits of university's physical laboratory space allows new type of learning opportunities for risk-free, repeatable experimentation and simulation (Diwakar et al., 2015). Another recent example is the 'flipped classroom' (Bergmann & Sams, 2012), which reallocates the time between lectures and classroom discussion. In this form of blended learning, lectures (usually in the form of a YouTube-like video streaming presentation) become preparatory work for students as homework and are accessed by students before a face-to-face class. The classroom discussions facilitate student reflection and enquiry and support adaptive instruction by teachers in a learner-centred paradigm.

2.2 Strategic dimension 2: curriculum

Curriculum is a systematic and intended packaging of competencies (i.e. knowledge, skills and attitudes that are underpinned by values) that learners should acquire through organised learning experiences both in formal and non-formal settings (UNESCO, 2016). It guides what will be learned, and why, and how this learning is facilitated.

As factual knowledge is now constantly evolving and new knowledge is generated quickly, the modern-day curriculum should move away from the transmission of factual knowledge (Jonassen, 2011). Rather, the orientation and the design of the curriculum should contribute to a balance between the acquisition of relevant knowledge that learners need to apply in the context of their life and the development of *twenty-first century competencies*, their universal toolkit to process, analyse and create their knowledge and cope with the socioeconomic/political development of the knowledge era (Levy & Murnane, 2005). According to Bloom's revised hierarchical taxonomy of learning domains (Anderson et al., 2001), students have to move up from lower-order receptive skills such as remembering and understanding to higher-order productive skills such as applying, analysing, evaluating and finally creating.

As the final stage of formal learning, higher education may be considered as the penultimate institution in students' educational career to develop this twenty-first century toolkit (Barnett & Coate, 2004). Due to this important role, HEIs can no longer be places for gaining content knowledge through the transmission of PowerPoint presentations; the curriculum has to aim to develop higher-order thinking and *twenty-first century competencies* at the programme and course levels. As an approach to meeting these curricular outcomes, blended learning must therefore be pedagogically appropriate; this may involve taking up the opportunities presented by on-line tools to support or be supported by face-to-face learning to engage students and enhance their learning outcomes.

A redesign of the curriculum is required beyond what is taught, how teaching staff teach, how a curriculum is learned and when and where learning takes place to ensure students are assessed in a learning-focused manner. Assessment is an essential part of a curriculum (Bransford, Brown, & Cocking, 2000), and education in the knowledge era places

high value on building a sustainable system where *assessment of learning* is used for reporting, selection and accountability to balance with *assessment for learning* which is mainly used for monitoring educational improvements. *Assessment for learning* through formative assessment helps students to overcome many inhibiting situations, such as correcting misconceptions with constructive feedback and opportunities to act upon that feedback, throughout the learning process (Shute, 2007). It also provides valuable information for teaching staff to revise and refine their instructions (Yorke, 2003). Blended learning provides new opportunities for formative assessment because it ensures prompt and individualised responses from teaching staff and peers (Gikandi, Morrow, & Davis, 2011). To maximise this potential, teaching staff must be well versed in a variety of on-line tools used to monitor student learning progress and offer formative feedback in multiple channels, such as through discussion forums in the Learning Management System (LMS) or e-portfolios. Good blended learning practice also requires teaching staff to be able to identify and implement appropriate assessment strategies and methods for both face-to-face lessons and the on-line component of the learning experience (Laurillard, 2014).

2.3 Strategic dimension 3: professional development of teaching staff

The role of the teaching staff is crucial for the successful implementation of blended learning (Garrison & Vaughan, 2008). Although teaching staff are experts in their respective fields, they may not have the expertise and experience to plan for and implement blended learning in their courses. The introduction of blended learning challenges teaching staff to revisit their roles in technology-enhanced learning environments. HEIs should therefore provide continuing professional development for blended learning. One-off workshops and seminars are not

enough to support teaching staff in transforming their learning and teaching practices. This strategic dimension centres on two interdependent strategic focal points: the conditions/measures and culture associated with professional development.

2.3.1. Professional development conditions and measures

Without highly motivated, dedicated and well-prepared teaching staff, blended learning initiatives in HEIs are most likely to fail. Teaching staff must understand how blended learning can open up new possibilities to enhance their learning and teaching practices (Vaughan, 2007). This involves highlighting the difference between using on-line technologies meaningfully in a hybrid delivery mode as compared with merely uploading course resources on-line (Donnelly, 2010).

In addition to an understanding of blended learning, teaching staff must be equipped with the necessary skills to use on-line technologies to engage students. These professional developments activities focus on *how-to* issues rather than *why* or *for-what-purpose* issues. The establishment of a separate centralised unit for driving blended learning, such as a Centre for Enhanced Teaching and Learning, plays a pivotal role in the facilitation of professional development beyond the training of technical skills (OECD, 2005). Teaching staff should be made aware that in addition to developing technical skills, professional development helps to establish a deeper understanding of the paradigmatic shift in the nature of learning and teaching created through the adoption of blended learning within a HEI. The unit could also provide pedagogical advice on and support for blended learning design.

A salient measure of professional development is the encouragement of peer support (Kwo, 2001). As peer support is a collaborative process based on help, trust and personal

relationships, it may better meet the individual needs of teaching staff. Teaching staff who are experienced in blended learning may model their practices to colleagues in the course team, department, faculty or institution. Modelling coupled with peer coaching by these staff members may address the hesitation or resistance encountered by other teaching staff when incorporating blended learning into their courses (Garrison & Vaughan, 2008).

Reward and incentive schemes serve as important contributory conditions for blended learning professional development. Teaching staff who are keen to implement blended learning practices in their courses may be awarded professional development grants on a competitive basis. Individuals or teams may submit proposals of their planned professional development activities to build communities, develop mentorships or redesign courses to integrate blended learning. Subsidies may be given to staff to participate in professional development programmes from other agencies. Whether the teaching staff have undergone blended learning professional development programmes or received grants and subsidies may then be factored into the staff appraisal system (Odden & Kelley, 2002). Teaching staff can also be encouraged to engage in blended learning by non-financial rewards such as certificate of merit or recognition (Odden, 2001). Sufficient recognition measures must be in place to motivate teaching staff to adopt blended learning practices (Odden & Kelley, 2002).

2.3.2. Professional development culture

The most important thing about professional development culture is the fundamental understanding that professional learning is a lifelong process and that knowledge and skills must be updated constantly to engage students in their learning (Darling-Hammond & Bransford, 2007). Professional development culture can be developed through supportive

policies and strategies. For example, a culture of sharing blended learning practices can be encouraged. Ample opportunities must be provided for teaching staff to engage in reflective dialogue about their current practices and develop action plans to shape their future practices. A nurturing environment in which teaching staff can reflect on their own practices in mutually beneficial relationships can decrease the isolation of classroom practices. Communities of practice (Wenger, 2000; Wenger, McDermott, & Snyder, 2002) may be formed to deepen teaching staff's understanding of the intricacies of the blended learning paradigm. Newer or deeper levels of knowledge can be generated through the group activities of staff who share ideas, issues, lessons learned and promising practices of blended learning.

2.4 Strategic dimension 4: learning support

Although today's students may be branded as 'digital natives' (Prensky, 2001) who are 'born digital', as technologies form an integral part of the overwhelming majority of students' daily routines, it has to be acknowledged that not all students own digital devices that support on-line learning. This can hamper their ability to learn in a blended learning environment. Learning support may start with loaning laptops or tablets to students in need to bridge this digital divide in the HEI, and hence, improving educational equity.

In addition, studies have found that students often lacked experience of using technology for learning because they often use it for the purposes of entertainment and communication rather than generating and constructing knowledge (Wang, Hsu, Campbell, Coster, & Longhurst, 2014). Students require technical support and educational guidance to use technological tools strategically for their learning. They have to be guided to learn independently and at their own pace, especially within the on-line learning environment. Therefore, just-in-time and

on-going student support should be readily available in HEIs to guide students and help them to learn in a blended learning environment. Dedicated advisory centres where students go for help and obtain advice and training should be in place at HEIs. This may involve helping students to become active, independent and self-regulated learners through sharing sessions and one-on-one coaching with professionally qualified student advisors and counsellors. As there are gender differences in learning strategies and on-line technologies use (Blum, 2005), gender considerations have to be accounted for in the design of the learning support.

HEIs should also take on the responsibility of developing students' information literacy/digital wisdom (Prensky, 2011) such as how to discern valid and reliable information from large swaths of data and how to use information ethically. To do this, the library and other relevant units or centres may conduct workshop or provide on-line learning resources on these topics.

2.5 Strategic dimension 5: infrastructure, facilities, resources and support

The integration of blended learning into current learning and teaching practices in higher education requires establishing an appropriate plan for the technological infrastructure, architecture and on-going operations. Strategic focal points within this dimension include:

- Infrastructure, facilities and resources, and
- Technical and service support.

2.5.1. Infrastructure, facilities and resources

Although technology in itself is not the driver of change (Yuen, Law, & Wong, 2003), the technological readiness of an HEI is still fundamental for blended learning (Niemiec & Otte, 2010). Establishing blended learning requires a focus on managing

the necessary physical infrastructure and human resources that are backed up with financial resources. HEIs should engage in careful consideration with vendors when planning necessary infrastructure for blended learning projects, as accommodating the needs of students and teaching staff at all times requires the delivery of adequate capacity and reliability. Recognising usage and demand is likely to be ever-increasing, a scalability plan to grow the infrastructure must be in place. HEIs are also expected to be able to cater to interests in emerging blended learning technologies such as Augmented Reality (AR) and Virtual Reality (VR).

The key constituents of infrastructure and facilities include campus-wide wireless networks, a technology-rich learning commons and digital learning device (laptop/tablet/mobile) schemes for teaching staff and students that may encourage a bring-your-own-device approach (diFilipo, 2013) and facilitate individualised and self-paced learning and group collaboration. Infrastructure and facilities are to be upgraded periodically to address the changing learning and teaching needs of students and teaching staff.

To facilitate blended learning, teaching staff may explore the use of current on-line resources for their courses. For example, a LMS is about more than uploading presentations and collecting assignments. It also serves as a rich, real-time collaborative learning environment for teaching staff to share learning and teaching resources. Moreover, students' learning-related data, collected via learning analytics tools on the LMS, such as student participation statistics and assessment result reports, may inform decisions about the design of future learning and teaching activities (Brown, 2011).

Individual teaching staff may develop their own learning and teaching resources using on-line publishing and authoring tools for students to access. Sharing these resources between teaching

staff or courses is not yet common practice. Nevertheless, these resources (e.g., courseware, notes, presentations, videos, images) are valuable assets and have the advantage of being recyclable and/or improvable. An archive of digital assets (repository) is essential for resource sharing and management. This system may be combined with the LMS for teaching staff to draw upon for their course activities. A good example of maximising the use of archives in course environments is allowing a group of teachers to take turns developing the resources for one course topic. This allows them to share resources and support blended learning within the course (Laurillard, 2014). In addition to the in-house archived digital assets, Open Educational Resources (OERs), either in the public domain or put into circulation under an open licence, can also be adopted to solve the problem of the shortage of blended learning materials.

2.5.2. Technical and service support

Technical and service support is adequate only if it is provided by a team of dedicated technicians and perhaps learning technologists with the necessary skills and experience. This technical and service support team should always be available for students and teaching staff. As the required support often involves step-by-step instructions and troubleshooting, team members may have to provide one-on-one support for teaching staff members to show them exactly what is technologically possible and how tools can be used in a blended learning environment (Davis & Fill, 2007).

2.6 Strategic dimension 6: policy and institutional structure

Policies supported by appropriate organisational structures can drive organisational change and development (De Freitas & Oliver, 2005). HEIs must formulate a blended learning master plan and its corresponding policies, specific guidelines and

mechanisms to encourage teaching staff to engage in blended learning. For example, as freedom and autonomy are crucial in motivating teaching staff to innovate (Pink, 2011), grass roots blended learning projects by faculty should be allowed to flourish through policies. In addition, incentives such as innovative teaching awards may serve an important motivational function for a wider adoption of blended learning. They send a clear signal to the teaching staff about what the HEI values. When teaching staff know that quality enhancement of learning and teaching counts towards their promotion and tenure or comprises an integral part of regular staff assessment, they are more likely to engage in blended learning practices. Still, it is important to realise that context (such as student population and faculty culture) plays a vital role in the formulation of reasonable and workable policies. It is also important to realise that the impact of the policies on blended learning may take several years to be significant.

A new institutional structure could be established to lead and support blended learning in HEIs (Porter, Graham, Spring, & Welch, 2014). For example, a Blended Learning Steering Committee chaired by the Provost/Vice-President (Academic or Teaching and Learning) to spearhead and oversee the blended learning initiative in the HEI. A Coordinating Task Force reporting to the Steering Committee develops a set of guidelines for administrative and academic units, and faculties to facilitate partnership and collaboration. Blended learning consultants or instructional designers may be situated in each faculty to support the blended learning practices of the teaching staff.

2.7 Strategic dimension 7: partnerships (internal and external)

HEIs often build partnerships to tap into each party's expertise

and experience and achieve a common goal (Shubber, 2008). In terms of blended learning, two types of partnership may be built: internal and external. Internal partnerships involve the faculties working together with the technology and teaching/learning support units to promote and support blended learning practices. Inter-faculty collaboration such as sharing resources and best practices across disciplines should also be encouraged. As a result, duplication of resources can be reduced, and investment at faculty level can be further optimised. As mentioned previously, a coordinating council can play a vital role in building and sustaining such a partnership.

In addition, globalisation allows HEIs to unite across international borders and work collaboratively to achieve common goals in terms of sharing technology, research, or resources so that promising blended learning practices are adopted. Innovations including blended learning may be more effective when ideas are shared between institutions, such as via inter-institutional exchanges or consortiums (Kylama, 2005).

External partnerships also include consultation and dialogue with the government to work out a scalable funding mechanism to secure the financial resources needed to provide full support for blended learning. Besides, HEIs can work with private sector corporations and organisations such as Apple, Microsoft and Blackboard or open-source communities such as Moodle. Such partnerships provide opportunities for HEIs to access and explore different learning technologies and shape the direction of future blended learning practices in institutions with industry experts. In addition, institutions can receive financial support from private sector corporations and organisations that are interested in the quality enhancement of higher education learning and teaching. In turn, these private sector corporations and organisations benefit from the research findings of the partner HEIs.

2.8 Strategic dimension 8: research and evaluation

Blended learning practices have to be informed and driven by research and evaluation; revisions and refinements are always required for the quality enhancement of learning and teaching in HEIs (Fry, Ketteridge, & Marshall, 2009). Pilot projects could be conducted to test possibilities and potentials before large-scale implementation is deliberated. This is an important step that may help HEIs to identify and address potential problems and gauge teaching staff and students' reactions to a new initiative before its full-scale implementation. The pilot projects, however, have to develop a set of mechanisms to sustain and scale up the blended learning practices.

Research and evaluation may also employ the analysis of "big data" from learning analytics (Ferguson, 2012) and visualisation to provide evidence of student learning engagement, collaboration and outcomes. This data-informed evidence may encourage more teaching staff to adopt blended learning as a viable learning approach and encourage leaders of HEIs to further support blended learning practices through policy initiatives.

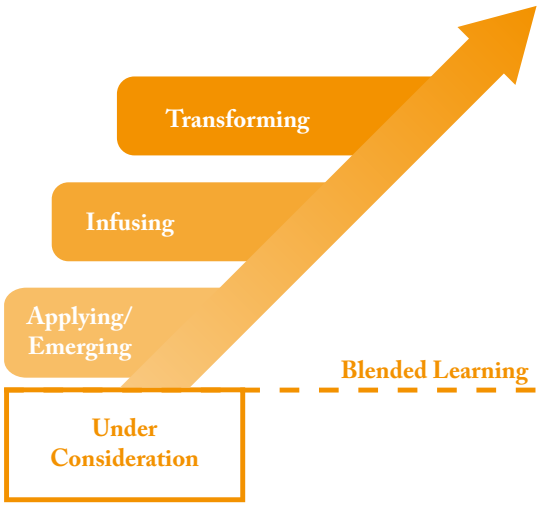
Research groups may conduct case studies at the institutional level to understand the promising practices of pioneering teaching staff and thereby inform other teaching staff who are exploring the use of blended learning in their own courses (e.g. Graham & Robison, 2009; King & Arnold, 2012; Motteram, 2006). Teaching staff who are motivated in blended learning may engage in action research to document their practices and the effects of those practices. Similar to professional development and policy, incentive schemes for promoting and rewarding scholarly activities related to blended learning may be offered. All these develop a culture for the scholarship of teaching that enhances the quality of learning and teaching in the HEIs.

3. The Self-assessment tool

The process of capacity-building for blended learning involves allocation of resources and mobilisation of personnel. While our framework outlines a holistic approach towards the implementation of blended learning, a self-assessment tool allows HEIs to reflect upon their existing blended learning strategies, identify gaps in these strategies with respect to their vision for how blended learning may enhance learning and teaching, and possibly develop new strategies or revise existing ones to address these gaps.

Our self-assessment tool (See Appendix I) consists of all the strategic dimensions (and sub-dimensions) of the framework. As there are different types of blends - low impact blends, medium impact blends and high impact blends, there is a need to set along a spectrum of stages that can reflect institutional strategies supporting blended learning practices. Therefore, we reference to the progression stages that are broadly defined by UNESCO (2005) as they are highly recognised in the Asia-Pacific region and proved useful to track where an institution is in supporting ICT integration. To reflect different types of blends in specifically higher education contexts, we further readapt UNESCO (2005)'s work and set the stages in our self-assessment tool as *Under Consideration, Emerging/ Applying, Infusing* and *Transforming* (see Figure 2). Each level follows a general description of characteristics or indicators. Blank boxes are also provided underneath to allow users to checkmark where their HEI is currently placed along the spectrum.

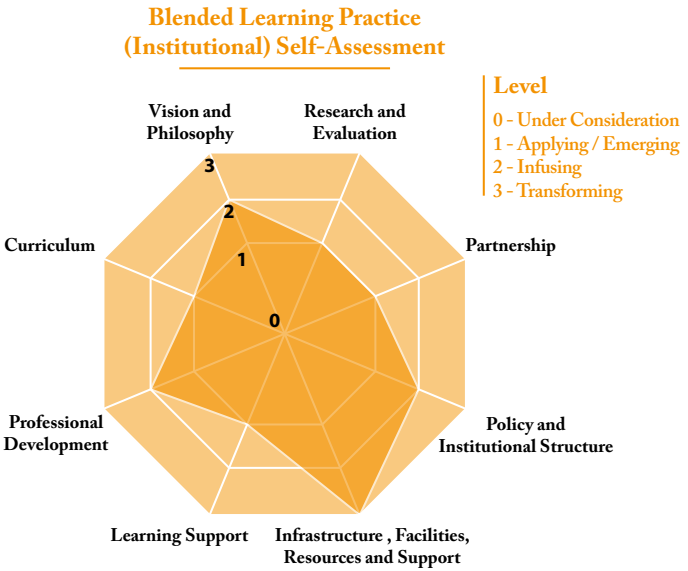
Figure 2: Stages of Institutional Strategies Supporting Blended Learning Practices.



Note: Modified from UNESCO (2005)

The end result of the self-assessment tool can be a visual representation in the form of a spidergram (see Figure 3) which enables HEI leaders and policy-makers to obtain a holistic view of all dimensions of existing strategies at once, and how the stages of different dimensions relate to each other. This snapshot at the time of the exercise can also be a reference for monitoring and reviewing the development of capacity over time. That is to say, the result of the self-assessment tool supports two aspects of assessment: describing what the current situation is and steering growth to higher stages of institutional strategies supporting blended learning practices in an HEI. As the next step, based on the result, the framework can assist in developing achievable goals and initiating/revising actions and strategies.

Figure 3: An Example of the Spidergram of Blended Learning Practice (Institutional) Self-Assessment



It is important to note that this self-assessment tool is not designed for benchmarking purposes or for cross-institution comparisons, but rather for analysing success and identifying areas where improvements can be made within the institution. More specifically, at the institutional level, the self-assessment tool could be used by the Blended Learning Steering Committee to reflect upon its existing blended learning strategies within each dimension, identify the stage that the HEI is at for each sub-dimension, identify the gaps in the strategies with respect to each sub-dimension and its vision of blended learning, and plan strategically how it will address the gaps by developing new strategies or revise existing strategies. Ultimately, HEI can work towards a promising practice in harnessing blended learning to enhance learning and teaching.

4. Concluding remarks

Adopting blended learning in higher education to enhance learning and teaching involves far more than introducing technological innovations. Rather, sustainable and scalable blended learning practices in HEIs must begin with institutional leaders adopting a holistic approach towards driving and supporting these practices. With an understanding of the current challenges faced by HEIs, this chapter has proposed a framework and developed a self-assessment tool for building the capacity of HEIs to sustain and scale up their blended learning practices. We hope that the framework together with the self-assessment tool will serve as part of a toolkit that would empower HEI leaders and policymakers in the planning and implementation of blended learning in their respective institution. With the concerted effort of all stakeholders towards a shared vision of enhancing higher education learning and teaching, the opportunities provided by blended learning are then more likely to be optimised.

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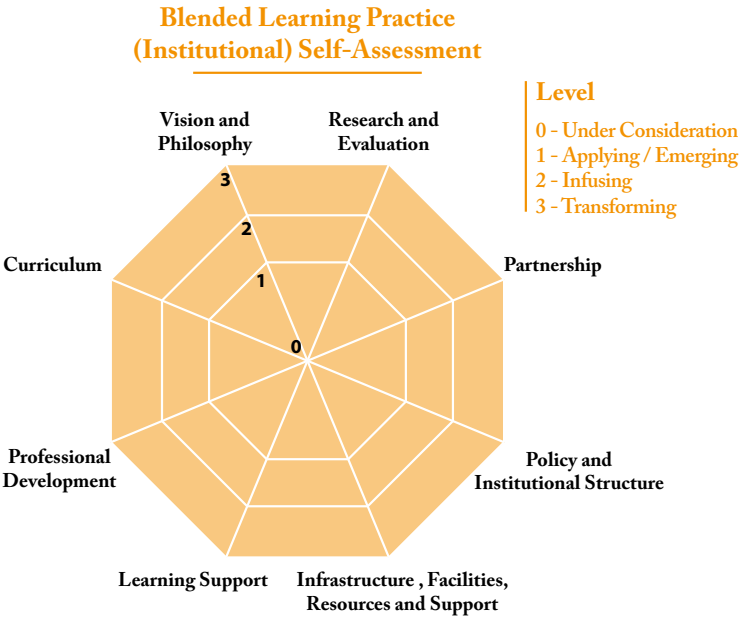
Appendix

Self-assessment tool



Strategic dimension 1: vision and philosophy

Vision

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of institutional vision that considers technology-rich environments.	Institutional vision focuses ONLY on how technology-rich environments support existing learning and teaching practices.	Institutional vision focuses on the need for changes in culture, policies and practices in technology-rich environments.	Institutional vision is being studied and emulated by other institutions.

Underlying philosophy

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of underlying philosophy for a blended learning approach towards learning and teaching.	Underlying philosophy for blended learning approach towards learning and teaching is mainly to involve technologies to enhance learning.	Underlying philosophy for blended learning approach towards learning and teaching is addressing the learning needs of students. Learning outcomes are what decide which, how and to what extent technology could be used.	Underlying philosophy for blended learning approach towards learning and teaching is mainly situated in encouraging meaningful learning experiences and offering students with a conducive environment allowing for reflection.

Reconsidering the role of blended learning in heis

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of reconsideration of the role of blended learning in the institution.	The need for reconsideration of the role of blended learning in the institution is acknowledged.	The reconsideration of the role of blended learning in the institution is reactive in essence. In other words, it reacts to changing needs of their students and the society.	The reconsideration of the role of blended learning in the institution is proactive and visionary (anticipating/ pre-emptive) in essence.

Strategic dimension 2: curriculum

Curriculum

Under Consideration	Emerging/ Applying	Infusing	Transforming
The design and implementation of the curriculum does not change with the adoption of blended learning.	The design and implementation of curriculum changes in some courses in a programme to take up the affordances of blended learning.	The design and implementation of curriculum changes in some programmes and their associated courses to take up the affordances of blended learning.	The design and implementation of curriculum changes for all programmes in the HEI to take up the affordances of blended learning.

Assessment

Under Consideration	Emerging/ Applying	Infusing	Transforming
No online learning technologies are used to engage students in the assessment tasks.	Online learning technologies are used to engage students in the assessment tasks; however, there is a lack of alignment between the learning and teaching activities and the assessment tasks.	Online learning technologies are used to engage in the assessment tasks; and, there is an alignment between the learning and teaching activities and the assessment.	Online learning technologies are used to engage in the assessment tasks; and, there is an alignment between the learning and teaching activities and the assessment. The assessment tasks are designed to take up the affordances of online learning technologies.

Strategic dimension 3: professional development

Conducive conditions for blended learning professional development

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of conducive conditions for blended learning professional development.	Some conducive conditions for blended learning professional development exist but professional development programmes are mainly focus on technical competencies.	Conducive conditions for blended learning professional development exist and professional development programmes include both technical and pedagogical competencies.	Conducive conditions for blended learning professional development exist and professional development programmes not only include technical and pedagogical competencies but also establish a deeper understanding of the paradigmatic shift in the nature of learning and teaching created through the adoption of blended learning.

A Nurturing environment with mentoring and peer coaching

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of mentoring and peer coaching programmes for blended learning professional development.	Some mentoring and peer coaching of blended learning can be found. They are ad-hoc or unplanned.	The HEI has mentoring and peer coaching programmes for blended learning professional development.	The HEI has mentoring and peer coaching programmes for blended learning professional development. Teaching staff are also encouraged to be involved in Communities of Practice within the HEI and across HEIs.

Professional development culture

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of a professional development culture.	Professional development culture exists to some extent but not at all levels or HEI-wide; the need for professional learning is being enforced by the senior management of the HEI.	Professional development culture permeates all levels within the HEI.	Professional development culture permeates all levels within the HEI. Supportive policies and strategies are in place. Ample opportunities are provided for teaching staff to explore innovative practices.

Strategic dimension 4: learning support

Learning support

Under Consideration	Emerging/ Applying	Infusing	Transforming
Learning support for students for students is absent.	Learning support is provided for students mainly in the form of an ICT Helpdesk that deals only with technical issues.	Learning support is provided for students beyond an ICT Helpdesk; online and on-site support are provided so that students are able to learn in a blended learning environment.	Holistic learning support by not only providing technical and learning skills to learn in a blended learning environment but also supporting students to become active, independent and self-regulated learners.

Strategic dimension 5: infrastructure, facilities, resources and support

Infrastructure, facilities and resources

Under Consideration	Emerging/ Applying	Infusing	Transforming
The access to infrastructure, facilities and resources is not sufficient to support blended learning.	Infrastructure and facilities are adequate for classroom learning and teaching activities, and resources are available and accessible to teaching staff and students.	Infrastructure and facilities are adequate for both classroom and out-of-classroom learning and teaching activities, and resources are available and accessible to teacv hing staff and students.	Infrastructure and facilities are adequate for both classroom and out-of-classroom learning and teaching activities, and resources are available and accessible to teaching staff and students. Teaching staff develop and share their digital resources for blended learning.

Technical and service support

Under Consideration	Emerging/ Applying	Infusing	Transforming
Technical and service support for teaching staff is absent.	Technical and service support are provided for teaching staff mainly in the form of an ICT Helpdesk that deals only with technical issues.	Technical and service support are provided for teaching staff beyond an ICT Helpdesk; instructional designers and multimedia developers are available centrally to support teaching staff in their blended learning practices.	Technical and service support are provided for teaching staff beyond an ICT Helpdesk; instructional designers and multimedia developers are available centrally and within each faculty to support teaching staff in their blended learning practices.

Strategic dimension 6: policy and institutional structure

Policy

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of policies that support blended learning in the HEI.	Some policies that support blended learning in the HEI are implemented.	Policies that support blended learning are developed and implemented at all levels in the HEI.	There is an alignment of blended learning master plan, corresponding policies, specific guidelines and mechanisms that encourage teaching staff to engage in blended learning.

Institutional structure

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of institutional structure that leads and supports blended learning in the HEI.	A specialised centre that leads and supports blended learning in the HEI is established.	A senior leader in the HEI structure leads the blended learning initiative with the support of the specialised centre in the HEI.	A strong leadership team or task force is in place at the HEI level to push and oversee the blended learning implementation with the support of the spcialised centre in the HEI.

Strategic dimension 7: partnerships

Internal partnerships

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of internal partnership on blended learning. Blended learning practices in each department are developed in isolation.	Internal partnerships on blended learning are encouraged by the HEI but there is a lack of formal support structure to develop and sustain these partnerships.	Internal partnerships on blended learning are encouraged by the HEI and there is a formal support structure and resources (financial, and human) allocated to develop and sustain these partnerships.	Besides encouragement and support by the institution for internal partnerships on blended learning, faculty, department and unit leaders and teacher staff are pro-active in identifying and building internal partnerships.

External partnerships

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of external partnership for blended learning.	Partnerships with other organisations on blended learning are often limited to one-off projects such as co-organising professional development workshops, collaborating on a research and development project, or co-financing the development of new blended learning technologies.	Most of the partnerships with other organisations on blended learning are sustainable where there is a long term commitment from both the HEI and organisations towards supporting blended learning practices.	Besides long term commitments to external partnerships to support blended learning practices, the external partnerships involve shaping the direction of future blended learning practices.

Strategic dimension 8: research and evaluation

Research

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of research and development support.	There is limited support for research and development of blended learning where most of the support is administrative in nature such as identification of available research funds, submission of research proposals, and preparation of research agreement or contracts.	Besides administrative support for research and development of blended learning, there is support for the preparation of research proposals that includes working out a budget, undertaking literature review, consulting \ research designs and methods and providing feedback.	Support for research and development of blended learning is provided by the HEI at all stages of the research project; that is, from the identification of sources of funding and preparation of research proposal to the project implementation and submission of final research report.

Evaluation

Under Consideration	Emerging/ Applying	Infusing	Transforming
Absence of evaluation of existing blended learning practices and blended learning-related policies.	The evaluation of existing blended learning practices and blended learning-related policies is carried out either on an ad-hoc basis or by a top-down approach that involves only a small group of staff in the HEI.	The evaluation of existing blended learning practices and blended learning-related policies involves all stakeholders of the HEI to identify the gaps in practices and policies; however, there is no follow-up activity to address the gaps.	The evaluation of existing blended learning practices and blended learning-related policies involves all stakeholders of the HEI to identify the gaps in practices and policies; and there are follow-up activities to address the gaps.

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2. Blended Learning at East China Normal University: Promising Practices and Challenges

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Abstract

This chapter presents a case study conducted at East China Normal University (ECNU) in Shanghai with a focus on examples of blended learning practices from the micro to macro levels. Three blended learning cases representing the class, course and programme levels were selected as good exemplars. Each of these cases is elaborated in terms of its background, design and practice and the comments of those involved, including investigators. In addition, the common challenges reported and observed in the practice of blended learning at ECNU are analysed. The strategies and key projects associated with blended learning at ECNU are introduced at the end of the chapter.

1. Introduction

Blended learning has played an important role in higher education given the rapid development of on-line learning (e.g., see the literature review by Wang, Han and Yang, 2015). Such is the case at East China Normal University (ECNU), where blended learning has been widely used to different extents, at different course levels and with different effects on learning and teaching. However, successfully scaling up blended learning from early adopters to more reluctant faculty members continues to present a challenge. An in-depth case study is required to share the lessons learned from current blended learning practices. These lessons should contribute to the growing community of blended learning practitioners and help to discover improved

blended learning solutions and respond to those reluctant to engage in blended learning.

Blended learning practices were adopted early at ECNU for several reasons. First, faculty members with overseas experience were already used to e-learning platforms and on-line cooperation with colleges and were willing to attempt blended learning in their own teaching when they returned to ECNU. Second, the students, who were mostly from the post-1990s generation, were quite familiar with electronic products and the Internet and could be attracted to a new pedagogy based on an e-learning platform. Third, university leaders realised that blended learning was a worldwide trend. As a result, teaching staff were encouraged to innovate by integrating information and communications technology (ICT) and implementing blended learning solutions into their teaching practices.

In general, three different blended models or approaches have emerged at ECNU for different instructional levels and with the support of different e-learning platforms. These three models demonstrate different blended learning practices at the class, course and programme levels. Details of these different models are elaborated in Section 3 of this case study.

The official e-learning platform was established in 2010. Thereafter, blended learning practices emerged, with an increasing number of teaching staff and students getting involved. The e-learning platforms currently implemented at ECNU are Moodle, Sakai and a customised platform. The Sakai platform is operated by the Network & Information Centre (NIC). The other two platforms are operated by the School of Open Learning and Education (SOLE). The blended learning practices at ECNU are based mainly on these three platforms. More than one platform was initially adopted at ECNU mainly because e-learning practices at the university were initiated and managed by different departments, including

NIC and SOLE. Other universities with office e-learning platforms also use multiple platforms for similar reasons and in response to different student needs. For example, although the official platform at the University of North Texas is Blackboard, Moodle is also used in some pre-service teacher training courses for students who are likely to attend schools that use Moodle.

The Sakai platform is open to all teaching staff and registered students at ECNU. At the moment, 333 courses are running on this platform, with 172 teaching staff and 7,849 students actively working on them using different blended models. All of these courses are blended with face-to-face and on-line sessions for about 10-50% of the course.

The Moodle platform and customised platform operated by SOLE are exclusively targeted towards teacher education programmes, including in-service teacher training and the Master of Education programme. For example, versions of over 60 teacher training courses related to education technology are running on the Moodle platform, with more than 1,300 teachers actively involved. The customised platform similarly runs teacher-training projects to serve principals and teachers across the country.

Founded in Shanghai in October 1951, ECNU is one of the most prestigious universities in China and is sponsored by the national programmes Project 211 and Project 985. Since China opened up to the world in 1978, ECNU has developed at an impressive pace and become a comprehensive research university. At present, the university has 21 schools and colleges and 5 advanced research institutes, with 58 departments offering 70 undergraduate programmes in humanities, education, science, engineering, economics, management, philosophy, psychology, law, history and art. Moreover, the university offers 26 doctoral programmes of the State Primary Disciplines, 38 master's

programmes of the State Primary Disciplines, 1 professional doctoral programme, 17 professional master's programmes and 18 post-doctoral mobile research stations (Publicity Department of ECNU, 2012).

Over 1,200 members of the more than 4,000-strong faculty are professors and associate professors, including 14 academicians from the Chinese Academy of Sciences or the Chinese Academy of Engineering. ECNU has approximately 14,000 full-time undergraduate students 12,000 graduate students and more than 3,700 international students.

The following sections of this chapter focus on four aspects of blended learning practice: (a) strategies, (b) typical cases, (c) case analyses and (d) future plans for blended learning practices. The strategies related to blended learning practices are presented in the second section. Three cases of blended learning at ECNU specified according to different dimensions are introduced in the third section. A simple analysis is performed for each case. The issues and challenges of blended learning at ECNU are discussed in the fourth section. Future development strategies for blended learning supported at ECNU and innovative learning and teaching models both subjected to research and applied in practice are proposed in the final section.

2. Policies and strategies

Policies and strategies play a crucial role in blended learning practice. At ECNU, clear vision and mission statements are presented in the university policy, as stated in the *East China Normal University Reform and Development Plan (2010–2020)*. The vision and mission statements related to blended learning include promoting and encouraging a variety of learning solutions enabled by e-learning technologies to support students and their development. As the fundamental guidance document

at the university, this plan ensures that blended learning is a long-term developmental goal at ECNU.

This mission was reaffirmed in the *Twelfth Five-Year Reform and Development Plan (2011–2015) of East China Normal University* and *Twelfth Five-Year Plan (2011–2015) of Information in East China Normal University*. In both plans, the blended learning strategies are emphasised in terms of coverage, curricula and technological support. They dictate that the university should build an integrated digital learning environment that is user-centric, teaching supported, resource based and available for all types of students (University Office of ECNU, NIC of ECNU, 2010). At the practice level, the main tasks related to blended learning are elaborated as follows. The Academic Affairs Office and NIC should actively explore blended learning curricula, massive open on-line courses (MOOCs) and micro-curricula and promote the spread of quality courses using IT tools (University Office of ECNU, 2015).

At the university level, an organisational structure is appointed to support the mission of blended learning. The Graduate School and Academic Affairs Office are responsible for supervising curriculum development and the innovation of blended learning practices. The NIC is responsible for providing platform and technological support and service for teaching staff and students, and the University Office is responsible for supervising the practice and coordinating with different departments. Curriculum development mainly relies on teaching staff and their teams from the various schools. The Academic Affairs Office and Graduate School are responsible for supervising the blended learning development and practice processes. The NIC is in charge of the technological aspects of blended learning, including the blended learning platform itself, and providing service support to teaching staff and students.

However, there are exceptions to the aforementioned university-level policies and practices. As already noted, the blended teacher training programme runs separately in SOLE, with a large percentage of the trainees comprising teachers and principals instead of registered ECNU students.

3. Promising practices

Similar to the practice of blended learning at the University of North Carolina (Ferreri and O'Connor, 2013), Southern Cross University (Taylor & Newton, 2013) and York University (Owston et al., 2013), ECNU engaged in early adopter practice when e-learning solutions were available and went beyond the practice when a top-down model was initiated at the programme level to implement e-learning as an alternative solution for delivering instruction. In general, three types of blended learning practice at ECNU now exist. In the following subsections, a case from each of the three types of practices is elaborated along with its context, design, blended learning method and evaluation method.

The three types of blended learning practices at ECNU are represented at the class, course and programme levels, respectively.

3.1 Class-level case

3.1.1. Background

This case describes the type of blended learning designed and practised at the class level, that is, blending learning focused on class activities, by implementing the on-line solution to enhance the face-to-face sessions in most of the cases. The case elaborated here was taught by Ms Song, a trainer from SOLE who taught a training course known as 'Design a Webquest'

(see http://webquest.org/; see also Dodge, 1995) as part of a series of education technology training courses. The on-line learning part of this class ran on the Moodle platform (http://sfs.dec.ecnu.edu.cn).

3.1.2. Instructional design

'Design a Webquest' was made up of two parts: learning inside and outside the classroom. Students had to finish their on-line activities before the face-to-face sessions so they would be well prepared for the on-site activities.

The instructional design of the learning conducted inside the classroom is listed as follows.

- Introduction (e-learning, 5 minutes): Students explored the case of Webquest, the website 'nutritious breakfast', and identified the differences between this case and the other regular instructional designs.
- What is Webquest? (face-to-face, 5 minutes): the trainer introduced the definition of Webquest and its advantages.
- The structure of Webquest (face-to-face, 5 minutes): the trainer explained all parts of the Webquest case to the class, including the introduction, tasks, resources, process, learning proposal, evaluation and summary.
- The features of Webquest (e-learning, 10 minutes): students downloaded 'Webquest case.rar' from 'Learning Resources' on the platform, unpacked the file and browsed at least two Webquests. Students thought about the characteristics of Webquest and shared ideas in a subsequent discussion.
- The role of Webquest (face-to-face, 5 minutes): the trainer introduced the function of each part of Webquest.
- The theme of Webquest (face-to-face, 5 minutes): the trainer

introduced the themes suitable for Webquest.

- Design a Webquest (e-learning, 10 minutes): students browsed on-line resources and began to think about designing a Webquest.

Outside of the classroom, students had the following learning tasks.

- Students continued to browse resources and determine a theme to apply.
- Students shared ideas about the Webquest themes, which were introduced inside the classroom and included targeted students, problems to solve and descriptions of the theme.
- Students browsed the themes of other students and made reasonable suggestions.

3.1.3. Assessment

Students' assessments of this course involved a mixed method, including attendance at face-to-face sessions, assignments and blog posts and final submission of the Webquest design. The final scores were calculated using the following rubric: 15% for attendance (face-to-face session attendance), 20% for assignments, 5% for blog posts and 60% for the final design of the Webquest.

The design of the Webquest was evaluated by the trainer based on the following criteria: appropriateness of the theme to the student's age level, context and learning goals; the student's interest as motivated by the design and the cognitive difficulty of the design.

3.1.4. Reflection

As demonstrated in the instructional design of this case, the blended learning practice was conducted in such a way that face-to-face learning activities were mixed with on-line

activities during the particular training period. The learning activities were split into approximately half on-line and half face-to-face activities.

This kind of blending required students to be highly participative and teaching staff to design a subject that could stimulate the students' interest. It also assumed a significantly heavier workload for the teaching staff. In the face-to-face sessions, the teaching staff needed to take care of both the on-site and on-line discussions and to guide students on-line after the on-site sessions.

3.2 Course-level case

3.2.1. Background

This case involved a blended learning practice designed and practised at the course level, meaning that the blending was focused on the course design across an entire semester.

The case elaborated here was a course known as 'Java Programming', taught by Dr Wu, a faculty member in the Department of Education Information Technology. Fifty-six sessions were conducted in the classroom, and students were required to spend approximately the same amount of time on the on-line learning platform. In addition, Dr Wu conducted question and answer (Q&A) sessions in his office every Tuesday. The on-line learning part of this course was run on the Sakai platform (http://sakai.dec.ecnu.edu.cn).

In addition to the regular e-learning functions (e.g., document publishing, scores book, discussion boards, chat rooms, assignment submission and content building), a wiki, statistics and Rich Site Summary were applied in the course. Using these functions, Dr Wu was able to share documents, short videos and resource links with students, and students were able to submit projects. Everyone was able to communicate with one

another through a bulletin board system.

3.2.2. Course overview

The course was an elective for junior students or third-year postgraduates majoring in Educational Technology. In the latest term, 50 students were enrolled in the course. Three learning objectives were designed for the course: to (1) familiarise the students with JAVA application programming, (2) develop the students' skills of information retrieval and problem solving and (3) build the students' abilities to engage in teamwork and self-learning. The main learning contents covered in this course are listed as follows:

- Setup of a development and debugging environment;
- JAVA basic data type, including array, operator and statement;
- JAVA class, method, property and modifier;
- Polymorphism and inheritance of a JAVA class;
- JAVA package and interface;
- JAVA graphical user interface (part 1: JLabel, JButton, JTextArea, JDialog and JTabbedPane);
- JAVA Swing layout manager;
- JAVA graphical user interface (part 2: JTable, JMenu, JList and JTree);
- Graphics, colour and math class;
- JAVA database programming (SQL package), exception class;
- JAVA input/output (IO package), object class;
- JAVA network communication (net package); and
- JAVA thread (thread class).

3.2.3. Instructional design

Dr Wu designed the aforementioned learning contents and divided them into three projects as follows:

- A 'dice' game including three sub-tasks, implemented from the second to fifth weeks;

- A 'ping pong' game including four sub-tasks, implemented from the sixth to tenth weeks; and
- A library management system including eight sub-tasks, implemented from the eleventh to nineteenth weeks.

The students participated in these projects as software engineers and considered the projects as their learning goals. During the development of the projects, students were permitted to have basic software development experience because they had to undergo software design, development and testing. Moreover, the regular knowledge goals of this course, such as the development of basic relevant knowledge and skills, could be developed within the context of its application.

In the first week, the students were grouped according to preference and worked as a group to complete the projects. During the classroom sessions, Dr Wu proposed a particular problem to be solved in the projects and presented the class with the knowledge needed to solve it. Thereafter, he decomposed the problem into smaller parts and indicated the relevant knowledge to the particular problem-solving aspects. He observed the learning status of each group and explained the common problems in the form of a mini-lecture.

Two types of interactions were observed in the classroom. One type was the discussion designed by Dr Wu. Groups could discuss specific problems and presented projects. The other type was the student-initiated discussion, in which the students asked for help. As class time was limited and the students had a low comprehension of the course, Dr Wu designed a few interactions between the groups in the classroom. However, the group assessments of the projects were significant. Dr Wu's lectures comprised one third of the classroom time. For the remainder of the period, students discussed items within their groups.

Outside the classroom, Dr Wu created short videos about pieces of learning content and uploaded them to the platform. In addition, he shared learning documents such as PowerPoint presentations, Word files, PDF files, Java API materials and other resources. Students could watch videos, search materials, engage in discussions and submit projects on the platform.

For example, a particular class devoted to 'Database Design' was a part of the 'Library Management System' project. In the class sessions, groups of students required 10 minutes to conduct needs analysis and study the design of a database. Thereafter, the groups made presentations for about 10 minutes, and Dr Wu gave brief suggestions by way of feedback. He took two minutes to introduce database design tools and the topic in his posted video lecture. Finally, each group completed the design of the dataset, including tables and fields, in 15 minutes, and Dr Wu offered help to the groups that encountered difficulties.

3.2.4. Assessment

A mixed methods approach involving the products of the three projects and participation in the learning discussions was used to evaluate this course. The final score was calculated based on the weighted grade of the projects, with 20% for Projects 1 and 2, 40% for Project 3 and another 20% split into on-line interaction and class note recording.

Each group was required to submit the codes of the three projects and create a presentation video no more than five minutes in length. The teaching staff graded the project according to the user interface and quality of the functions. In addition, the first group to submit the project received a bonus score as motivation.

Any student could post or reply to the technical issues in the forum on the learning platform. According to the quantity and quality of the on-line interaction, additional points could be awarded to students.

All of the students were required to submit three notes about their learning experiences, including their understanding of the knowledge, doubts, project process, individual contributions, problems and solutions and other aspects.

3.2.5. Reflection

The pass rate of the course was around 50%. The low rate was due to the high level of difficulty for students who were unprepared in terms of their basic programming knowledge and skills. Moreover, students were quite unprepared for the learning method, which required strong motivation and self-regulated learning abilities.

From a technological viewpoint, as there were no automatic tools to collect data from on-line learning sessions, it was not easy for the teaching staff to determine the learning situation of the students. An automatic learning analytics system within the e-learning platform would have been greatly helpful.

From an administrative viewpoint, the heavy workload of the teaching staff, who invested time and effort in preparing learning materials, developing learning cases and communicating with students on-line, should have been considered. For example, some parts of the on-site sessions could have been reduced as long as the learning purposes were met during the on-line sessions.

3.3 Programme-level case

3.3.1. Background

This case describes the blended learning practice designed and practised at the programme level, meaning that the blending focused on the entire programme across a two-and-a-half-year period. The case elaborated here is the Master of Education programme, which targeted in-service teachers who had

graduated from ECNU's undergraduate programme within several years and wished to pursue further study. Given the hectic schedules of the in-service teachers, the entire programme was designed in such a blended way that the students could learn on-line for more than half of the course and attend the face-to-face sessions during summer and winter vacations. This blended programme started in 2012. Since then, the on-line learning platform (http://edm.ecnu.edu.cn) has been open to more than 3,000 master's students each year.

3.3.2. Curriculum arrangement

The programme courses can be classified into five types: public degree courses (5 credits), degree basic courses (8 credits), mandatory courses (10 credits), specialised elective courses (minimum 6 credits) and education practice and reflection courses (6 credits). The courses numbered 26 in total. The ratio of on-line to face-to-face courses was approximately 13:10, in addition to some in-service teaching practice credits.

The on-line courses were conducted entirely from a distance, and the face-to-face courses required face-to-face meetings at ECNU during summer and winter breaks.

At the start of the programme, the students were required to come in for the first face-to-face session, which was usually conducted during summer break, and a training session was delivered to the students to help them learn the e-learning platform. A manual devoted to blended learning was distributed to the students to help them learn the distance education courses on the learning platform when they went back to their workplaces.

3.3.3. Responsibility of the teaching staff

Unlike the regular programmes, the blended programme required the following from the teaching staff.

- Teaching staff corresponded with the programme's Management Centre through e-mail or SMS and with SOLE, which provided the platform service for the entire programme.
- Teaching staff took part in technical training and preparative teaching meetings according to the requirements of the Management Centre.
- Teaching staff set the 'lesson plan book' in detail before the start of each semester and carefully arranged on-line topic discussions, on-line Q&A sessions, homework and other activities.
- Teaching staff conducted an on-line Q&A session with students at least twice. These sessions lasted for less than an hour and provided a simple record for Q&A results, the arrangements of which were suggested during the midterms and finals.
- Teaching staff posted at least six discussion questions, thereby enabling students to discuss, browse discussion boards at least two to three times a week, answer the question threads in a timely manner, acknowledge their teachers' concern and active involvement and receive personalised guidance.
- Teaching staff published an interim evaluation and a final evaluation decided by the teachers under the term arrangement.
- A serious qualitative evaluation for students' homework was set for two weeks after the assessed work was submitted. Teaching staff were required to quantitatively assess every assignment (evaluation of fraction) and work and write a simple comment on the advantages of the job, lack of jobs and measures for improvement.
- Teaching staff paid attention to collecting students' opinions

and discussions about distance learning in addition to fruitful posts.

- Teaching staff put forward valuable questions and recommendations to the Management Centre.
- Teaching staff held a summary seminar after joining the teaching process.

3.3.4. Learning schedule

Table 1 shows the schedule of the entire blended programme. This schedule indicates the blending of on-line and face-to-face sessions across a period of two and a half years.

- Before formally beginning the learning process, students read the *Letter to Students* posted on the platform by the teachers; learned about the curriculum, critical mission and specific requirements; and made their own study plans according to the lesson plans.
- Students logged in to the e-learning platform to view on-line courses. The contents of the courses included text, audio, video and other formats.
- Students actively participated in every course discussion. According to one's learning process, teachers posted discussion questions in the appropriate course content area to enhance student thinking. Students could also ask questions during the discussion about each kind of knowledge problem that occurred in the learning process, and the teachers answered the questions in a timely manner.
- Students completed and submitted the assignments. In accordance with the learning schedule, the teachers opened a submission system in the proper time. Students viewed the course exam assignments as early as possible to complete the assignments and submitted them through the operating system.

- Students participated in a peer assessment communication. After setting a homework deadline, the teachers had the option of arranging the communication. At that time, students went to the work-shared area to join the peer assessment.
- Students identified learning outcomes. The students' scores were displayed in a public database after the end of the learning period.

3.3.5. Assessment

The student assessment method in this blended programme was basically the same as that in other regular programmes; that is, the completion of the thesis and the credits required in the programme. Table 2 lists the courses that were required before the students were allowed to build their theses.

The final grades consisted of two parts: assessments of (a) the learning process and (b) the final learning results. The assessment of the learning process included learning participation, assignments and interim examinations. The assessment of the final learning results was conducted with the terminal examinations. The final grades were calculated using the following rubric: 15% for on-line participation, 15% for interaction, 30% for assignments and the interim examination and 40% for the terminal examination.

Table 1: Learning schedule template

Time	Learning Tasks
March 13	• Read lesson plans and understand learning requirements. • Write and upload a self-introduction and become acquainted with classmates.

Training Process	• Learn distance courses by one's self. • Take part in on-line discussions. (Each chapter generally has one or two discussions.) • Submit homework on time. (Participate in peer assessment seminar if needed.) • Participate in intensive Q&A session on-line.
April ** (o'clock–**o'clock)**	• First intensive Q&A session on-line.
April 1–April 30	• Submit the interim examination assignments.
May ** (o'clock–**o'clock)**	• Second intensive Q&A session on-line.
May 15–June 25	• Submit the terminal examination assignments.
June 25	• Participate in the questionnaire. • Submit thoughts on training.

Table 2: Calculation of final learning outcomes

Evaluation Forms	Assessment Items		Number	Weight
Process Evaluation	Learning Participation	On-line Time	/	15%
		Instructional Interaction	/	15%
	Interim Examination Assignments		1	30%
Summative Evaluation	Terminal Examination Assignments		1	40%
Total Score				100 points

3.3.6. Reflection

The advantage of blended learning is that it offers a solution for in-service teachers to pursue further studies during their busy schedules. Conducting education research while working full time can help in-service teachers to scrutinise and apply what they learn to their actual practices. However, there are some noteworthy disadvantages. This kind of blended programme assumes that the students have high self-regulation abilities, adhere to the programme schedule and coordinate their

teaching and own studies effectively. Not all students can deal with these responsibilities efficiently, especially those with full-time teaching jobs.

4. Issues and challenges

As shown in the previous section, whereas the blended learning practice has its advantages in promoting learning, there are also issues and challenges that arise, as revealed in the three different cases. Some of the issues are quite common, especially in terms of technological support, administration and the blending of on-line and on-site learning activities.

4.1 Learning platforms

Different learning platforms are currently being used as e-learning platforms for blended learning, as mentioned in the preceding cases. This is especially the case in universities that use e-learning platforms along with the MOOC platform. It presents the following challenges.

- The curriculum resources of these platforms are not based on the same standards. Therefore, what is developed for one platform is not necessarily transferrable to another.
- The teaching staff may not be willing to invest effort in one of the platforms if they perceive that the effort will be wasted when a new platform is introduced.
- The learning platform must be customised to provide learning analytics functions that alleviate the workload of teaching staff in determining the learning statuses and needs of students.

Therefore, a clear roadmap at the university level is crucial when considering strategies and making a realistic plan that includes the funding, material and human resources required to work

out a major e-learning platform. Course material construction, sharing and operation should also be considered in this plan.

4.2 Learning model

The effective realisation of blended learning must be carefully designed so that the blended model supports relevant course features, targeted learning goals and the needs of students. For example, the learning model demonstrated in the class- and course-level cases somehow exhibited the features of a project-based learning model, which may not be appropriate for other courses. Therefore, learning designers face the following challenges.

- The teaching staff may not be aware of the appropriate blended learning model, even when they are interested in applying e-learning solutions in their teaching practices.
- Best practices are not available for teaching staff from different content areas to learn how to design blended learning activities both inside and outside the class sessions.
- Whether students can really learn via on-line learning activities without attending class remains in doubt.
- Teaching staff currently practice the blended model according to their understanding and experience of teaching. Further study is required to determine how to innovatively design an appropriate blended model for different content areas and different instructional levels.

4.3 Administration

At present, teaching staff are responsible for course development, practice and evaluation and administration is in charge of supervision. However, when facing a new instruction model, teaching staff require support from administration to learn how to better control the quality of on-line learning. Other

administrative support is also needed to help teaching staff use their teaching hours more effectively, including their on-line and face-to-face hours.

4.4 Institution collaboration

The teaching staff and students in management agencies and information institutions currently lack collaboration in their blended learning practices. That there are three different e-learning platforms running to host blended learning activities is indicative of the lack of collaboration between the related stakeholders. However, there is no practical way for teaching staff and students to learn each other's practices, share their experiences and mutually solve their problems. A mature model that comprises a method for assigning responsibility or right and indicates cooperation between different agencies and processes must be studied.

Teaching management institutions are ideally responsible for training and inspecting teaching quality, and information institutions are responsible for constructing and maintaining on-line platforms. Furthermore, teaching staff are responsible for course design. In real-world circumstances, information institutions may help to train staff members, and management institutions should take part in platform construction. Therefore, blended learning based on an on-line platform is multi-interactive and collaborative.

5. Future plans and directions

In July 2015, a project known as 'Smart Campus' was initiated at ECNU in a strategic partnership with Tencent to harness the use of ICT in teaching, learning, administration and research innovation. This project seeks to promote e-learning and blended learning practices at ECNU, including setting up

a Smart Learning Platform, building e-learning resources to support students' self-guided learning and facilitating blended instruction. Along with these goals, endeavours are in place to innovate learning and teaching practices in a more adaptive way.

5.1 Smart Learning Platform

The Smart Learning Platform will be implemented in the next three years at ECNU. The term 'smart' indicates that the platform will be not only applied to meet the various needs of blended learning at different levels as previously identified, but also fully featured, easy to use and compatible with browsers. A batch of high-level and characteristic courses will then be developed on this platform, and the application of blended learning will be promoted across the university. Along with this platform, resource-, competence- and service-building efforts will be put in place to support blended learning practices.

5.1.1. Resource building

As the case analysis revealed, the lack of best practices for blended learning is a challenge that hinders the scaling up of e-learning at ECNU. Therefore, along with the setup of the Smart Learning Platform, a supportive initiative will be put in place to build on-line course resources, best practices for blended learning and guidelines that describe the contribution and operation of blended learning courses.

5.1.2. Competence building

Based on case analysis, the lack of teaching staff competence in blended learning practices also presents a challenge. Therefore, aside from providing best practices for blended learning, a supportive strategy will establish a package of competence-building solutions for teaching staff, including workshops, seminars and classroom observations, to help them

learn how to apply the e-learning solution to their teaching practices.

5.1.3. Service building

Aside from Q&A sessions to address technical issues, there is currently no routine service for blended learning provided to teaching staff and students. This also presents a challenge to the blended learning practices at ECNU. The issue has been considered a component of the Smart Learning Platform, in which a comprehensive service package has been designed with a focus on personalised learning services for students. These personalised learning services are based on the modelling and analysis of students' on-line learning behaviour, a novelty of the e-learning age.

5.2 Innovative teaching and learning

Based on case analysis, there is a need to study the innovative learning models further by taking course content, learning goals and students into careful consideration. Therefore, along with the setup of the Smart Learning Platform, endeavours are in place to innovate learning and teaching practices, including differentiated, interest-based and community-based learning practices.

5.2.1. Differentiated instruction

One of the promising features of the Smart Learning Platform is that it can provide personalised learning services for students based on the modelling and analysis of their on-line learning behaviour. With the help of a service providing students with learning support, differentiated instruction, an innovative teaching practice that can adapt to the individualised learning needs of students, will be implemented in the near future.

5.2.2. Interest-based learning

Interest is always the best teacher. Interest-based learning is encouraged as a promising innovative learning and teaching practice that promotes the learning results of an e-learning solution. Using the university's current resources and the path of the external resource link through the educational cloud, students can easily obtain required learning resources with learning service tools and engage in an expansive learning experience based on personal interest.

5.2.3. Community-based learning

Community-based learning is another innovative blended learning practice. In this case, students form many learning groups spontaneously based on their interests, and those with multiple interests become the cross-points of different groups, promoting a learning network society. Learners share resources and experiences on the Internet. The Internet is an interactive, interdependent and two-way communication environment that promotes close integration between individual knowledge construction and social knowledge coordination; accelerates the divergence, linking, convergence, extension and deepening of various kinds of views and minds; and generates new knowledge and collective intelligence.

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3. From Diffusion to Explosion: Accelerating Blended Learning at the University of Western Australia

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Abstract

This case study describes how blended learning has been adopted, supported and accelerated at The University of Western Australia (UWA), a research-intensive institution considered as the leading university in Western Australia for over 100 years. Attention is paid to institutional-level structures, strategies and supports that have been changed or initiated to enable and encourage transformation in learning and teaching and enhance the student experience. Technology must be integrated into learning and teaching through course redesign processes to achieve real transformation, and course redesign has recently been given greater emphasis at UWA. This case study also reveals how the university has attempted to transition from implementing a diffusion model of pedagogical change to a more concentrated institutional level strategy aimed at 'exploding' the traditional lecture and encouraging the rapid transformation of learning and teaching.

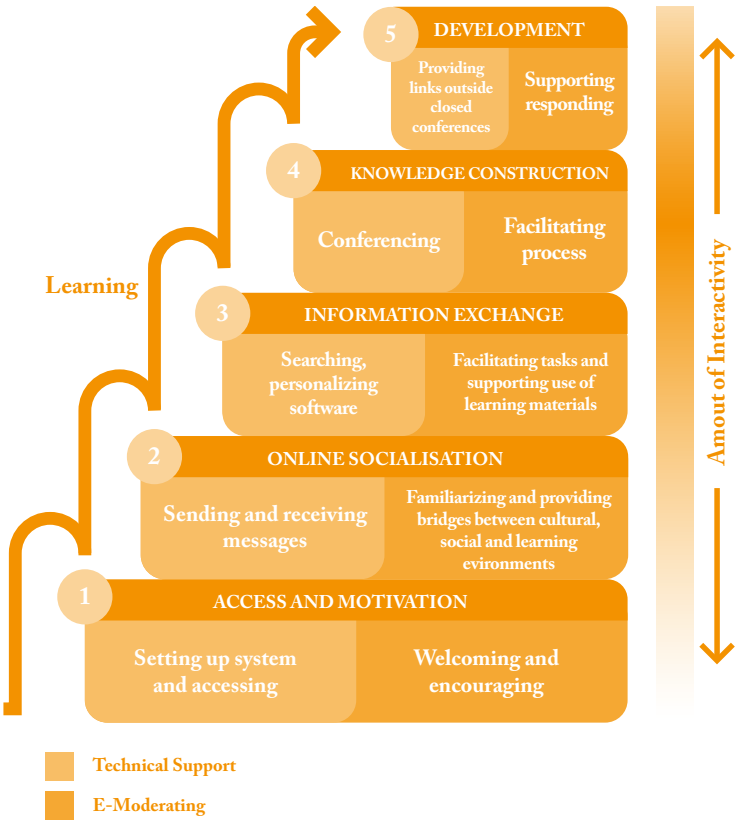
1. Introduction

Barber, Donnelly and Rizvi (2013, p. 3) warned that higher education required 'deep, radical and urgent transformation' to remain relevant and satisfactorily serve rapidly changing societies and industries subject to the forces of globalisation and technology. Others have gone so far as to say that the very existence of universities is at stake if they do not 'adapt to the new reality' (Dailey-Hebert & Dennis, 2014, p. 1). According to Barber and colleagues, transformation is needed in many

aspects of higher education. For example, institutions are experiencing an increasing need to find cost-effective ways of attracting, retaining and serving students who may not be looking for traditional education in a traditional institution. Furthermore, universities must work creatively to ensure that graduates are employable in rapidly changing and emerging industries, many of which operate on global rather than local or national stages. In response to such challenges, innovations in learning and teaching have become strategic priorities at UWA, and the accelerated adoption of blended learning using the Blackboard Learn™ Learning Management System (LMS)/Virtual Learning Environment (VLE) at its core is a key component of the strategic plan for these innovations.

Blended learning can be beneficial in several ways if implemented and supported appropriately. It can be a highly effective means of actively engaging a diverse range of students and enhancing learning outside the traditional physical, temporal and interactive limits associated with formal face-to-face learning (Poon, 2013; Vaughan, 2007). It can help university teachers offer student-centred and active learning, which can promote student learning of important twenty-first century skills such as communication, information literacy, creativity and collaboration and develop the ability to use digital technologies for a range of purposes (Garrison & Kanuka, 2004; Zurita, Hasbun, Baloian, & Jerez, 2015). It can also be an effective means of establishing learning communities that work together to build knowledge through such processes as inquiry, reflection and discourse (e.g., Garrison & Vaughan, 2013). Furthermore, the adoption of blended learning has the potential to allow higher education institutions to become more flexible and agile in terms of their ability to respond quickly to contextual changes in a cost-effective way (Poon, 2013).

Figure 1: Salmon's 5-stage model of learning and teaching on-line



Source: http://www.gillysalmon.com/five-stage-model.html

There are many definitions and models of blended learning, and they appear to be fairly dynamic due to constant innovations in the field. Put simply, blended learning involves a mix of on-line and face-to-face learning. Some researchers have emphasised the underlying pedagogical approaches or what may be termed

the 'qualities' of learning and teaching. For example, according to the Clayton Christensen Institute (2015), blended learning offers students some flexibility and choice in terms of time, place, pace or path. Models that include the notion of 'learning design' emphasise pedagogical approaches and how they relate to intended student learning outcomes and experiences. Salmon's (2011) e-moderation model can be positioned here. This model, which focuses on scaffolding on-line learning through a five-stage model, underpins much of the current pedagogical change at UWA.

To elaborate, the five-stage model involves scaffolding students to use both technology and learning tasks and materials through five stages, including access and motivation, on-line socialisation, information exchange, knowledge construction and development (see Figure 1). This model is discussed in more detail later in the chapter, when Carpe Diem workshops are described.

In describing and defining blended learning, some authors have focused on the proportion and manner of on-line versus face-to-face delivery. For example, Jones, Chew, Jones and Lau (2009) proposed a blended learning continuum with fully face-to-face learning at one end and fully on-line (termed 'e-intensive') learning at the other. 'Basic ICT use', 'e-enhancement' and 'e-focused' learning can be found at other points along the continuum. Basic ICT use, which may include the use of Microsoft PowerPoint™ presentations in class, and e-enhancement, which may include the provision of on-line lecture notes, announcements and basic communication, hardly qualifies as blended learning by most definitions. The only approach on the blended learning continuum that seems to be truly blended is 'e-enhancement', which involves the use of on-line discussions and interactive materials to support face-to-face teaching. Allen, Seaman and Garrett

(2007) similarly proposed course classifications, including 'traditional', 'Web-facilitated', 'blended/hybrid' and 'on-line' (see Table 1). These authors suggested using percentages of on-line/face-to-face 'content delivery' to describe the different classifications. These percentages are of relatively little value in current conceptions of blended learning, in which the 'quality' of on-line/face-to-face activities is emphasised as opposed to the 'quantity' of content delivery. Under a 'quality' definition of blended learning, if only a relatively small percentage of a course is on-line, it can still be counted as 'blended' if both the on-line and face-to-face elements are carefully designed and integrated. A further source of criticism of the classifications adopted by Allen et al. (2007) is their reference to 'content delivery', the notion of which is not in line with contemporary conceptions of how students learn – as active participants in the learning process, not simply as passive recipients of 'delivered' knowledge (Trentin, 2010).

The Clayton Christensen Institute (2015) described blended learning models in terms of how face-to-face and on-line elements are organised and implemented. The four main models include the 'rotations', 'flex' and 'à la carte' models and the 'enriched' virtual model. In the rotations model, students are asked to rotate between different learning modalities or learning activities, some of which are on-line. This may entail students rotating through a coherent series of learning stations within or outside the classroom, some of which may involve on-line activities. Students may do on-line homework or listen to/view recorded lectures at home prior to the discussion, application and workshopping of concepts in a face-to-face setting. The flex model is primarily an on-line model, although students are asked to perform some off-line activities. Here, on-line activities are carried out by students at their own pace, usually during class time; these activities should be tailored to individual students' learning needs. The teaching staff act

as facilitators by providing support to individuals or groups of students on an as-needed basis. The à la carte model involves students taking a course or unit fully on-line to accompany the off-line face-to-face learning that takes place in the physical classroom. Finally, the enriched virtual model involves students attending face-to-face classes and then completing the rest of the course/unit on-line, with the teaching staff member acting as e-moderator (on-line tutor/facilitator). In this model, students and teaching staff do not meet face-to-face regularly. Some of these models such as the station rotation model are more prevalent in schools than in higher education institutions. Bocconi and Trentin (2014) proposed a model that attempted to help educators determine an appropriate 'mix' of on-line learning spaces and processes, depending on the learning context. According to these researchers, learning may be on-site individual, on-line individual, on-site collaborative or on-line collaborative. This model summarises the key components described in the Clayton-Christensen models previously described.

Table 1: Allen, Seaman and Garrett's (2007, p. 5) prototypical course classifications

Proportion of content delivered on-line	Type of course	Typical description
0%	Traditional	No on-line technology is used. Content is delivered in writing and orally.
1-29%	Web facilitated	Web-based technology is used to facilitate what is essentially a face-to-face course. An LMS (or CMS) or webpages are used to post content.

30-79%	Blended/ Hybrid	A blend of on-line and face-to-face learning. A substantial proportion of the content is delivered on-line and on-line discussions are typically used. Some face-to-face meetings are typically used.
80%+	On-line	A course in which most or all of the content is delivered on-line. Face-to-face meetings are not typically conducted.

It seems clear that effective blended learning generally does not entail merely tinkering with technology and inserting it into pre-existing courses where it may serve little or no pedagogically useful purpose. The implementation of powerful blended learning may necessitate fundamental changes in pedagogy and the relationships between students and teachers. However, there may be some cases in which radical changes are not necessarily required. Alammary, Sheard and Carbone (2014, p. 443) observed the presence of low, medium and high impact blends that involved 'adding extra activities to an existing course', 'replacing activities in an existing course' and 'building the blended course from scratch', respectively. Although Garrison and Kanuka (2004, p. 99) suggested that '[b]lended learning inherently is about rethinking and redesigning the learning and teaching relationship', Alammary et al. (2014) suggested that in some cases low impact blends may be acceptable – for example, as the first steps for teaching staff with low digital literacy, or in cases where a major rethink is not deemed necessary.

There is little doubt that many attempts to use blended learning in higher education have not succeeded, especially on an institutional level (Torrisi-Steele & Drew, 2013). In discussing the failure of many universities to implement successful blended learning, critical theorist Neil Selwyn (2014, p. 6) asked what happened to 'pre-millennial expectations of the cyber-campus

and effortlessly "blended" learning' and how these 'wonder technologies seemingly got embroiled in the most obstructive and constraining elements of the university machine'. He argued that few higher education institutions around the world had in actual fact managed to fundamentally transform their learning and teaching. Furthermore, he observed that in some cases the use of ICT in learning and teaching had actually led to negative effects such as the disempowerment and frustration of teaching staff and the alienation of students while failing to lead to enhanced learning despite a lot of expense and angst. Selwyn's comments perhaps highlight that because universities are highly bureaucratic organisations that are accountable to external bodies, they often lack room to manoeuvre when it comes to being innovative, flexible and able to respond quickly to student and societal needs.

If universities are to move beyond what Allen et al. (2007) called 'Web facilitated' courses and Jones et al. (2009) termed 'basic ICT use' and 'e-enhancement' towards truly transformational models, they require the right kinds of institutional strategies, structures and supports (Graham, Woodfield, & Harrison, 2013). Significant organisational change may be needed to put these strategies, structures and supports into place. However, according to Garrison and Vaughan (2013, p. 24), 'organisational change that significantly enhances the effectiveness and efficiency of the learning and teaching transaction' within blended learning modes does not often occur in universities.

At UWA, a concerted push for accelerated technology-enhanced pedagogical change was instigated in 2014, and innovations in learning and teaching have since been encouraged and supported by a suite of changes and initiatives at multiple organisational levels. Such organisational changes are crucial (although there is no guarantee they will lead to the desired outcomes) because governance and political structures in addition to staff

resistance (Noh, Isa, & Samah, 2012) can greatly impede the success of learning and teaching innovations in higher education (Garrison & Vaughan, 2013). Before we describe the process of change at UWA, we present some historical information about the institution to contextualise the case study.

2. The University of Western Australia: history and background

Established in 1911, UWA was the first university in Western Australia and is now one of five in the state. A full history of UWA, which in 2014 had approximately 24,000 students, can be found on its website at http://www.uwa.edu.au/university/history. The university has nine faculties, is considered the most prestigious and research-intensive university in Western Australia and is listed in the top 100 universities according to the Academic Ranking of World Universities. It is also a member of Australia's prestigious Group of Eight, a coalition of research-leading universities in Australia. With its reputation as a first class research university, UWA seeks to be counted among the top 50 universities in the world by 2050. In a somewhat bold move, UWA introduced its 'New Courses' model in 2012 (Louden, 2010). The model moved away from the prevailing trend in Australia to provide vocationally focused degrees. Instead, it aimed to provide undergraduates with a broad education through a three-year degree, followed by a postgraduate degree or award that may be professionally/vocationally oriented. For many teaching staff members at UWA, this represented a significant departure from previous practice and involved a great deal of course redesign. At the time of the change, students' ratings of teaching quality and levels of overall satisfaction declined. It is within the context of increasing competition and government funding cuts in addition to the need to improve student experience that the university

has sought new ways to innovate its pedagogical practices.

In 2013, the Deputy Vice Chancellor (Education) proposed an *Education Futures* project, and one of its areas of focus was to review and address the mix of on-line and face-to-face learning at the university (Cameron, 2013). Before discussing the launch and implementation of the project as a stimulus and vehicle for pedagogical change, we present a brief overview and discussion of the blended learning practices at the university prior to Education Futures.

This case study is based on the analysis of freely available UWA websites and documents, together with the author's reflections and perspectives as one of the many agents of change. As no confidential information is used in this case study and no new data were collected, human ethics permission was not required or sought.

3. Adoption of blended learning through diffusion

As already noted in this chapter, there are many definitions and models of blended learning (Bohle Carbonell, Dailey-Hebert, & Gijselaers, 2013; Partridge, Ponting, & McKay, 2011). However, in its *University Policy on Selecting Teaching Modes*, UWA currently defines blended learning as 'learning which combines online and face-to-face instruction'. This policy does not explicitly articulate that on-line and face-to-face instruction in effective blended learning should ideally be mutually supportive or complementary (Poon, 2013) and closely connected through coherent pedagogical design rather than merely combined or mixed. The notion that blended learning may embrace fundamental pedagogical transformations is not explicitly evident in this policy. However, policy changes that better reflect new strategic directions at UWA are on-going.

As already indicated, some researchers have maintained that blended learning should be seen as 'a design approach whereby both face-to-face and online learning are made better by the presence of the other' (Garrison & Vaughan, 2008, p. 6). This notion of *design* is elaborated later in this chapter when Carpe Diem learning design is discussed.

3.1 Blending before education futures

According to Graham et al. (2013, p. 4), "When institutions have not clearly defined and strategically adopted BL [blended learning], they are not really likely to know the extent to which BL has been adopted institution wide." To some extent, this statement is true of the situation at UWA. It is impossible to outline with any certainty the prevalence or models of blended learning that were in use at UWA prior to Education Futures or even currently. However, a significant proportion of the university's unit coordinators were not using the university LMS/VLE (Moodle).

Several lecturers were experimenting with pedagogically exploratory versions of blended learning through such activities as 'flipping' the classroom (e.g., Forsey, Low, & Glance, 2015; Hodkiewicz, 2014; Howitt & Pegrum, 2015; Jarvis, Halvorson, Sadeque, & Johnston, 2014; Oakley & Pegrum, 2015), which fits within a rotation model of blended learning. Many others used the Moodle LMS/VLE in fairly traditional ways to supplement face-to-face teaching with audio and/or video recordings of lectures, quizzes and a range of more constructivist learning activities such as discussion forums and blogs in addition to the assignment submission and gradebook features. Many courses and units could be categorised as 'traditional' or 'Web-facilitated', based on the categories of Allen et al. (2009).

3.2 More on flipping at UWA

The flipped classroom is a rotation model of blended learning that is not really new (Brame, 2013), but has been popularised in recent years by secondary teachers Bergmann and Sams (2012). It entails the removal of the 'information transmission' type of teaching such as lectures and presentations from face-to-face classrooms so that educators can instead use this valuable time to help students achieve deeper learning through discussion, application, skills development and other active learning strategies. One flipped classroom designed by a UWA teaching staff member in the Faculty of Education in a unit entitled *Learning Environments in Early Childhood* involved a total departure from traditional lectures, tutorials and workshops. With the help of mobile technologies such as iPads and smart phones, the teaching staff member conducted all of her classes in unconventional learning spaces such as parks, childcare centres and school premises. Students (pre-service teachers) were required to engage in a range of preparatory activities on-line before meeting the teaching staff member and their peers in the authentic learning spaces (Howitt & Pegrum, 2015). Other lecturers at UWA (including the author) flipped their classrooms by discontinuing face-to-face lectures in one or more of their units and instead required students to view several on-line mini-lectures, do readings and carry out on-line learning activities before class, using the freed up face-to-face time to 'workshop' concepts through discussion, hands-on activities and problem solving. Innovators throughout the university tried a whole range of new technology-enhanced learning and teaching strategies.

3.3 Grassroots adoption and diffusion of blended learning

Before the Education Futures principles and initiatives were implemented, individual faculties and innovators within those faculties were changing their pedagogical practices according to an essentially 'bottom-up' approach (Bohle Carbonell, Dailey-Hebert, & Gijselaers, 2013). Innovative teaching was mostly started at a 'grassroots' level, with incremental scaling up to an institutional level being a possibility and/or an intention. Although bottom-up approaches allow for grassroots commitment and ownership, any scaling-up process may be slow (or simply not happen) and lead to institution-wide inconsistencies and inefficiencies.

One of the important elements in any change process is assisting staff to make transitions to new ways of doing things, and this involves relevant and timely professional development. Before 2015, blended learning was supported by professional development sessions from the Centre for Advanced Teaching of Learning (CATL), which has since been replaced by the Centre for Educational Futures (CEF). CATL provided several dedicated workshops on blended learning in addition to point-of-need support for teaching staff interested in using this approach. A comprehensive series of workshops on how to use Moodle to enhance learning and teaching was also offered, as were many other well-subscribed workshops and activities each year.

The diffusion model of technology integration is described as follows on the CATL blended learning webpage: "Rogers' model of technology diffusion illustrates that there are innovators and early adopters of technology – they need to be free to explore emerging technologies and new pedagogical uses of technologies for quality learning and teaching experiences – just as there are those who are reluctant or slow to use technology."

The diffusion model proposed by Rogers (2003) assumes that change can occur in social systems (such as universities) through the following five steps: knowledge, persuasion, decision, implementation and confirmation. First, a person gets to know an innovation and forms an opinion about it. Second, he or she decides whether to adopt or reject the innovation and put it into practice. Finally, the person evaluates the innovation and confirms or disconfirms its value/usefulness.

According to Rogers' theory, the people involved in this process include innovators, early adopters, the early majority, the late majority and so-called 'laggards'. The clear message here is that innovation is something only a few people do, with the rest following and possibly never catching up. In a context (such as UWA) where it is hoped that many or most of the people involved are innovative, professional development based on assumptions from Rogers' theory may need to be used alongside other models. For example, networked and viral learning (Oakley & Pegrum, 2015), which involves the rapid spreading of ideas and innovation within and across institutions through multiple modes including social media, may be a fitting complement to the spread of innovation through diffusion.

Teaching staff challenge or resist against transformational learning approaches for a variety of legitimate reasons (Garrison & Vaughan, 2013), which may include insufficient time, training and commitment on the part of the teaching staff. A major barrier is the perception that there is insufficient evidence that blended learning works in terms of enhanced student learning and engagement (Garrison & Vaughan, 2013). For these reasons, diffusion of innovation may not occur without other strategies to promote and support it. UWA's response to these issues is described in the second half of this chapter.

Now that the background and historical context of innovation in learning and teaching at UWA has been discussed, the next

section describes the processes that led to the implementation of Education Futures.

4. Envisioning and launching education futures

Through a process of university-wide consultation, seven vision statements were crafted by an Education Futures project team composed of university leaders and directed by the Dean of the Faculty of Education to guide the future of learning and teaching and student experience at the institution. Education Futures was launched in 2014 with an event attended by a range of stakeholders. At the event, short movies were shown of the practices of several teaching staff members who were already attempting innovative teaching practices, including blended learning. The movie showcase can be viewed at the Education Futures website (http://www.worldclasseducation.uwa.edu.au/strategic/education-futures-vision/movie-showcase). The movies were primarily intended to stimulate discussion for teaching staff considering innovations in their learning and teaching practices.

Education Futures indicated that it could propel and improve blended learning, which had not previously been widespread at the university in any coherent or high impact fashion, based on the following vision statements.

1. *Transformative teaching:* Teaching practices at UWA are designed to engage, challenge and transform student learning throughout their courses.
2. *Evidence-based teaching:* UWA provides evidence-based, quality teaching practices.
3. *Experiential learning:* UWA provides students with a rich variety of learning experiences, including service learning, that connect them to the University, professional, local and global communities.

4. *Integrated research experiences:* Learning and teaching experiences at UWA are integrated with and informed b, research.
5. *Optimised resources:* UWA learning and teaching activities are supported with an extended range of quality resources, facilities and technologies.
6. *Vibrant campus environment:* UWA values and provides a vibrant, collaborative learning environment within its attractive campus.
7. *Global citizenship and leadership:* UWA prepares its students to be contributing members and leaders of local, national and global communities.

5. Setting the scene for education futures

5.1 Change champions

To get the Education Futures vision off the ground, what may be termed a coalition of change agents or 'change champions' (Nadesalingam, 2014) was formed through a *Leading Transitions* programme that entailed approximately 37 people from all of the university faculties. Although most of the participants in the programme were teaching staff, some were professional staff members from IT and student support services. The programme ran over several half days and a two-day residential workshop over one semester and was facilitated by an outside consultant. Participants learned leadership strategies, engaged in team-building activities and worked to transform the vision statements into actionable strategies. The group identified blended learning as a way of realising some of the Education Futures vision statements and labelled it 'Exploding the Lecture'.

5.2 Changes to organisational structure

Before Education Futures was implemented, some changes at the institutional level were put into place. A new position at the university executive level was created: Pro-Vice Chancellor (Education Innovations). Soon afterwards, the new CEF was instigated along with an Education Futures Strategy Group. A standing committee of the newly formed Education Committee, the role of the Education Futures Strategy Group is to advise and 'make recommendations to the Education Committee on policy and strategic matters in relation to the university's education strategy and vision as well as to make recommendations to other university staff members and bodies on learning and teaching issues, including improvements in educational delivery and the use of technology and innovations in learning and teaching' (see http://www.governance.uwa.edu.au/committees/other/education-futures-strategy-group). A new Curriculum Committee was also set up and given new abilities to fast-track unit and course changes to assist teaching staff in making changes to their courses and units. Individual faculties also made some changes to reflect and support Education Futures; for example, the Teaching and Learning Committee changed its name to the Education Committee. In some cases, more support staff with expertise in linking ICT and pedagogy were provided.

6. Implementation of education futures

The implementation of Education Futures primarily focused on three key projects: the *Black Swan* project, which entailed moving over to the Blackboard LMS from Moodle and supporting staff to use its capabilities fully and effectively; *Carpe Diem*, a unit redesign process developed by Pro-Vice Chancellor (Education Innovation) Professor Gilly Salmon over 14 years to assist unit coordinators in redesigning their units so that

technology and face-to-face teaching could be integrated into a coherent learning system; and an orientation (later named *Prospect*) that introduced new students to the university culture and the ways in which they were expected to learn. Several other projects have since been launched, including schemes to encourage innovation and learning and teaching scholarship across the university, improve the digital and physical learning environments and build the capability and capacity of teaching staff.

7. Building teaching staff capacity and readiness

Garrison and Vaughan's (2008) previously cited definition of blended learning, which proposes that on-line and face-to-face learning should *enhance each other* in a synergistic fashion, implies that fundamental and perhaps radical changes to pedagogy are necessary to achieve effective blended learning. Accordingly, it is inadvisable to simply tack on on-line activities to existing unit or course designs. For fundamental change to happen, university teachers must redesign their courses. The course design process adopted at UWA is Salmon's (2013) Carpe Diem process, described as follows.

7.1 Carpe Diem workshops

The idea of educators being designers of learning (Conole, 2013; Laurillard, 2012) has become popular in recent years. Educators account for intended learning outcomes and learner characteristics to plan coherent and effective courses. They engage in backward planning, starting with the learning outcomes. Conole offered the following definition of learning design:

> *It is a methodology for enabling teachers/designers to make more informed decisions in how they go about designing learning activities and interventions, which is pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to curriculum level design. (2013, p. 7)*

With the aim of assisting teaching staff in using design thinking to improve their units, Carpe Diem workshops were instigated as a major element in the implementation of the Education Futures strategy. Salmon and Wright (2014, p. 54) described the Carpe Diem process as a 'collaborative team based online learning design process'. Although this definition refers to on-line learning, the Carpe Diem process promotes designing for blended learning.

At UWA, Carpe Diem is a two-day process in which a unit coordinator and at least one and usually two or three teaching staff members in a unit work in a pod or team that also includes a librarian and a learning technologist under the supervision of a facilitator who has pedagogical knowledge. Together, the pod members redesign the unit to maximise its potential for supporting student learning and enhancing student experience. The Carpe Diem process aims to assist teaching staff in redesigning their units in ways that suit the units' particular learning objectives, student characteristics, the specific resources and learning spaces available and the teaching staff's abilities and preferences. A particular emphasis is placed on the learning support students can receive through feedback and collaboration. Assessments are often changed and redistributed to promote this. Teaching staff are encouraged to redesign their units so that ICT (primarily the LMS/VLE) is integral, with the aim of enhancing student learning and collaboration. They are challenged to think about their own role and that of

students in the learning process, in addition to alternative ways of assessing students' learning and providing formative feedback to support that learning.

In contrast to traditional professional development models, which typically comprise presentations or workshops in which participants learn about or how to do something that may or may not be transferred to practice (Kennedy, 2014), the Carpe Diem process involves participants working on a unit or a course and leaving the session with a tangible product or an action plan. The Carpe Diem process involves six steps, which are briefly described in Table 2.

More information about the Carpe Diem workshops at UWA is available on the Education Futures website (see http://www.education-futures.uwa.edu.au/carpe-diem-workshop).

Table 2: The Carpe Diem learning process

The Carpe Diem Learning Process	
Stage	**What happens**
Writing the blueprint	Team members work together to lay out the aspirational aspects of the unit or course, including: • a mission statement; • a few adjectives to describe the look and feel of the unit; and • a picture to represent the 'spirit' of the unit. Team members also think about how feedback can be provided to students during the unit and what kinds of assessment tasks can be designed to assess the unit outcomes in a fair, efficient and creative way. Non-traditional assessment activities involving digital technology are encouraged.
Creating a storyboard	Team members work together to create a storyboard of what will happen during the unit based on the following questions. • What teaching, learning and assessment activities will be included? • How will the learning and teaching activities be sequenced? • How and where will technology be used? • How will the students collaborate and communicate? • How will the students receive formative feedback? Study hours are counted and should total approximately 150 hours.

Making an on-line prototype	Team members work together to create e-tivities, which are on-line activities designed to engage students and help them learn. Each e-tivity has: • an attractive and interesting title; • a clearly stated purpose; • a brief summary of the task; • a 'spark' to grab students' interest; • a clear description of the contribution expected of each student, which may be a wiki, a discussion board posting or any number of on-line activities; • an indication of the role the 'e-moderator' or lecturer/tutor will play; • an indication of how long the e-tivity should take to complete; and • a description of 'what comes next' or how the e-tivity will be followed up.
Reality checking	Carpe Diem participants try out one another's e-tivities and provide feedback such as their first impressions, whether they found the e-tivities easy to navigate, whether what they were supposed to do was made clear and how the e-tivities could be improved.
Reviewing and adjusting	During this phase of the process, participants reflect on the feedback and make necessary adjustments to their e-tivities, blueprints and storyboards. They also think about how they will evaluate the success of their unit design after it has been delivered to students.
Planning next steps	The participants map out an action plan for getting their unit ready, particularly the on-line components. They prioritise what must be done and think about the support they may need and where they will obtain it. They list any 'risks' they see in terms of completing the work. Finally, there is a 'presentation and admiration' segment, in which a team member talks for approximately three minutes about the redesigned unit.

As indicated earlier in this chapter, Salmon's five-stage model (2013) is a central element in the Carpe Diem workshops, as it assists university teachers in designing courses with on-line components (or 'e-tivities'). Stages 1 and 2 of the model ('Access and Motivation' and 'On-line Socialisation', respectively) are very important stages, as they motivate students to engage in the

on-line activities offered and help them to build an identity in the on-line group and find other students with whom they can work and interact; indeed, trust is built in these stages. In Stage 3 ('Information Exchange'), students exchange information with one another and contribute to on-line discussions. In Stage 4 ('Knowledge Construction'), students move from cooperating with each other on-line to working on collaborative tasks that involve knowledge construction – this is where they can develop their capacity to be highly reflective, critical and creative. Students may also engage in inquiry and problem solving, which are important twenty-first century activities. In the final stage of Salmon's five-stage model ('Development'), students should take responsibility for their own learning and that of their peers. They should become metacognitive and self-regulatory in their learning; that is, their ability to think about their thinking and learning should be developed, which may change them as learners. The relationship between the educator (or 'e-moderator') and student is fundamentally different from traditional roles and relationships.

7.2 Conferences and drop-in sessions

A sequence of conferences and regular drop-in sessions has contributed another element of the professional learning provided at UWA. These sessions have been part of the Black Swan project, with the aim to assist staff in the transition to Blackboard. Support is on-going in the new purpose-built CEF. Many teaching staff members have also received intensive tutoring from learning technologists in the Carpe Diem workshops. Regular e-newsletters are sent to teaching staff members to promote the momentum of professional learning, and the LMS provides self-help resources. The learning technologists who run the drop-in sessions and participate in the Carpe Diem workshops are skilled at linking technology and pedagogy and are well aware of learning design processes.

8. Student capacity and readiness

Norberg, Dziuban and Moskal (2011) observed that students' 'old habits of passively attending class' were becoming increasingly ineffective. Thus, it should be taken into account that students must be prepared for transitions to blended learning, although many current university students will have experienced some blended learning at school. Where blended learning is in operation, students must engage in active learning in their face-to-face classes, rather than simply listen to lecturers transmitting information via a lecture or a presentation. Thus, adjustments to their role expectations may be required. At UWA, a new type of student orientation was piloted at the beginning of 2015, in which new students were encouraged to think about different modes of learning and teaching, about themselves as learners (learning preferences) and about the range of new technologies used in learning and teaching at UWA. The orientation, known as *Prospect*, did not involve students passively sitting and listening to presentations, but required them to interact with teaching staff members and peers in a variety of activities. The duration of the orientation was two days. This model will be scaled up for 2016 and improved for the student and staff participants.

8.1 New policy and guidelines

Higher education institutions may need to rewrite their policies and guidelines to facilitate the effective use of blended learning. For example, assessment policies may not easily allow blended learning in cases where creative collaborative assessments are part of the design. Teaching staff are required to ensure that students' own work is assessed, and this can be difficult to do in collaborative assignments, on-line or otherwise. Assessment policies sometimes stipulate grading distributions that may not be appropriate in cases where student achievement is higher

overall due to superior learning and teaching practices. At UWA, a new assessment policy was drafted during 2015. Although it advises on-line submission of assessments, innovative assessment procedures that may occur within the context of blended learning do not appear to be a particular priority for policy writers.

UWA, which has a strong research tradition, has also taken steps to better reward teaching. The system for measuring academic performance is being modified to allow reward innovative and risk-taking behaviour, even if it temporarily results in lower student evaluations. This change means that innovation in learning and teaching may create a smoother pathway towards academic promotion and recognition.

A document entitled *Guidelines for Deployment of University Online Environments (fully digital, blended or mobile)* was recently drafted (Salmon, 2015). Its guidelines (provided in Appendix 1) are in rubric format and intended to guide staff in using on-line environments to increase student engagement. The 'baseline' is an expectation of all unit coordinators or designers, with 'effective' and 'exemplary' elements of desirability.

9. Material resources and infrastructure

9.1 Technology

As already noted, at the beginning of Semester 2 in 2015, the Blackboard LMS/VLE was introduced as a replacement for the open-source LMS/VLE that had been used for the previous six years. UWA has also made increased provisions for students who want to bring their own devices. Technical assistance (BYOD Support) is available on an appointment basis in two of the larger university libraries.

Other IT systems at the university have been overhauled to support the changes to teaching practices and curricula. For example, CAIDi, a new course management system adopted to speed up and better manage course and unit changes and approvals, was introduced in 2013.

9.2 Buildings and spaces

Apart from the new purpose-built CEF, which is a hub for professional development and research related to learning and teaching practices that adopt technology, several other classrooms have been updated to facilitate pedagogical approaches other than information transmission, which involves the teaching staff or tutors delivering content for absorption by students. Tables and chairs that can easily be moved around the room, multiple whiteboards and improved ICT facilities enable collaborative work, group discussion and the establishment of rotational learning activities. The CEF models the use of flexible learning spaces in its workshops. However, most of the teaching spaces remain traditional. Despite diminishing student attendance at lectures, traditional lecture halls still exist at UWA. Thus, exciting possibilities for new learning spaces remain ripe for exploration.

In recent years, university libraries have been updated to provide many more collaborative workspaces and computers. As in many universities and schools around the globe, books are taking up less room (in some libraries) as more students are accessing e-books on their devices and using group study spaces.

10. Conclusion

This chapter describes and discusses moves that UWA has made to generate a more effective and prevalent use of blended learning as part of an aim to 'explode the lecture' and use innovative and transformational learning and teaching strategies that are in line with UWA's Education Futures vision statements. Institutional changes in strategies, structures and processes have been required to facilitate this move, and such changes are on-going. Whereas innovative practices such as blended learning were previously spread through diffusion, new ways of encouraging innovation have been (and are being) tried in an attempt to speed up pedagogical change and the considered use of digital learning technologies in learning and teaching. It is too early to gauge the effect of the changes, and additional staff consultation, buy-ins and up-scaling are required. It also seems necessary to better engage students as partners in the change process.

The Education Futures vision statements pursue a new learning and teaching paradigm in which pedagogical experimentation, innovation and a questioning of the traditional ways of doing things become the norm at UWA, and the use of high quality blended learning in various forms becomes far more extensive. Through blended learning and other innovations, the traditional lecture, underpinned by information transfer, will truly be 'exploded'.

About the Author

The author is the Course Coordinator of the Master of Teaching (Primary) and the Associate Dean (Teaching and Learning) at the Faculty of Education at UWA. She is a member of the *Educational Innovations Strategy Group* at UWA and participated in the *Leading Transitions Programme*. During 2015, she assisted at and facilitated a number of Carpe Diem workshops.

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Appendix

Draft Guidelines for Deployment of University Online Environments (fully digital, blended or mobile)

	Categories: On-line Environments
Baseline	Students refer to their LMS unit to gain up-to-date key unit information (unit outline) LMS provides students with access to learning resources, assessment guidelines and communication tools. All significant resources are accessible via the LMS on mobile devices The unit is very clearly and appropriately paced and scaffolded throughout the semester
Effective	Students refer to their Blackboard unit for personal learning needs and as scheduled for collaborative learning activities LMS provides the student with collaborative learning tasks, formative assessments, communication tools and more complex learning activities
Exemplary	Students engage with the teaching staff and student community via appropriate collaboration tools and in a variety of authentic on-line learning activities The on-line learning experience is simulated into and relevant for the learners' life experience LMS pedagogical design encourages the student to be an 'active' learner who creates and interacts with the resources of the unit

	Learning Resources
Baseline	All of the resources are current, contextualised and copyright compliant The unit is easily navigable and in manageable segments Tools and media are appropriately chosen to deliver the learning outcomes The unit includes timely and relevant learning materials, e.g., lecture notes, lecture recordings
Effective	Unit design takes full advantage of on-line tools, features and media in the LMS Unit promotes relevance to industry and research skills and knowledge Learning materials include resources that require student interaction such as case studies, case examples and simulations Links are provided to more informal learning opportunities Blended learning, digital environments, mobile learning and the campus are put to their best uses
Exemplary	Media rich resources, e.g., videos, animations, simulations or virtual labs Student-generated materials augment/enhance university learning materials Students are encouraged to use tools and resources outside those provided in the LMS Students are actively encouraged to share their understanding and resources and provide peer support Open Education Resources are used to enhance the student learning experience and to provide a different voice, viewpoint or experience

	Learning Activities
Baseline	Clearly stated expectations of student participation in class activities and 'e-tivities' E-tivities appropriately positioned, clear instructions provided Rapid feedback on satisfactory completion of e-tivities
Effective	Activities that facilitate student engagement, e.g., blogs, wikis, journals e-portfolios Learning activities are authentic and relevant On-line activities to support independent learning, e.g., formative assessment via quiz tool or group collaboration tasks Scaffolded activities culminating in a final product, e.g., website, performance, demonstration, presentation
Exemplary	Student-centred learning tasks that extend student engagement and collaboration, e.g., creation of digital interviews, peer reviews, digital mash-ups Learning tasks have depth, complexity and duration More conceptual approaches to learning, e.g., problem-based learning, simulations Opportunities for adaptive or self-directed learning

	Communication and Collaboration
Baseline	Broadcast messages and alerts to students, e.g., announcements Peer-to-peer networking opportunities, e.g., discussion boards Reference to industry and research communities and networks
Effective	Skilled staff e-moderation for learning on discussion boards, wikis, etc. Social media links and e-tivities Teaching staff are role models for appropriate on-line conduct, engagement and communication Collaborate (Web classroom) is used by lecturer and as breakout rooms for students
Exemplary	Social media such as Twitter, Diigo, Flickr, YouTube and Slideshare built into learning design Virtual classroom offering student presentations and collaboration Innovative opportunities for student engagement, e.g., student conferences Peer review is part of the learning process

	Student Support
Baseline	Staff contact information and contact guidelines provided Student support services are included, e.g., library tutorials, referencing styles, careers Information about faculty-specific help Unit complies with accessibility policies and standards Frequently asked questions are available for all
Effective	Staff and peer-to-peer support, e.g., through social media or discussion boards Students receive and use frequent feedback of all kinds Analytics reports are used to identify and support at-risk students
Exemplary	Active promoted linkages with industry professionals and research through an on-line community of practice Peer support and mentoring Learning analytics reports are used to encourage engagement and performance Badges for motivation and record keeping

	Assessment
Baseline	Assessment details expand on unit outline information Assignments submitted on-line, e.g., through Turnitin or Blackboard Assignment Manager Guidelines for assignment submission, return process, notification of marks and feedback provided Links to academic integrity resources (i.e., Turnitin) Focus on rapid feedback
Effective	Learning design promotes frequent opportunities for peer and staff feedback and formative assessment Formative assessments provided, e.g., pre-test quizzes with automated feedback Opportunities for reflection and self- assessment Audio and video feedback from staff ePortfolio integration Feedback and results available to students on-line, e.g., feedback and results recorded in Grade Centre and available in My Grades Digitalised assessment wherever possible and viable
Exemplary	Authentic assessment options include recorded presentations, essays/reports, blogs, podcast series and videos Scaffolded peer assessment Assessments that inspire learning and engagement

Source: Salmon, G. Consultation Draft V 3, 31 March 2015.

Oakley, Grace

Dr. Grace Oakley is currently an academic at The University of Western Australia and has worked in Higher Education in Australia since 2000, mainly in teacher education. Grace teaches and conducts research primarily in the areas of language and literacy, early childhood and primary education, and the use of learning technologies to enhance and transform teaching and learning, including mobile learning. She has been involved for over a decade in teaching pre-service and in-service teachers how to integrate digital technologies into their teaching. Some of her recent research involves the use of learning technologies to facilitate international learning collaborations. She is Associate Dean Teaching and Learning at the Faculty of Education and has recently, through the facilitation of Carpe Diem workshops, been involved in assisting university teachers from a range of disciplines implement blended learning.

4. Blended Learning - Policies in Place at Universiti Sains Malaysia

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Abstract

Under the Ninth Shift of the Malaysian Education Blueprint, which relates to globalised on-line learning, Malaysia has been strengthening the capabilities of the academic community to deliver on-line learning and efforts are being made to establish a national e-learning platform to co-ordinate and spearhead content development. Twenty-first century education and its emphasis on e-learning has had a huge effect and changed the learning directions in higher education institutions in Malaysia. This chapter examines the blended learning strategies adopted by Universiti Sains Malaysia (USM). The author looks at Malaysia's Education Blueprint and the e-learning policy in the country's higher education institutions. The chapter specifically discusses the current blended learning situation at USM and explains how eLearn@USM has become the integration portal for teaching staff and students to access course information on-line. It also explains the blended learning strategies adopted by the university in relation to the vision and mission, curriculum and assessment, professional learning, student support and infrastructure, hardware and software and issues and challenges associated with blended learning, along with future directions for blended learning at the university.

1. Introduction

This chapter examines the blended learning strategies adopted by Universiti Sains Malaysia (USM). The first part gives readers an overview of Malaysia's Education Blueprint and the

e-learning policy in the country's higher education institutions. It then discusses the blended learning strategies adopted by USM in relation to the vision and mission, curriculum and assessment, professional learning, student support and infrastructure, hardware and software and issues and challenges associated with blended learning, along with future directions for blended learning at the university.

Learning happens in different styles and at different speeds (Felder & Brent, 2005). The emergence of ICT has produced higher education institutions that offer a variety of methods that complement the classroom learning experience and enhance learning according to the individual's needs. Osguthorpe and Graham (2003) described a mixed learning environment that shaped the formation of blended learning, an approach that enabled learning to be independent of time and place. Garrison and Vaughan (2008) viewed this form of learning as one that effectively included the right mix of learning environments to enhance the learning experience and offer a student-centred, self-paced, flexible and multifaceted approach to the learning and teaching process.

2. Malaysia Education Blueprint 2015-2025 (Higher Education)

The Malaysian government has aspired to create a higher education system that ranks among the world's leading education systems.

The Malaysian Education Blueprint (Figure 1) outlines 10 shifts that will drive continuous distinction in the higher education system. These 10 shifts particularly address quality, efficiency issues and overall performance issues in the system. They also focus on global trends that are disrupting the higher education landscape.

The first four shifts focus on outcomes for key stakeholders in the higher education system, and the other six shifts focus on enablers for the higher education ecosystem, covering vital components such as funding, governance, innovation, global prominence, globalised on-line learning and transformed higher education delivery.

The 10 Shifts

Figure 1: Malaysia Education Blueprint 2015-2025 (higher education)

Source: https://www.um.edu.my/docs/default-source/about-um_document/media-centre/um-magazine/4-executive-summary-pppm-2015-2025.pdf?sfvrsn=4

3. Blended learning in higher education in Malaysia

The implementation of technology in learning and teaching practices has attracted great interest from practitioners in higher education institutions in Malaysia. Many higher education institutions have started to implement information and communication technology (ICT) solutions such as electronic learning to make learning and teaching processes more flexible both inside and outside the classroom.

Malaysia is in a good position to harness the power of on-line learning to widen access to good quality content, enhance the quality of learning and teaching and lower the cost of delivery. This is possible considering the level of Internet penetration in Malaysia, which currently stands at 67%, the seventh highest penetration rate in Asia. Higher learning institutions are developing massive open on-line courses (MOOCs) in their niche areas of expertise while participating in international MOOC consortiums and building the Malaysian education brand globally. Students will benefit from robust cyber infrastructure that can support the use of technologies such as videoconferencing, live streaming and MOOCs.

Under its national e-learning policy (*Dasar e-Pembelajaran Negara* or *DePAN*), Malaysia has opportunities to move from a mass-production delivery model to one in which technology-enabled innovations are bundled to democratise access to education and suggest more personalised learning experiences to all students.

Under the National Education Blueprint for Higher Education, public universities in Malaysia have been developing strategic plans for blended learning implementation. The country's higher education institutions have been working to become 21st century universities through rapid socioeconomic and

technological changes. These changes have sounded a clear call for universities to carefully examine their educational practices from a new perspective and face the challenges that lie ahead in knowledge-based societies. The Ministry of Education has been fully supportive of higher education institutions developing strategic plans to mobilise blended learning.

4. Blended learning strategies – the case of Universiti Sains Malaysia

USM was the first research university founded in Malaysia. This section describes the case of USM and the path taken to adopt blended learning at the university.

4.1 Universiti Sains Malaysia – A Profile

USM was established as the second university in the country in 1969. Before the University Act came into effect on 4 October 1971, it was known as the University of Penang.

USM is well known both locally and internationally. Its main campus is located on a tropical island in Penang, Malaysia, and it has two branch campuses, including a 'Health Campus' at Kubang Kerian in Kelantan and an 'Engineering Campus' at Nibong Tebal.

Since its inception, the university has been developing and expanding. Starting with the enrolment of 57 science-based students, USM now offers courses at undergraduate and postgraduate levels to approximately 20,000 students. A university that champions sustainability issues, USM has 26 schools, offering undergraduate and postgraduate education and research-based studies to both local and international students. Another 17 centres of excellence and 2 higher institution centres of excellence also offer research and innovation opportunities

to prospective researchers and provide for the development, application and dissemination of knowledge. The university's main thrust in the development of higher education is in the fields of natural sciences, applied sciences, medical and health sciences, pharmaceutical sciences, building sciences and technology, social sciences, humanities and education.

USM was the first Accelerated Programme for Excellence (APEX) university in Malaysia, a special status accorded by the Ministry of Higher Education. The APEX agenda seeks to propel the university to be one of the best higher education institutions in the world. USM is also the premium research-intensive university in the country, with a vision of *'Transforming Higher Education for a Sustainable Tomorrow'* based on its mission as *'a pioneering, transdisciplinary research intensive university that empowers future talents and enables the bottom billions to transform their socio-economic well-being'*.

4.2 Blended learning at USM

On-line learning has been one of the primary modes of learning since USM's early days of operation. E-learning at USM began in 2002 when the School of Distance Learning developed its own Learning Management System (LMS) to fulfil its distance learning requirements. The in-house-developed system, known as the 'Interactive Distance Education Application', was widely adopted and used by the school's distance learning teaching staff and students until 2004. Originally limited to a few forms such as multimedia courseware, learning objects and on-line forum discussions, it has since expanded to include video conferencing in addition to audio and video streaming. On-line learning at USM is delivered via the university's LMS, which has evolved functionally over years of semesters.

In 2004, the university switched to Moodle, a free and open-source LMS after benchmarking different open sources

and licensed LMS. The Moodle system was proliferated to every school at USM to give each its own e-learning environment. By doing so, every school ran its own standalone server and networks. All of the data were managed manually by the teaching staff, and there was no single control entity present to govern and regulate the overall system and its usage. It was not until 2009 when a collective effort was established to form a unified administrative body for the e-learning management system.

The systemic restructuring took place in the 2009/2010 academic year by involving all of the schools and research centres. A single university-wide Moodle LMS known as eLearn@USM was then introduced (as shown in Figure 2).

eLearn@USM has become the integration portal for USM teaching staff and students to access course information on-line. By centralising the process into a single management system, it offers a 'single sign-on' feature that is very useful for teaching staff.

Figure 2: eLearn@USM portal and single sign-on

Source: http://elearning.usm.my

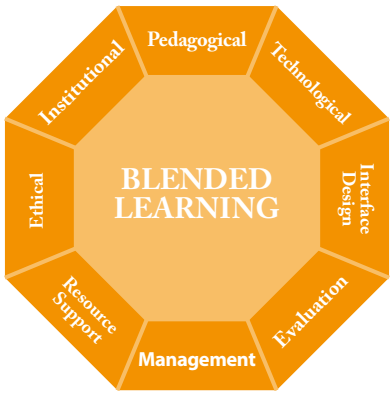
eLearn@USM is entering into its seventh year of use and continues to play an instrumental role in enhancing learning experiences at USM. eLearn@USM has increased the learning experiences of students though the provision of on-line applications such as iTutorials, iWeblets and iRadio. Blended learning has enabled USM to leverage technology to reach a wider audience regardless of location. This global reach feature supports 24/7 access to eLearn@USM.

The on-line forums available on eLearn@USM have done more than enable socialisation between students and tutors. More importantly, they are supporting constructivist learning through joint collaborations, in which knowledge is built on postings made in response to issues raised for discussion. In addition, it has allowed students who are generally passive in the physical classroom to actively speak their minds, share their experiences and give their opinions on-line. In general, blending on-line delivery learning with traditional classroom learning appears to be more effective than either conventional methods or individual forms of e-learning. Blended learning has been able to support and democratise education though the provision of various learning styles. It also provides learning opportunities wherever the students are and in the most flexible way possible.

4.3 Blended learning strategies at USM

The success of blended learning means effectively choosing the right mix of learning environments to enhance the learning experience. A personalised blended learning system provides learners with the most productive environment to help them acquire knowledge in the most effective way possible. eLearn@USM is tied closely to USM's vision of *'Transforming Higher Education for a Sustainable Tomorrow'*. It is based on Khan's octagonal blended learning framework, as illustrated in Figure 3.

Figure 3: Khan's octagonal blended learning framework



Source: Khan, B. H. (Ed.). (2005). Managing e-Learning: Design, delivery, implementation, and evaluation. Hershey, PA: IGI Global.

eLearn@USM has transformed learning and teaching practices at USM. It supports pedagogical needs that align with USM's mission to empower teaching staff and students through the adoption of different styles, learning environments and tools to improve the learning experience. Indeed, eLearn@USM addresses all eight of the dimensions involved in developing a blended learning system.

However, USM has looked at ICT infrastructure as a priority and put much effort into ensuring that everything is in place. The university is focused on creating a strong organisational structure to implement and manage blended learning. It has also continuously made large investments in staff training and development. These three key areas have been considered the most important and given priority by USM. They are explained in more detail as follows.

4.3.1. ICT infrastructure for blended learning at USM

In the technological dimension, USM emphasises ICT infrastructure across all of its campuses. E-learning at USM is supported by high-speed networks, whose usage is reviewed periodically to ensure it meets ever-growing requirements. About 90% of USM campuses have wireless access coverage. This facility is important to sustaining the mobile learning experience in blended learning. Most of the schools at USM have computer labs available for student use, and teaching staff rooms are equipped with wired networking.

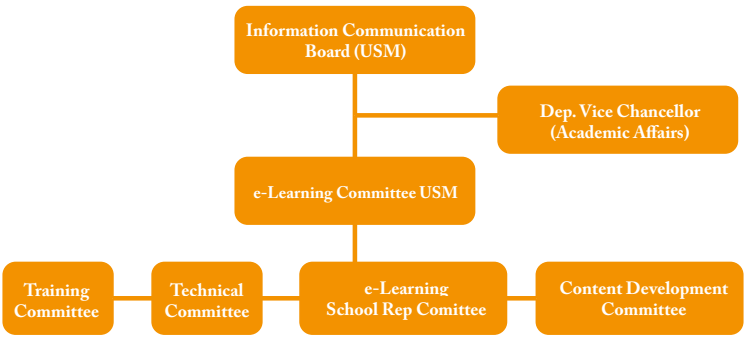
eLearn@USM has an intuitive user interface that enables easy access and usage. It also supports some useful features that improve collaboration between teaching staff and students. Authoring tools such as *Articulate Studio Suite* and *Lecture Maker* are available for teaching staff to build course materials. eLearn@USM also supports embedding multimedia content such as video and audio playback. It even has a polling feature that teaching staff can use to conduct surveys among the students.

4.3.2. Organisational structure for blended learning at USM

Institutional, management and resource support are among the important areas addressed by USM when formulating its blended learning strategy. USM strongly believes that these areas can contribute to the success, existence and adoption rate of the blended learning system. The overall institution and leadership direction; vision; mission; and administrative, academic and student support that will be available over the short and long term depend on a strong leadership structure.

Among the factors contributing to the high usage rate of eLearn@USM are a strong leadership team and organisation, as shown in Figure 4.

Figure 4: Organisation and structure of eLearn@USM



Source: Universiti Sains Malaysia

Having a senior leader such as the Deputy Vice Chancellor as the key person in the organisational structure for blended learning at USM has had an effect on the overall speed with which decisions are made and blended learning is adopted at the university. In the case of USM, the main role of the Deputy Vice Chancellor (as shown in Figure 3) is to ensure that sufficient budgets and resources are secured to maintain continuous system development and support. Other important functions include ensuring continuous technical support with a robust technical and help desk support structure that is available around the clock both on-line and off-line, in addition to on-going professional development.

4.3.3. Support and training for blended learning at USM

As stated by Hartman et al. (1999), there are many challenges associated with support and training in blended environments, including the increased demands placed on teaching staff time to provide learners with the technological skills required to succeed in face-to-face environments. Levine and Wake (2000) and Morgan (2002) discussed the ways in which organisational culture was changing to accept blended approaches. USM

acknowledges the importance of providing professional development to teaching staff who are teaching in on-line and face-to-face environments. To create a successful model that can support a blended approach to learning from the technological infrastructure and organisational perspectives, USM set up a one-stop centre that deals with professional development issues and the related needs of teaching staff. This centre is called the Centre for Development of Academic Excellence (CDAE).

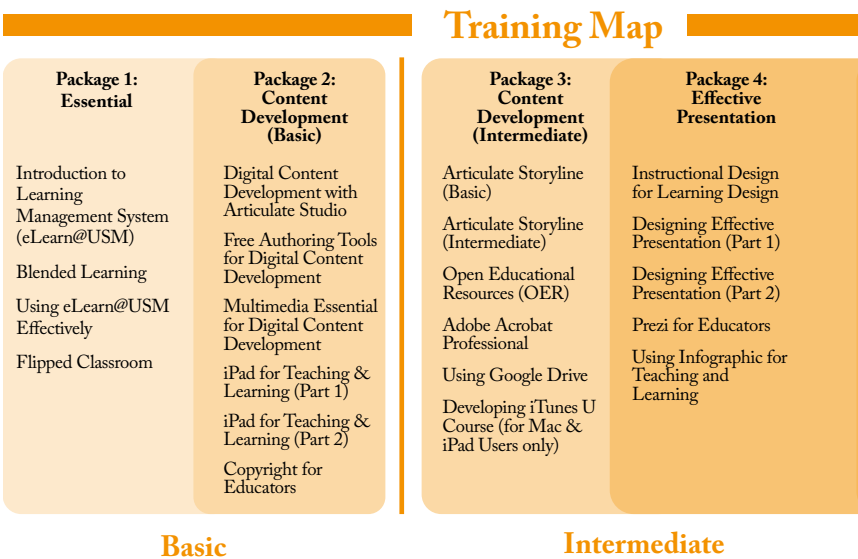
5. Centre for Development of Academic Excellence (CDAE)

USM formed the CDAE on 1 January 2012. The main aim of the centre is to improve the quality of learning and teaching among educators and students while planning and executing activities in accordance with the National Higher Education Strategic Plan and National e-Learning Policy initiated by the Ministry of Education for Higher Education.

The objectives of CDAE include:

- transforming and improving learning and teaching practices to parallel the National Higher Education Strategic Plan, National e-Learning Policy and the USM APEX Transformation Plan by encouraging the implementation of student-centred learning (SCL);
- planning and executing continuous personal and professional development programmes to increase the quality and excellence of learning and teaching;
- encouraging the use of technology-enhanced learning in learning and teaching among teaching staff through exposure and continuous training;

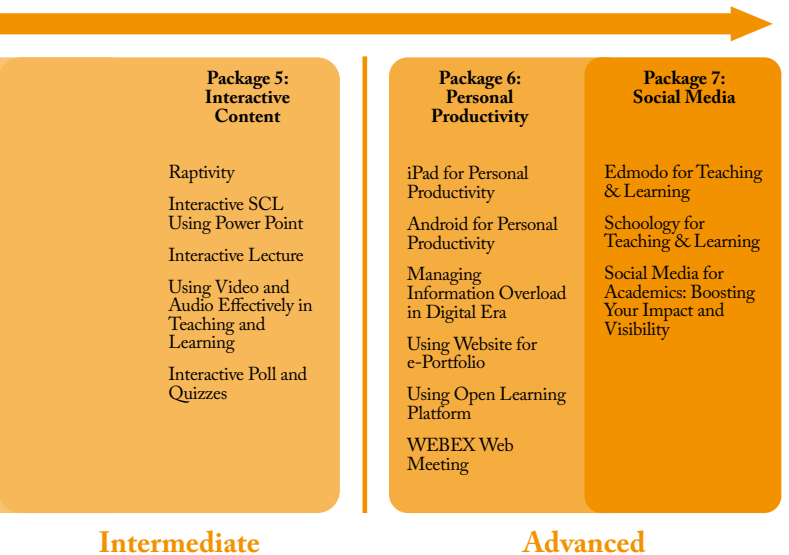
- planning and creating OpenCourseWare, especially within sustainability-related programmes;
- coordinating and encouraging lifelong programmes offered by responsible centres, providing academic counselling services to weak, average and excellent students and continuously evaluating their effectiveness;
- planning, coordinating and implementing courses/workshops/training for character development, motivation, self-esteem and leadership qualities in students and evaluating the effectiveness of these programmes; and
- becoming a one-stop centre of reference for teaching staff and students for learning and teaching. The experts in the CDAE also provide consultation services on various aspects of learning and teaching.



Source: https://cdae.usm.my/index.php/en/2015-06-05-08-51-11/academic-excellence/e-Learni

The CDAE is responsible for the on-going professional development of the teaching staff at USM. With the support of the Centre for Knowledge, Communication, & Technology (Pusat Pengetahuan, Komunikasi dan Teknologi) via eLearn@ USM, the centre runs many on-going workshops throughout the year for the benefit of teaching staff. These workshops are specifically designed to equip USM stakeholders with relevant and useful knowledge to be competitive in an international setting. The content of these workshops is frequently reviewed and improved to suit the stakeholders' various needs for self-development and improvement. The CDAE developed an e-learning training map, as shown in Figure 5.

Figure 5: E-learning training



ing-training

The CDAE is also dedicated to offering workshops on the implementation of SCL for USM teaching staff, whom it aims to equip with adequate skills and knowledge to practice SCL in their classrooms.

The CDAE runs workshops throughout the year, packaged as beginner, intermediate and advanced courses, to guide teaching staff to move from the ground level to where the university vision wants them to be. Apart from SCL training, the CDAE focuses on pedagogy and andragogy, student engagement, curriculum and instructional design, instructional strategies and assessment. The CDAE runs SCL courses in February, August and October each year, focusing on learning theories and Bloom's taxonomy. It also runs workshops on teaching strategies and the scholarship of teaching and learning in February, May, June, September and November each year. Workshops that introduce audiences to SCL approaches are conducted almost once every quarter during the year. Various other workshops focusing on integrating technology in learning and teaching, problem-based learning and outcome-based education are held in repeated sessions each year. The centre also focuses on training teaching staff to ensure student engagement in learning and teaching. Workshops on effective ways to conduct discussions, the power of storytelling and how to motivate students in addition to classroom management are held throughout the year. Teaching staff also give training sessions on curriculum and instructional design in addition to instructional strategies such as game-, project- and brain-based learning and essential questions to promote critical thinking. Other workshops focus on making teaching staff understand the importance of assessment. Workshops on the continual quality improvement of student learning, assessing the affective and psychomotor domains for student learning and developing good multiple choice questions are also held a few times a year. All of these workshops are packaged to support beginner,

intermediate and advanced users. Please refer to the Yearly Workshops Chart prepared by the CDAE in Appendix 1 for further reference.

Along with the various workshops, the CDAE holds a one-day teaching and learning seminar every year for participants to gain updated, relevant knowledge and approaches in the field. Experts are invited to share their knowledge and expertise with the USM teaching staff. Hence, the CDAE has become an important component in the advancement of learning and teaching activities at USM.

6. Issues and challenges of blended learning at USM

Like other institutions, USM has faced various issues and challenges in implementing blended learning.

6.1 Monitoring learning progress

One of the challenges of blended learning implementation is the difficulty involved in tracking and monitoring a learner's pace and progress. This seems to be a result of a lack of functionality on eLearn@USM. There is no pre-assessment before live or self-paced learning takes place. Although students can upload their completed assignments and teaching staff can give them grades or post-assessments, the system is missing any meaningful ways for teaching staff to gauge a learner's progress during the course. Thus, it is difficult to measure the effectiveness of the blended learning approach and the resultant knowledge transfer.

6.2 Changing mind-sets

Overcoming the prejudicial view that blended learning is not as effective as conventional classroom training is the key to achieving sustainable engagement from teaching staff and students. Traditional classroom learning is appealing to most teaching staff because they understand their roles and what is required of their behaviour and efforts to conduct or achieve a successful learning experience. Blended learning intervention has changed such expectations, as it has taken away the comfort zone and presented many unknowns. As a result, a huge amount of effort is required to make things happen that give students the best learning experience.

Management must develop the enthusiasm necessary to overcome the gaps in the organisational understanding that blended learning is a comprehensive approach that must be institutionalised beyond an 'individual' programme.

6.3 Staying in contact virtually

There is a dire need for teaching staff to be able to assess student performance in real time and provide frequent and timely feedback. Assessment results can be used to progressively monitor and track student performance and ascertain that all requirements are being met. Teaching staff should stay in contact with students to ensure that expectations are well understood. A visual course map with suggested schedules for self-paced learning can help students get more organised.

6.4 Preventing rote learning

One big challenge is to prevent rote learning. The on-line instructional environment presents the risk that students are helped only to recall basic facts and procedural skills and not excel or develop a skillset that requires higher-order thinking. Mohd Razali and Yahya (2010) highlighted that on-line

learning in the blended system lacked the social interaction and motivation required to complete the self-studying process and that it was harder to groom soft skills like communication and leadership via on-line learning. Hameed et al. (2008) also highlighted that on-line learning at the student's own pace did not offer the same opportunities to seek clarification as in face-to-face interactions. Teaching staff should therefore be willing to make some paradigm shifts by adding time to focus on key activities that promote critical thinking and idea articulation through scheduled interactive sessions, both through classroom activity and on-line. USM is continuously taking measures to solve the preceding challenges.

6.5 Being part of the community of learners

Tinto (1975) noted that insufficient interactions between students, peers and faculty and differences between the prevailing value patterns of other students were likely to result in dropouts. In other words, students who feel they do not fit in and have a low sense of community tend to feel isolated and are at risk of dropping out. As McGregor (2005) suggested, an e-community can only do so much; an interactive community such as a class gathering or a group meeting is required. USM organises various events on its grounds to overcome possible feelings of isolation in students.

7. Future directions of blended learning at USM

Nasruddin et al. (2011) stated that in 2005, research at USM contributed to a comprehensive foresight of future alternatives in Malaysian higher education towards 2025. Given the intense use of mobile and smart devices, this is creating rich and new avenues for blended learning. Therefore, USM is on the path of

creating greater room for instructional growth and distribution, wireless evolution, digital portfolios, peer-to-peer collaboration tools and even augmented reality technology that broadens connectivity and the 'accessible anytime, anywhere' feature of the blended model.

The CDAE is moulding the role of teaching staff, who must continue to shift their practices towards these rich on-line learning environments. There is a crucial need for teaching staff to master the instructional skills necessary to educate in multiple learning and teaching environments, which will become more exploratory or self-paced in the future.

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Appendix I

Yearly Staff Training Chart prepared by the Centre for Development of Academic Excellence (CDAE) (source: www.usm.my).

Pkg.	Code	Title	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1. Pedagogy and Andragogy												
	SCL01	Learning Theories and Bloom's Taxonomy	12						6		19	
	SCL02	Teaching Strategies	24					27				26
	SCL03	Scholarship of Teaching and Learning				18				1		19
2. Student Centred Learning												
	SCL04	Introduction to the Approaches of Student-centred Learning		5			1			7		
	SCL05	Integrating Technology with Student-centred Learning		10			4			3		
	SCL06	Outcome Based Education	25			12					20	
	SCL07	Problem Based Learning I		11			15			2		
	SCL08	Problem Based Learning II*			2		2				6	
3. Student Engagement												
	SCL09	Effective Ways To Conduct Discussion*	26						13			24
	SCL10	The Power Of Storytelling*							10		1	
	SCL11	How To Motivate Your Students*		3			8		18			
	SCL12	Classroom Management*					16			28		18
4. Curriculum & Instructional Design												
	SCL13	Curriculum Design			8			23				17
	SCL14	Instructional Design I		24		19						

Pkg.	Code	Title	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	SCL15	Instructional Design II			9			28			5	
5. Instructional Strategies												
	SCL16	Differentiated Instruction		26		28				8		
	SCL17	Game-based Learning			14						22	
	SCL18	Project-based Learning		12					20			16
	SCL19	Brain-based Learning*			16				4		27	
	SCL20	Essential Questions to Promote Critical Thinking			21					30		4
	SCL21	Teaching Portfolio*		31			9			9		
6. Assessment												
	SCL22	Continual Quality Improvement of Student Learning*				25			2			25
	SCL23	Assessing Affective Domain For Student Learning*		17			10			29		
	SCL24	Assessing Psychomotor Domain For Student Learning*			22				3		28	
	SCL25	Developing Good Multiple Choice Questions*		26			25		29			
	SCL26	Creating Effective Essay Questions			23		11			28		
	SCL27	Item Analysis of Multiple Choice Questions			28			30				3

Package 1: Beginner

Package 2: Intermediate

Package 3: Advanced

Ranjit Singh, Termit Kaur

A member of the International Society for Technology in Education (ISTE) and a Lead Trainer for UNESCO ICT in Education Resource Distribution Centre, Universiti Sains Malaysia, Dr. Termit Kaur Ranjit Singh is a Senior Lecturer in the School of Educational Studies, Universiti Sains Malaysia, with areas of interest in ICT in Education, Instructional Technology, Peer Coaching and Training, and Human Performance. Termit has expert connections with UNESCO Bangkok and SMART Technology Education. Apart from that, she has also been actively involved in consultancy on Staff Training with some local organisations in Malaysia, the Ministry of Education Republic of Maldives and also private Institutions of Learning in Maldives. Termit has more than 20 years of teaching experience in not only Malaysia but also Australia, China and the Republic of Maldives, and has conducted workshops on ICT integration in Teaching and Learning, both locally and internationally.

5. A Case Study of How the Technological Infrastructure of Chiang Mai University Supports Blended Learning Practices

Laohajaratsang, Thanomporn
Information Technology Service Centre, Chiang Mai University, Thailand

Abstract

Chiang Mai University (CMU) officially began implementing blended learning practices in 2000. Its teaching staff currently offer 1,300 courses that combine e-learning with face-to-face instruction. CMU's success in blended learning development derives from the university's continuous policy of promoting the use of information and communications technology (ICT) in learning and teaching. Moreover, the popularity of mobile technology and social media helps to encourage more faculties and students to integrate ICT into their learning and teaching practices. This chapter introduces a case study to explore how CMU continually develops blended learning practices and how the technological infrastructure of CMU effectively supports blended learning. A brief introduction to CMU is presented, followed by the current status of its blended learning practices and the evolution of their development. Three aspects of technological and human resource development, including digital infrastructure, digital learning and digital teaching staff and students under the CMU's 'Digital University' strategy, are described in detail, and the university's new model of investment in wireless network provision is highlighted. Finally, the chapter ends with the lessons learned, focusing on the key success factors behind the use of blended learning practices in higher education institutions.

1. Introduction

Established in 1964 as the first provincial university in the Kingdom of Thailand, Chiang Mai University (CMU) is a comprehensive higher learning institution that provides a broad range of academic programmes to more than 40,000 students and 2,000 faculties. CMU is recognised as one of the top three ranking higher education institutions in Thailand in terms of academic quality. According to the QS Asian Universities Ranking, CMU is currently ranked 91st among Asian and 501st among world universities.

> *"One of Chiang Mai University's strategies is to support the use of ICT in learning and teaching management."*
>
> *Associate Professor Niwes Nantachit, M.D., CMU President*

The Thai Ministry of Education's ICT in Education Master Plan (2007-2011) is considered the first plan to focus on information and communications technology (ICT) development in Thailand. It offered a vision for expanding away from computer distribution, networks and ICT infrastructure in schools and the acquisition of digital content towards the integration of ICT into learning and teaching together, with ICT used as a part of blended learning (Laohajaratsang, 2010). In response to this vision, CMU's ICT Master Plan (2012-2016) set out a clear policy for the use of ICT in learning and teaching and identified the following five main strategies.

- Promote the development of digital learning media for students' self-lerning.
- Provide digital learning resources and equipment for ICT-integrated teaching, learning and research.
- Support databases and information systems to enhance the competitiveness of the university in teaching, learning, research and administration.

- Facilitate accessibility to information, communication and academic service to allow access anywhere, anytime and on any device.
- Promote the use and development of websites and social media in learning.

As a result, CMU has a clear e-learning policy for blended learning practices. It regulates the integration of ICT in learning and teaching as a means of ensuring academic excellence in every discipline. Blended learning practices that include e-learning course development and management are efficiently supported in many ways. Faculties are encouraged to use a blended learning approach in their teaching practices. ICT has played a significant role in supporting student-led curriculum improvements, student-centred teaching approaches and the learning of twenty-first century skills at CMU.

The purpose of this case study is to introduce and explain how CMU continually develops blended learning practices and how this blended learning is successfully supported by the university's technological infrastructure. First, the current status of CMU's blended learning practices is presented, followed by a brief overview of the evolution of blended learning development at the university. All three aspects of technological and human resource development, including digital infrastructure, digital learning and digital teaching staff and students under CMU's 'Digital University' strategy, are then explained. Next, the university's new out-of-the-box model of investment into wireless network provision, which involves a key partnership with TOT Public Company Ltd., is described in detail. Finally, the chapter ends with a review of the lessons learned, focusing on the key success factors behind the blended learning practices in higher educational institutions.

2. Blended learning and Chiang Mai Univeristy: from past to present

2.1 Blended learning at CMU

According to the definition provided by the Association for Talent Development (formerly known as the American Society for Training and Development), blended learning refers to the learning approach that teaching staff adopt to make the best use of the features unique to each delivery environment and thereby optimise learning (ASTD, 2011). Blended learning practices usually involve combining Internet resources, digital learning content and/or e-learning courses with face-to-face instruction. CMU officially started a blended learning (e-learning) project 15 years ago, primarily to cope with the problem of having an insufficient number of English teaching staff teaching the *Fundamental English* course offered to all first-year students majoring in Medical Science and science-and-technology-related fields. The university wanted to provide its students with an alternative and highly flexible approach to English learning. The first official blended learning course at CMU was designed to complement classroom instruction. Students who took this *Fundamental English* course were requested to self-learn one third of the course content on-line via the university's e-learning system. The research conducted following the first blended learning course showed that blended learning facilitated students' learning performance and improved the quality of instruction. After a year of promoting e-learning, many teaching staff were interested in offering additional blended learning courses. Today at CMU, 1,392 courses (representing 20% of the courses offered at the university) offered by 906 teaching staff are blended type courses (see Figures 1-2).

2.2 Evolution of blended learning development

The evolution of blended learning development at CMU can be divided into four developmental phases based on the major advancement of e-learning development achieved in each phase (see Figure 3).

First Phase (2002-2004): CMU started a blended learning project while developing high quality e-learning courseware for the Fundamental English class. Five general education courses were subsequently developed. Students were able to access all of the courseware from the central Learning Management System (LMS) for the first time. During this phase, CMU began to adapt its first LMS using the WebCT program. At first, 40 pilot teaching staff used WebCT to create course content and manage e-learning courses. By the end of 2004, 151 e-Learning courses served 3,318 students via the university LMS.

Second Phase (2005-2008): the LMS was migrated from the commercial WebCT to an in-house-developed LMS known as Knowledge Creator (KC). This new system managed 213 on-line courses serving 6,616 students. The number of e-learning courses continually increased, reaching a total of 617 courses delivered to 25,752 students in 2008. In the area of courseware development, Stream Author and EXE were brought in for teaching staff to create learning media for on-line learning and teaching through the LMS. Blended learning practices developed rapidly during this phase, as evidenced by the rapid increase in the number of e-learning courses. Many CMU teaching staff were also trained to use blended learning practices for effective teaching.

Third Phase (2009-2011): the LMS development technology was again migrated towards open-source learning platforms. Moodle was deployed and the university LMS was officially named CMU Online: KC-Moodle. This new system managed

793 on-line courses serving 38,060 students. In 2011, the number of on-line courses grew to 1,046 courses serving 40,000 students. Other than Flash-based types, the courseware for blended learning practices was developed in the form of video streaming. In addition, ITSC New Media Studio was launched to facilitate the teaching staff's need for new media production. ITSC New Media Studio produced various learning media from basic streaming media to high definition. The number of streaming media on-line courses increased by seven times, bringing the total number of streaming media on-line courses to seventeen in 2011.

Fourth Phase (2012-Present): this stage of LMS development has focused on infrastructure development to support blended learning, including server improvements from traditional physical servers to cloud servers that better meet the needs of students and teaching staff. With the growth of e-learning courses, the number of users and the migration to Moodle version 2.5, the cloud servers offered more storage space, better memory capacity and better accessibility for both students and teaching staff. Access available from anywhere and at any time made the system more stable and efficient for on-line learning. At present, users and usage of the LMS are progressively increasing.

The number of on-line courses has reached 1,392 courses delivered to more than 45,000 students. In response to the growing popularity of mobile devices, Moodle 2.5 has already been upgraded to support mobile learning. CMU students can now access their on-line courses via mobile devices. In addition, the use of social media and Web 2.0 in learning and teaching has become a hit. Hence, professional development programmes are being provided on an annual basis to prepare CMU teaching staff to integrate ICT, social media and Web 2.0 into blended learning practices.

2.1 Blended learning at CMU

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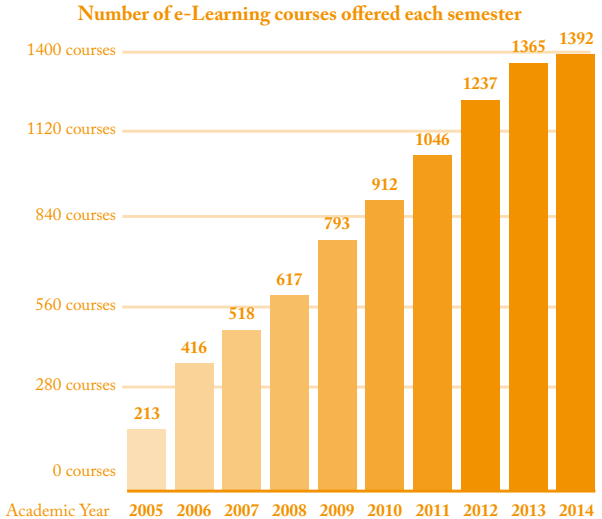
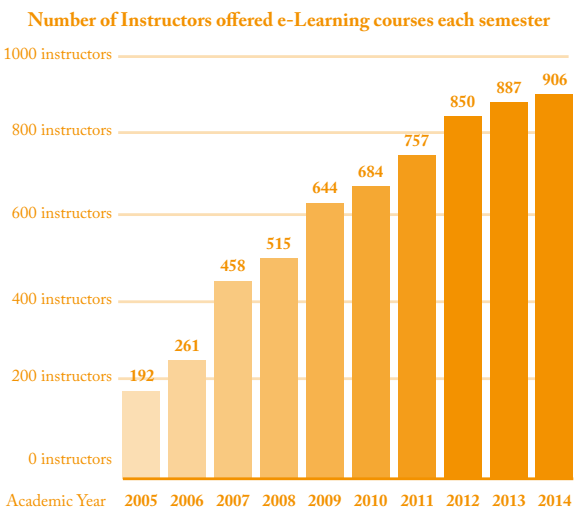
Figure 1: Number of blended learning courses



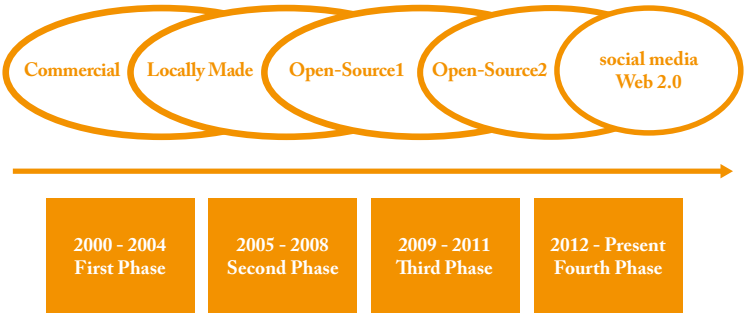
Source: ITSC Annual Report 2015. Chiang Mai University

Figure 2: Number of teaching staff members offering blended learning courses



Source: ITSC Annual Report 2015. Chiang Mai University

Figure 3: Developmental phases of blended learning at CMU



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First Phase (2002-2004): CMU started a blended learning project while developing high quality e-learning courseware for the *Fundamental English* class. Five general education courses were subsequently developed. Students were able to access all of the courseware from the central Learning Management System (LMS) for the first time. During this phase, CMU began to adapt its first LMS using the WebCT program. At first, 40 pilot teaching staff used WebCT to create course content and manage e-learning courses. By the end of 2004, 151 e-Learning courses served 3,318 students via the university LMS.

Second Phase (2005-2008): the LMS was migrated from the commercial WebCT to an in-house-developed LMS known as Knowledge Creator (KC). This new system managed 213 on-line courses serving 6,616 students. The number of e-learning courses continually increased, reaching a total of

617 courses delivered to 25,752 students in 2008. In the area of courseware development, Stream Author and EXE were brought in for teaching staff to create learning media for on-line learning and teaching through the LMS. Blended learning practices developed rapidly during this phase, as evidenced by the rapid increase in the number of e-learning courses. Many CMU teaching staff were also trained to use blended learning practices for effective teaching.

Third Phase (2009-2011): the LMS development technology was again migrated towards open-source learning platforms. Moodle was deployed and the university LMS was officially named *CMU Online: KC-Moodle*. This new system managed 793 on-line courses serving 38,060 students. In 2011, the number of on-line courses grew to 1,046 courses serving 40,000 students. Other than Flash-based types, the courseware for blended learning practices was developed in the form of video streaming. In addition, *ITSC New Media Studio* was launched to facilitate the teaching staff's need for new media production. *ITSC New Media Studio* produced various learning media from basic streaming media to high definition. The number of streaming media on-line courses increased by seven times, bringing the total number of streaming media on-line courses to seventeen in 2011.

Fourth Phase (2012-Present): this stage of LMS development has focused on infrastructure development to support blended learning, including server improvements from traditional physical servers to cloud servers that better meet the needs of students and teaching staff. With the growth of e-learning courses, the number of users and the migration to Moodle version 2.5, the cloud servers offered more storage space, better memory capacity and better accessibility for both students and teaching staff. Access available from anywhere and at any time made the system more stable and efficient for on-line learning.

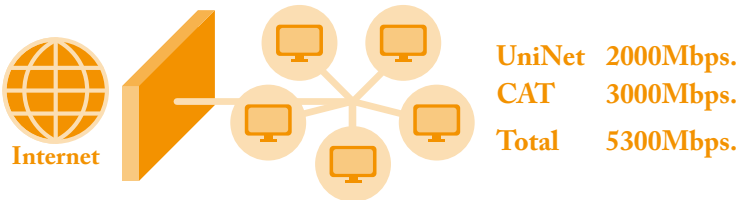
At present, users and usage of the LMS are progressively increasing.

The number of on-line courses has reached 1,392 courses delivered to more than 45,000 students. In response to the growing popularity of mobile devices, Moodle 2.5 has already been upgraded to support mobile learning. CMU students can now access their on-line courses via mobile devices. In addition, the use of social media and Web 2.0 in learning and teaching has become a hit. Hence, professional development programmes are being provided on an annual basis to prepare CMU teaching staff to integrate ICT, social media and Web 2.0 into blended learning practices.

3. Technological-infrastructure-supported blended learning

CMU launched a proactive university strategy known as 'Digital University' in December 2013. This strategy represented a strong commitment from CMU to becoming a leading university in terms of using innovative technologies to leverage students' learning performance according to the *Learning in the 21st Century* framework, improving faculties' teaching and research skills, uplifting the educational personnel's community service abilities and increasing the efficiency of the university's management. In working to achieve this strategic goal, CMU committed to focusing on five aspects of ICT (digital) development, including digital infrastructure, learning, students/faculties, administration and security. However, as this case study aims to determine how the technological infrastructure at CMU is designed to support the use of ICT in effectively developing the quality of learning and teaching practices, only the development of digital infrastructure, learning and faculties/students are explained as follows.

Figure 4: ICT infrastructure architecture at CMU



Source: ITSC Annual Report 2015. Chiang Mai University

3.1 Digital infrastructure

In terms of ICT infrastructure, CMU's Information Technology Service Centre (ITSC) – the unit responsible for all ICT-related services – provides students and teaching staff with a network and information technology infrastructure that effectively supports blended learning practices. These services include CMU network systems (both wired and wireless network systems) along with data centres and servers.

3.1.1. CMU network and wireless network systems

Although CMU is a large university campus in terms of land, all of its units under two major campus areas (Suan Sak and Suan Dok) and two additional affiliated centres (Mae Here and Lamphun province) are linked via its network system and the Internet via fibre optic cables at a speed of 5 GbPS (see Figure 4). Understanding the significance of wireless network technology in today's world, CMU launched the mega wireless project under the 'Digital University' strategy. To serve the needs of more than 50,000 Internet users (students and staff) on university campuses, CMU required at least 2,100 additional access points to respond to user needs. This meant that the university had to invest in wireless network installation, including the acquisition of access points and switches along

with an expansion of the sub-network system, which cost the university approximately 50-60 million baht (USD$1.5-1.7 million). Using the standard model of investment constrained by a yearly university budget for ICT investment, it would have taken the university 10 years to acquire the number of wireless access points required. However, with its new investment model, CMU was able to successfully achieve its goal within two years by finding the right partner.

3.1.2. New co-investment model: finding the right partnership

Before focusing on CMU's partnership with TOT Public Company Ltd. (TOT), some detailed work related to the development of a new investment model is worth mentioning. First, three potential models of investment for this wireless mega-project were identified. These models were proposed to CMU's ICT Management Committee, chaired by the CMU President.

- Model A: CMU makes an investment and allows all of the Internet service providers (ISPs) to pay for the Service Set Identifier (SSID) for connection to the CMU wireless network.
- Model B: all of the interested ISPs share the investment money and allocate areas around the campus to develop their wireless network and install all of the access points. CMU pays for the connection and the SSID to the ISPs.
- Model C: CMU partners with the ISP that offers the best fit with the university's wireless network development plan. The selected ISP must then allow other ISPs to connect to the network. Other ISPs must pay for the connection to the CMU wireless network and SSID.

After considering the benefits and drawbacks of each model, CMU's ICT Management Committee selected Model C

based on a number of factors, including the large amount of investment in Model A and potential technical conflict problems caused by different wireless network systems in Model B. After considering all of the offers from various ISPs, the committee selected TOT as its partner to co-invest in the wireless mega-project. With the investment money from TOT, CMU and TOT set up a wireless network throughout the university's campuses with 2,100 access points (adding to the 600 access points already in place, for a total of 2,700). After the wireless network connection was completed and the access points were installed, CMU was given two SSIDs at no charge, and three major ISPs decided to offer their services on campus by connecting to the university's wireless network. Under this new co-investment model, all 50,000 CMU students and staff can benefit from not only free wireless access services provided by the university, but also those of the ISPs of whom they are customers. Most importantly, all CMU students and staff can enjoy access to digital content/learning and research materials and are able to communicate with others anywhere, anytime and on any device while on CMU campuses.

3.1.3. Data Centre

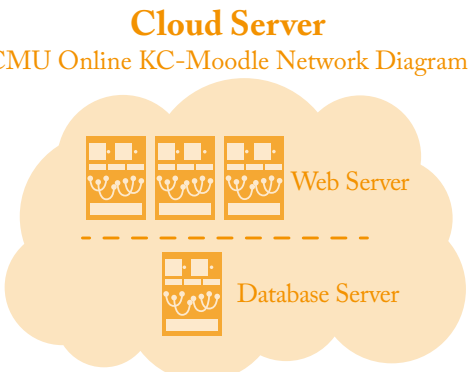
In addition to the wireless network infrastructure, CMU invested in its Data Centre, where all of the university's important data including digital content and learning materials are located. The intention was to ensure that the university's important data and digital learning content would be securely protected and properly backed up. Over the past three years, more than 40 million baht (USD$1 million) has been spent on the development of the CMU Data Centre.

3.1.4 Cloud servers

Cloud-based servers made the LMS resource management even more effective and beneficial for a greater number of students

and faculties. Database and Web servers have been regularly upgraded for faster performance and stability (see Figure 5) – important given the massive number of concurrent users – especially for CMU Online (the central LMS). CMU's private cloud servers use virtualisation technology to facilitate the expansion of services and to administer information technology efficiently via the Data Centre. Three services are provided for all of the campus offices: collocation, virtual private server and Web-hosting services.

Figure 5: Cloud server



Source: ITSC Annual Report 2015. Chiang Mai University

3.2 Digital learning

Having realised their importance, CMU has committed itself to developing and providing digital learning services. These services consist of *CMU Online and digital learning media, video streaming software, ITSC Corners* and *Smart Classrooms.*

3.2.1. CMU Online and digital learning media

CMU offers an efficient blended learning environment. At present, there are 1,392 e-learning courses, including 70 free e-learning courses delivered to 45,000 students courtesy of CMU

Online (or KC-Moodle), the university's central LMS. CMU Online provides powerful tools, including course management, Web content development, evaluation and communication tools. Teaching staff can use CMU Online to create e-learning materials, manage on-line instruction and evaluate learner performance. All of the digital instructional content created via CMU Online are located in the Data Centre (see Figure 6). Digital learning materials at CMU contain several types of media, including text-, graphic- and video-based materials, streaming media and game-based learning materials. All of the digital learning materials are collected and available for download at the CMU portal for digital learning resources (see Figure 7). CMU's recent digital instruction materials include an on-line English programme called 'Blended Learning', which was designed to improve students' English listening, reading and grammar skills. In addition, with the support of the Thailand Cyber University Project, CMU is currently developing three massive open on-line courses (MOOCs) as part of its outreach programmes. Digital instructional content and digital learning media/resources for the three MOOCs are now being designed and developed.

Figure 6: CMU Online and digital learning media

Source: ITSC Annual Report 2015. Chiang Mai University

Figure 7: CMU portal for digital learning resources

Source: ITSC Annual Report 2015. Chiang Mai University

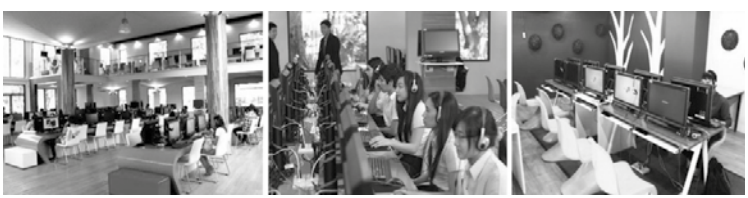
3.2.2. Video streaming software

CMU provides teaching staff with video streaming software known as *Stream Author*. This software allows teaching staff to create low-cost learning media by videotaping their teaching practices. (Teaching staff are also encouraged to record by themselves.) The teaching staff's presentation media, which can take different formats including PowerPoint, Word, PDF, pictures or animation, are simultaneously recorded in a streaming format. In addition, should teaching staff require assistance in developing streaming media, the streaming media production team is always available at the *CMU New Media Studio*. Designed to help teaching staff produce high-definition streaming learning media, the *CMU New Media Studio* is the most well-equipped facility on campus. Students can access video streaming learning materials or teaching staff lectures via CMU Online (KC-Moodle).

3.2.3. ITSC Corners

ITSC Corners is the name given to the 47 IT centres located throughout the CMU campus, including locations at the central library, student campus dormitories and student organisation office and across all 21 CMU faculties. More than 1,090 high-end personal computers are provided with high-speed Internet connections, allowing students to enjoy on-line activities or complete their academic work. In addition, one outstanding feature of ITSC Corners is their unique modern design. Students can visit and use the available PCs or bring their own personal devices, find a corner they like and work with their friends (see Figure 8).

Figure 8: ITSC corners: modern IT centres around the CMU campus



Source: ITSC Annual Report 2015. Chiang Mai University

Figure 9: Smart classrooms at CMU

Source: ITSC Annual Report 2015. Chiang Mai University

3.2.4. Smart classrooms

In terms of innovative learning approaches, CMU provides facilities to support faculties in managing ICT-integrated instruction and blended learning practices. *Smart Classroom* is a type of 'future classroom' that integrates the use of all types of learning devices (e.g., tablets, laptops, smart phones, PCs, clickers, cameras, AV tools) and other system software (see Figure 9). Teaching staff can assign ICT-integrated activities to students, who can interact, communicate and perform the activities using any learning devices available in the *Smart Classroom*. In addition, teaching staff can easily self-record their instructions by clicking a smart box once in any Smart Classroom, and students can review the instruction anywhere and at any time. Moreover, teaching staff can easily use recorded video material as an important component in their flipped classroom implementation. Therefore, the availability of the recording function, its ease of use and the availability of technical assistance mean that the *Smart Classroom* easily and efficiently supports teaching staff in the implementation of blended learning practices. Teacher-created resources are an invaluable part of the Smart Classroom, especially in situations where Thai language resource materials are not readily available.

3.3 Digital faculties/students

Technological development for blended learning cannot be fully exploited unless teaching staff and students are willing to transform their learning and teaching practices. Realising this, CMU has prepared both faculty members and students for new methods of learning in the twenty-first century. CMU developed the Professional Development Curriculum (PDC) for CMU teaching staff to create awareness and understanding and equip them with the skills required to design learning approaches for the twenty-first century environment. The PDC

includes several training and workshop curricula that include blended learning, ICT-integrated learning and digital literacy approaches.

Meanwhile, CMU recently partnered up with ICDL Thailand, which provides a leading international standard certification for end-user computing skills and serves as the body for delivery of the International Computer Driving License Programme. As a result, CMU students can be trained by certified teaching staff to improve their digital literacy skills. The programme can and will help CMU students prepare for future work in the professional world.

4. Lessons learned

As stated earlier, it has been more than a decade since CMU's teaching staff officially started adapting blended learning approaches into their teaching practices. What has the university learned during these 15 years?

First, the technological readiness of the organisation is a crucial factor in promoting blended learning practices. Without technological readiness, it would be impossible for faculties and students to enjoy their blended learning, as they would have to spend their instructional time solving technical problems. Evidenced by an increasing number of blended learning courses, the technological infrastructure at CMU supports blended learning practices effectively. CMU has a policy of continuously and consistently promoting blended learning. In addition, the university has clearly assigned the ITSC, the unit responsible for all ICT-related services, the tasks of providing faculties and students with services that promote blended learning and addressing any technical difficulties they encounter. Of course, the CMU President's launch of the 'Digital University' strategy in 2013 undoubtedly signalled the university's commitment

to providing technological readiness for the purposes of both academic quality improvement and university management.

Second, the resistance of teaching staff to transforming their teaching practices remains the major obstacle for promoting this innovative way of teaching. However, strong leadership from the university's leaders along with their commitment to managing the change in CMU teaching staff's teaching practices have been the keys to CMU's success in this area. As mentioned before, the university issued a policy in its ICT Master Plan (2012-2016) that clearly promoted the use of ICT in learning and teaching and blended learning practices, including the development of digital learning media and learning resources, the provision of ICT facilities for learning, the support of databases and information systems, the facilitation of information access through ICT and the promotion of website development and social media in learning.

Third, a lack of digital learning material/resources in the local language (Thai) hinders the adoption of blended learning practices. Most of the high quality learning media and resources available are in the English language. Teaching staff with limited English proficiency find it difficult to translate content and are consequently unwilling to use digital media. Therefore, teaching staff at CMU have been encouraged to produce their own on-line learning materials using the 'Web Content Development' tool on CMU Online or video streaming software. By giving teaching staff the tools to develop low-cost but high quality materials, more teaching staff have felt confident enough to embrace blended learning approaches. In addition, technical assistance is always available when they have problems. Based on the increasing number of e-learning courses available via CMU Online, CMU has adopted an effective approach to addressing this challenge.

Fourth, in terms of managing the wireless mega-network project, ICT investment for an institution such as CMU requires a creative management model. In this case study, CMU needed to invest in wireless network technology, which could have cost the university around USD$1.5-1.7 million. With the university's routine investment plan, it would have taken around 10 years for the university to accomplish the goal. Hence, CMU came up with a new investment model that involved finding the right partner, which allowed it to achieve the goal within just two years.

Finally, a systemic approach to blended learning practices must be formulated to successfully promote blended learning practices in higher education institutions. This approach must include all of the key factors that account for the success of blended learning practices. The key success factors include a) a clear vision, strategy and policy on behalf of university leaders in relation to technological and digital content development at the university; b) strategic planning and action plans that support blended learning practices by the assigned university committee; c) clear roles and responsibilities for the units providing infrastructure and promoting blended learning (e.g., the ITSC); d) quality professional development curricula/ programmes from qualified personnel that implement blended learning; and e) collected best practices for blended learning approaches made available for all teaching staff.

5. Summary

As shown in Figure 1, an increasing number of courses at CMU are demonstrating the successful adoption of blended learning approaches. Under CMU's 'Digital University' strategy, the technological development is divided into three major aspects: digital infrastructure, learning and faculties/

students. Digital infrastructure involves the development of wireless networks, the Data Centre and cloud servers. It highlights the university's new model of wireless network investment, which involves co-investment between CMU and partner companies. Digital learning consists of CMU Online and digital learning media, video streaming software, ITSC Corners and Smart Classrooms. Digital faculties and students include the professional development programmes in place for CMU teaching staff and the international standard computing training and certification programmes in place for CMU students.

In preparation for the next step, CMU is currently developing the next phase of the Digital University Strategic Plan (2017-2020). Major projects that support digital infrastructure including the development of wireless network systems, the Data Centre and cloud servers remain the clear focus under the plan. In terms of digital learning, CMU's goal is to promote social media and Web 2.0 as new powerful tools for blended learning by continuously enhancing their integration into the blended learning system. In addition, mobile educational applications are being developed to facilitate the learning of CMU students and especially their English language skills. A 'social learning' approach that focuses on the ways in which CMU teaching staff can effectively connect with their students and enjoy their communication and learning through this innovative learning tool will be introduced, and research will be carried out to measure its effectiveness. Lastly, when it comes to digital faculties and students, CMU teaching staff will be provided with additional regularly updated professional development programmes, and students will have access to an array of quality international standard training programmes under continuous development.

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6. Leading and Supporting Blended Learning: A Case Study of the Centre for Excellence For Learning and Teaching at Nanyang Technological University

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Abstract

The blended learning concept implemented by the Centre for Excellence for Learning and Teaching at Nanyang Technological University was designed to be a composite of seamlessly integrated initiatives. It created a sustainable on-line learning environment based on the Blackboard Learning Management System, which currently functions as the gateway to campus-wide e-learning. Here, students are able to access course content and stay in touch with their classmates and teaching staff. Learning takes place anytime, anywhere and on any device using various social platforms, such as the Learning Activities Management System, that allow for quality social-constructivist interactions and learning. High quality recordings of lectures are available for students to download, learn, relearn and review soon after the end of a class. Well-designed server and network infrastructure ensure a good on-line learning experience that benefits student learning and teaching staff use. Face-to-face teaching is done in tutorial rooms designed to bring students together to facilitate social interactions and small group learning. Students are given response devices known as clickers to enable peer-to-peer learning and interactive engagement with teaching staff during lectures or tutorials. edUtorium offers a comprehensive developmental programme to ensure the teaching competencies of teaching staff and the appropriate and effective use (what, when and how) of technology-enabled learning services and facilities.

1. Introduction

The success of a campus-wide initiative for the effective use of technology to support blended learning and teaching depends on the following factors:

- support from senior university management;
- strong, focused and knowledgeable leadership with an effective organisational structure;
- well-thought-out design and robust processes to manage the diffusion, adoption and support of new learning and teaching paradigms; and
- a robust infrastructure that offers services on which both teaching staff and students can depend.

Many higher education institutions have established centralised units whose role is to provide direction, leadership and support for such initiatives. At Nanyang Technological University (NTU) in Singapore, the Centre for Excellence in Learning and Teaching (CELT) led the initiative.

Nanyang Technological Institute was established in 1981. In 1991, it was re-established as NTU. Today, it caters to 23,700 undergraduates and nearly 9,000 postgraduate students (NTU, 2015), and employs nearly 1,700 teaching staff. In the QS Universities Ranking (2015), it achieved its standing as 'the fastest-rising university in the world's Top 50', ranked 39th in the world and 1st among young elite universities. NTU offers engineering, science, business, humanities, arts and social sciences programmes and more recently a medical school.

This paper discusses the outcomes of the various blended learning initiatives introduced at NTU from 2000 to 2013 and the role of organisational support in scaling and ensuring high and useful implementation and successful learning outcomes.

2. Blended learning and a rethinking of organisational structure, culture and processes

Blended learning involves students engaging in a complementary hybrid of traditional face-to-face learning in lecture theatres or classrooms and a web-based experience in which in- and/or after-class activities take place.

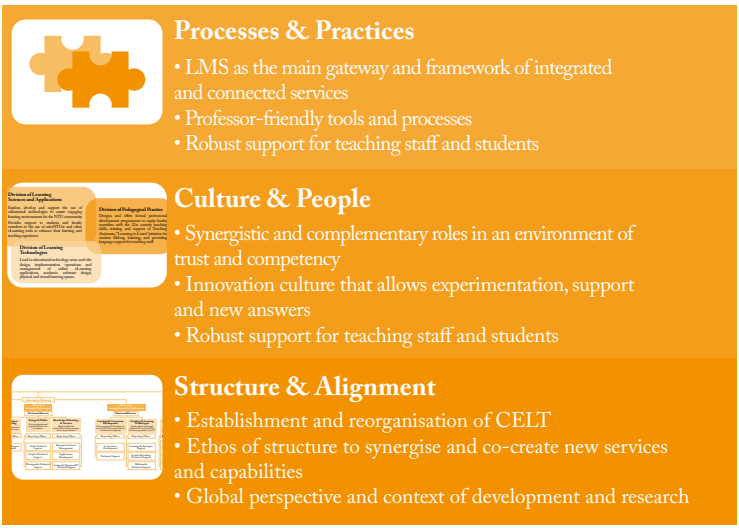
Technology provides the 'connectedness' and glue required to produce the sense of 'togetherness' that enriches student learning. Using technology, teachers can include on-line forums, formative assessments, collaborative learning, post-lecture reviews and other features in their blended lessons.

Such a change requires extending the learning environment. Teaching staff and students must shift their practices as they move from traditional *formal* learning spaces (lectures and tutorials) to *informal* (libraries, cafeteria, places where students gather or hang out) and *virtual* (on-line) spaces.

One key challenge is to create a true blended learning environment that teaching staff and students perceive not as an assembly of discrete lessons, activities, e-tools and e-resources, but as a seamless integrated learning experience involving technology acceptance, adoption and usage.

To create such a reality, integration must start from the ground level at the design stage. NTU began looking at organisational structure, culture and processes as shown in Figure 1.

Figure 1: Holistic approach for supporting blended learning and teaching at NTU

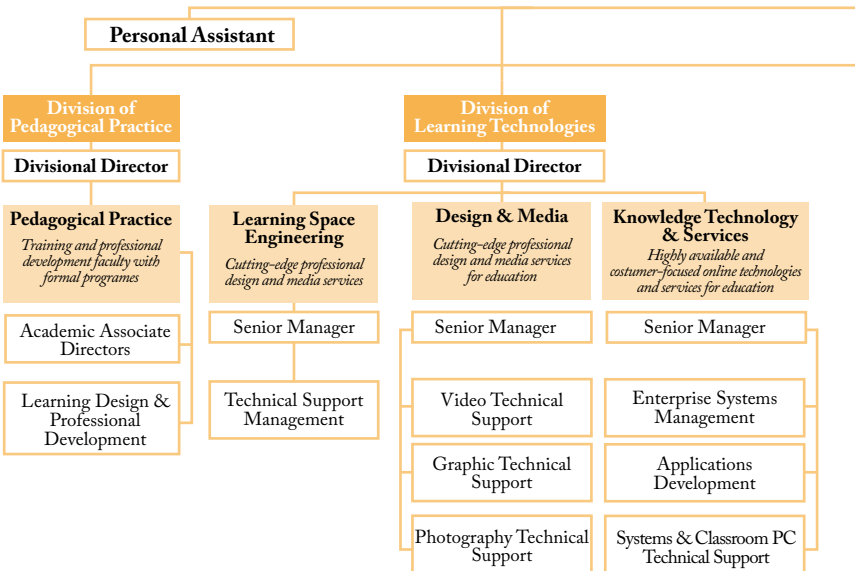


Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

3. The blended learning transformation hub: the Centre for Excellence for Learning and Teaching

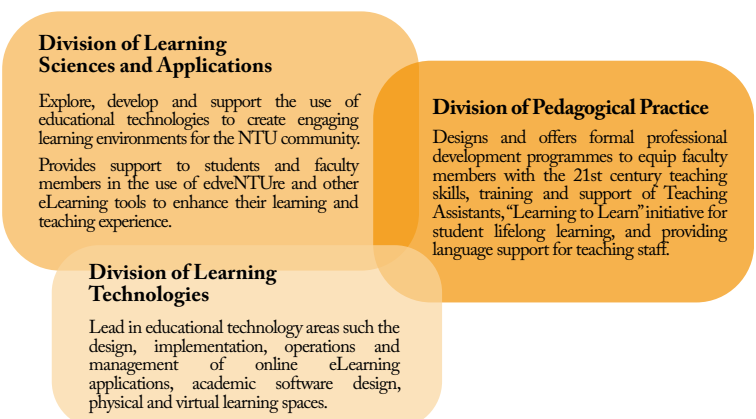
CELT was established to lead the campus-wide digital transformation of learning and teaching for NTU. It garners global perspectives and practices along with technological progress and embarks on various initiatives to design a meaningful student experience as undergraduates pursue higher education before joining the workforce. It ensures that its services and learning environment design are diligently considered and implemented. It seeks out and develops teaching staff to support an innovative culture that allows experimentation, brainstorming and the development of new and diverse ideas. The achievement of these goals required a change in the organisational structure rather than simply additional resources, and thus CELT was established through the restructuring of the Centre for Educational Development (CED) in 2010 (Figures 2 and 3).]

Figure 2: Organisational chart for CELT (2013)



Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

Figure 3: Venn structure of CELT



Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

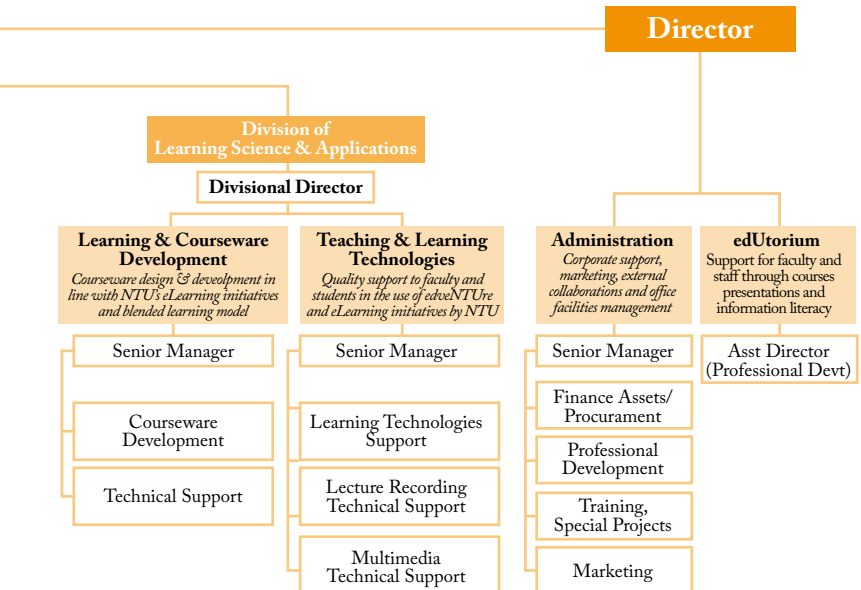
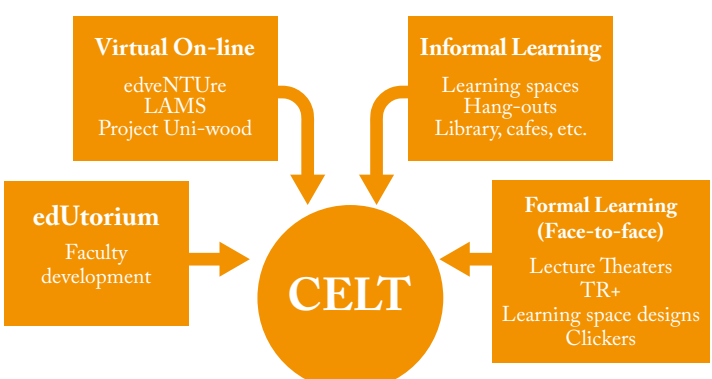


Figure 4: Blended learning subsystems supported by CELT



Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

An agile organisational structure provides the right 'form' (or structure) coupled with the right culture of innovation, akin to principles such as having the 'right people in the bus' (Collins, 2001), 'failing forward', 'fail fast; fail early' (McGrath, 2011), 'fire bullets, then cannon balls' (Collins & Hansen, 2011), resilience (20 Miles March (Collins, 2011)), learning by 'making new mistakes' (Esther Dyson) and building on such lessons. Adopting the strategy of being a 'second mover and fast follower' allowed CELT as an organisational unit of 50 individuals to grow together and support one another in an environment of trust, safety and support and produce new global benchmarks and academic-operational outcomes.

CELT deliberately and diligently designed various blended learning subsystems to provide a seamlessly integrated environment and enhance the student learning experience.

4. Blended learning initiatives led and supported by CELT

Although the blended learning initiatives led and supported by CELT are major projects in their own right, their overall purpose and intention is to create a holistic learning culture as integrated components of the social educational environment. Each initiative is deliberately and diligent evaluated for fit, alignment, integration, purpose and outcomes. Students must be the main benefactors and comprise the acid test of any claims for creating a learner-centric experience during their tenure on campus.

With these concepts in mind, the following four major e-learning initiatives were adopted.

- Online social learning: edveNTUre and the Learning Activities Management System (LAMS).

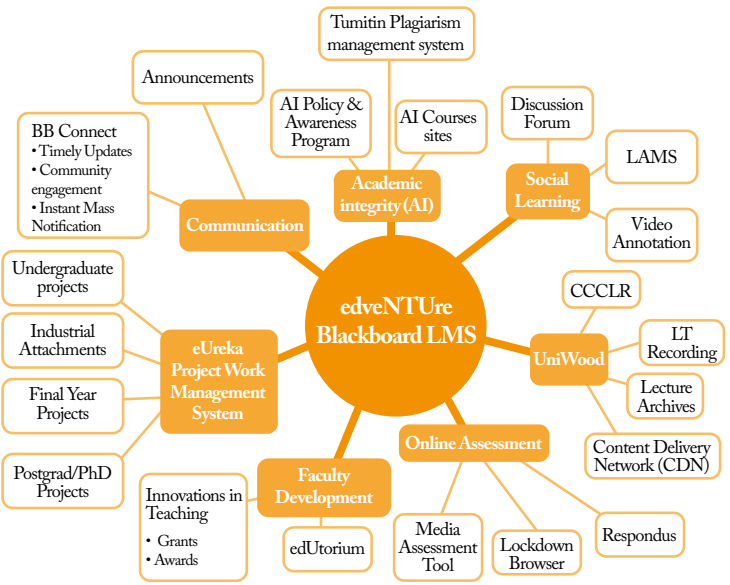
- Face-to-face social learning: campus-wide use of clickers.
- Content: *Project UniWood* campus-wide lecture recording project.
- Learning spaces: to facilitate face-to-face group peer collaboration.

4.1. edveNTUre and the Learning Activities Management System (LAMS)

Web-based learning was previously inducted into NTU as an IT initiative based on the *TopClass* platform in 1998. In 2000, it was transformed into an educational initiative when CED took the lead and responsibility for adopting technology to support learning and teaching. This systemic shift was significant, as it highlighted the focus, approach and support structure needed to ensure education centricity rather than IT centricity. It also marked the beginning of e-learning for NTU.

edveNTUre – the name given to the NTU learning eco-system (2000-2013) – was conceptually designed with the Blackboard Learning Management System (LMS) as the core platform. Blackboard was selected due to its 'professor-friendly' interface design. Students and teaching staff access it as a gateway to all of their web-based learning and teaching needs. All of the other services are integrated and connected seamlessly via gateway hyperlinks and single sign-on (SSO) services to the LMS. This provides a future pathway for edveNTUre to evolve and be enhanced while maintaining a consistent and familiar front door.

Figure 5: edveNTUre eco-system



Source: http://edveNTUre.ntu.edu.sg

Apart from *edveNTUre*, LAMS was set up as a powerful platform for on-line socio-constructivist learning. Introducing LAMS was beneficial in that it inducted learning design concepts for teaching staff as they reflected on their teaching practices. Such reflections usually result in clarity of purpose and an outcomes-based process of teaching on-line. Various tools to support learning and interactivity are available. The teaching staff see components, contexts and options as they consider each learning pathway.

The Q&A tool in LAMS is a very useful yet basic tool that supports social learning, and helps teaching staff to track students' progress and participation. On viewing their classmates' responses, students may also learn the same concept

multiple times, presented in different student voices. Peer assessment can also be performed by rating fellow classmates' contributions (from 1 to 5 stars). This supports implicit critical thinking and develops students' critical evaluation skills.

There has been *sustained* annual growth in student use of edveNTUre and the LAMS since their launch in 2000. The *weekly* page views have increased a hundredfold, from 250,000 in the first year to 22.8 million in 2013 (Figure 6).

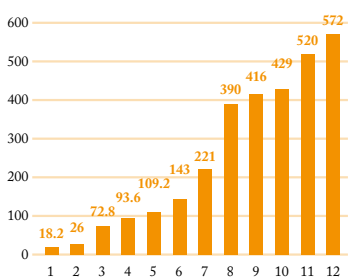
Although it can be argued that page views (or transaction hits) alone are not indicators of engagement, such a high level (about 800 page views per student per week on average) indicates the '*stickiness*' of students returning to use Blackboard for their learning.

Figure 6: Usage of edveNTUre and the LAMS at NTU

edveNTUre eLearning System Usage

No. of Page Views (or mouse clicks)

Date	Number of page view per week
July 2000	250,000
July 2001	500,000
July 2002	1 million
July 2003	2.1 million
July 2004	2.5 million
July 2005	3 million
July 2006	3.5 million
July 2007	6 million
July 2008	9 million
July 2009	9.35 million
July 2010	10.1 million
Aug 2011	12 million
Aug 2012	18 million
Mar 2013	22.8 million



2.5 billion cumulative page view hits since July 2000

Estumated 0.5B page views per year

Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

4.2. edUtorium Teaching Staff Development Programme

Although teaching staff development is not blended learning *per se*, it is nevertheless a key element in its successful implementation and associated outcomes. Johnson et al. (2012) observed that *'digital media literacy continues in its rise in importance as a key skill in every discipline and profession'*. This literacy is based on the wide usage and adoption of Internet and information technology, not as add-ons, but as integrative components of learning and teaching for both students and teaching staff.

In 2002, CED established the edUtorium Teaching Staff Development Initiative to ensure and build the corresponding teaching staff capability and competencies necessary to perform in this rapidly evolving technology-enabled learning and teaching context. edUtorium provides a regular series of short continuing education courses and workshops. For example, the 'Foundations of University Learning and Teaching' course is conducted twice annually and is designed for new teaching staff with little or no teaching experience. In addition, four types of teaching staff seminars are held annually:

- 'From Good to Great' Teaching Staff Development Seminar;
- 24 x 7 Anytime Anywhere Learning (focusing on the use of social media);
- Innovations in Teaching; and
- Fostering Academic Integrity and Responsibility.

About 4,000 training seats are taken for all of these programmes annually. It is not uncommon for some teaching staff to take multiple courses.

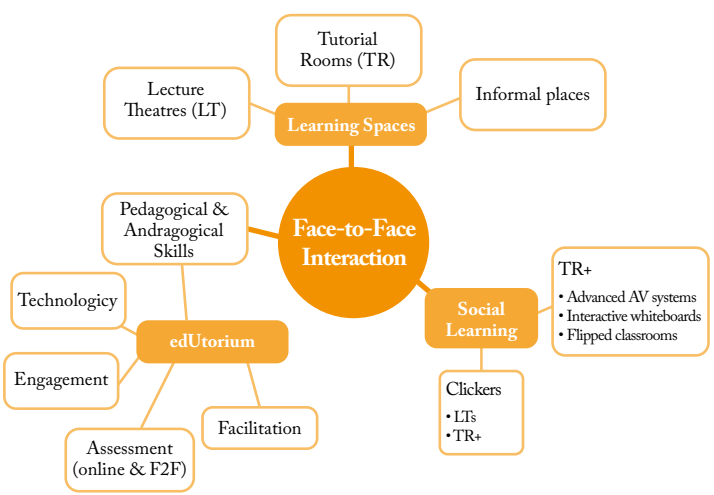
Figure 7: Participation in edUtorium courses and programmes (internal and external participants) (2012)

Professional & Faculty Development Programme 2012

Months	Planned Courses	Conducted Courses	Participants		
			NTU/NIE	External	Total
Jan	22	16	191	0	191
Feb	41	39	269	4	273
March	47	41	382	35	417
April	33	30	265	43	308
May	22	20	190	5	195
June	19	19	178	361	539
July	34	29	364	3	387
Aug	51	46	530	8	538
Sept	40	37	317	11	328
Oct	31	26	787	31	81
Nov	43	36	351	10	361
Dec	16	14	136	1	137
Grand Total	**399**	**353**	**3969**	**512**	**4472**

Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

Figure 8: Face-to-face interaction for learning and teaching



Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

4.3. Face-to-face classroom interaction

The traditional classroom practices and pedagogies have moved from *Education 1.0* to versions *2.0* and *3.0* (Gerstein, 2014). From a didactic mode still predominantly adopted in lectures, the shift has introduced an interactive engagement and social learning process via the use of clickers. It has been complemented by *Project UniWood*, the campus-wide lecture recording initiative that allows students to view, review and relearn material. Teaching staff can also create additional self-recorded material from their PCs at home or in their offices as supplementary content. In the tutorials, the cluster configuration of student seating facilitates group work and presentations. Clicker activities are supported in all of the lecture theatres (LTs) and tutorial rooms (TRs – see Section 4.3.3). To build up the competencies of teaching staff in a way that maximises the technological offerings, the edUtorium initiative organises regular workshops and other training events (Figure 8).

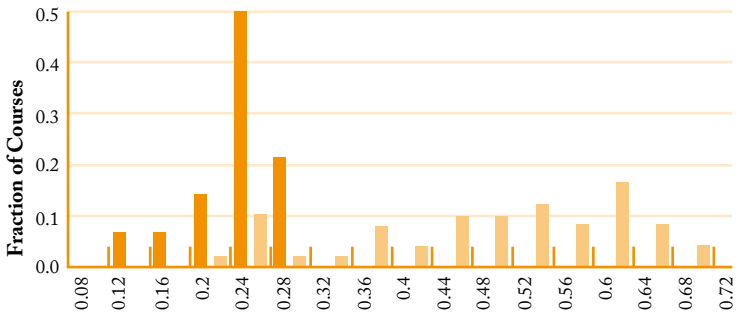
4.3.1 Campus-wide use of clickers (or the Student Response System [SRS])

When teaching staff present lectures, they typically believe that due to their intense preparation (typically 20-30 hours of preparation for a 1-hour presentation), every student will understand their delivery (at a 100% level of understanding). However, Hake (1998) established that such a gain totalled only about 30%.

One cost-effective way to address this issue is to provide students with an environment that offers interactive engagement through the use of clicker devices. Although CELT explored this concept earlier in 2004, it was only later in 2008 when clickers achieved a small-size form factor that the first pilot study was conducted.

By 2011, all undergraduates enrolled at NTU were given electronic clicker devices in addition to their matriculation cards. This was done as a campus-wide initiative to create a *social learning culture.*

Figure 9: Effectiveness of interactive engagement versus traditional methods



Source: Hake, R.R., (1998). Interactive-engagement vs. traditional methods: A six-thousand student survey of mechanics test data for introductory physics courses. American Journal of Physiscs, 66, 64-74

To reach this state of adoption, the following considerations were made.

a. The effectiveness of interactive engagement versus the traditional (lecture) method of teaching (Hake 1998 – Figure 9; Deslauuriers et al., 2011) – it is well established that students who attend a lecture gain an understanding of 30% of the lesson. When used well, interactive-engagement methods can increase this by up to 2.5 times.

b. Under the edUtorium initiative, teaching staff are trained and supported by the CCD section. A Clickers Clique support group was formed to get teaching staff interested in its use and create a community of practice. From this group, volunteer teaching staff were invited to participant in clicker pilot studies before campus-wide diffusion.

c. All clicker devices are administered centrally. CELT installs radio frequency (rather than infra-red) transceivers connected to USB cables in all of the teaching facilities. The cables can then be connected (by default) to PCs in the LT or TR+ or to the teaching staff's personal notebook PCs. Each transceiver in the LT is pre-set to a unique channel so that when it is in use, the teaching staff do not need to perform any setup actions. Students entering the class are able to self-set the channel of their clicker devices to that of the location. This venue channel number is displayed prominently for students to self-set their clickers (see the top left corner of Figure 17).

d. To facilitate the central management of clicker devices, CELT works with the Admissions Office to distribute clicker devices to all new students during matriculation. All of the devices are centrally registered and linked to the students. Students who require help to address issues such as device faults, loss and replacement can receive central support from the CELT Help Desk. Upon leaving NTU, students can return the devices to either CELT or their schools/programme department. Clickers are distributed and collected only once during each student lifecycle at NTU. This provides an alternative to the process of issuing/collecting the clicker devices during each class session, and allows teaching staff to focus on the pedagogical benefits of interactive engagement methods and social learning, rather than be burdened with the logistic pre/post-class distribution/collection of clickers.

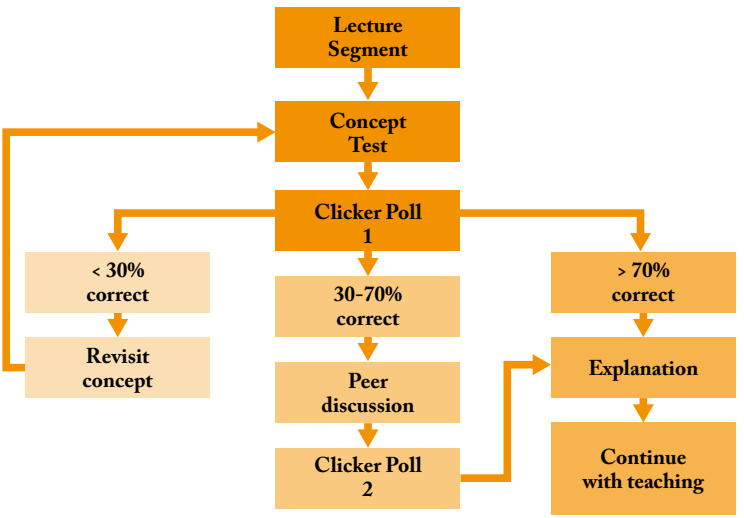
e. Students who are loaned clicker devices are expected to bring them to their classes. To protect and minimise device loss, all of the devices are distributed with a protective plastic sleeve and a lanyard (Figure 10). Students can either wear the lanyard along with their student ID card or tie it to their bags to ensure that they remember to bring it to class.

Figure 10: Clicker device connected to a lanyard

Source: http://www.ntu.edu.sg/cits/lsa/clickers

f. Teaching staff are trained to use the clickers. The clicker's basic use is as a polling tool for answering multiple-choice questions. It can be used to check student understanding or obtain a demographic profile of the class (see Figure 11). To facilitate social learning, a 'poll – discuss – re-poll' process is used in which students are instructed to look for a classmate who provided a different answer to a question. Clicker questions are deliberately designed to ensure a spread in poll results. Their intention is to explain a student's choice to others and why that student thinks his or her answer is correct. This is an example of effective social (peer-to-peer) learning. After a short interval for discussion, a re-poll is conducted. The teaching staff can then take the opportunity to hear from the various response segments and discuss their alternate responses. In so doing, students come to know not only the correct answer, but also *why* the other responses were not correct.

Figure 11: Social learning management depending on poll outcomes (Mazur & Lasry, 2009)

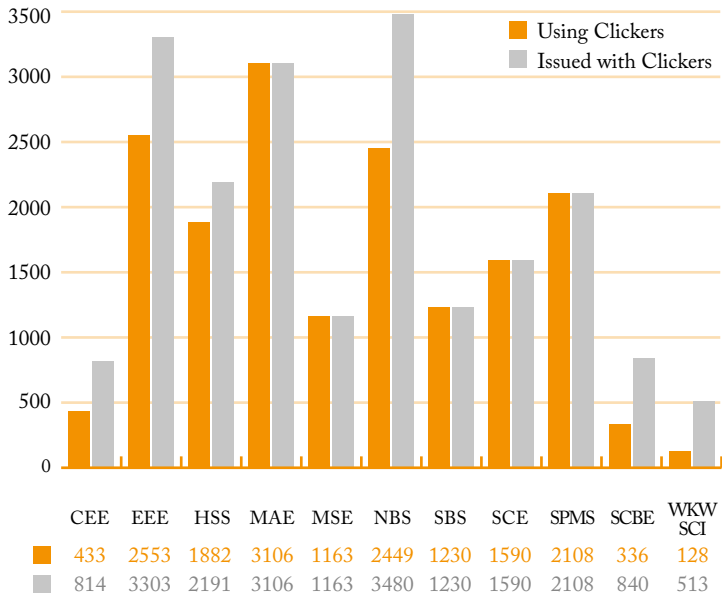


Source: Mazur, E. & Lasry, N. (2009). Technology is not a pedagogy: Peer instruction with and without clickers. 2009 AAPT Winter Meeting in Chicago, IL on 16 February 2009.

g. During the exercise, students express an *'overwhelming relief'* in discovering that they are not alone in their thoughts and answers. Such *self-awareness* and *'wider contextual appreciation'* helps students to develop a sustained interest in their studies. It is evident that in spite of the availability of the recorded lectures, attendance in many subjects has sustained at high levels. Although other methods of interactive engagement may be more effective, the effort and time they require may be much higher, resulting in heavier workloads for both teaching staff and students. Our introduction of clicker devices has been perceived as a good and balanced approach that teaching staff can adopt easily (low learning curve) and use to achieve quick and significant learning outcomes.

The usage data in Figure 12 are based on device issue-usage data collected for school programmes. When clickers are used in a class, their usage is tracked and can be uploaded centrally.

Figure 12: Use of clickers by students based on schools (2013)



Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

4.3.2 Project UniWood

CED began to explore lecture recordings in 2002. When evaluating various content creation tools, we are mindful of the requirement of maintaining sustainable operational processes, along with the view that this mode of content creation-delivery will be scaled up to become campus-wide in the future. To appreciate this end outcome, we ask a key question:

Is the campus-wide lecture recording initiative

1. an IT project
2. a network project
3. a video production project
4. a student learning project?

The answer to this fundamental question is *'all of the above'*. First and foremost, the initiative is a project that must benefit students and their learning. This puts the concerns of teaching staff about decreasing attendance into a different light. Lecture replays benefit students, not the teaching staff. In any case, two observations have been noted.

- Student absenteeism is minimal for teaching staff who teach well, especially for those teachers who adopt participative learning through the use of interactive technologies such as clickers. There have been cases of absenteeism due to poor teaching engagement, rather than due to the availability of lecture recordings (in other words, attendance would have dropped even if that class had been recorded). CELT's response to the latter was to help the teaching staff improve their teaching skills via one-to-one mentoring arrangements.
- Student behaviour and attitudes towards learning change when the lectures are recorded. Students attending such classes take fewer notes but listen more attentively. They also engage more with the teaching staff. They listen and often ask more questions during presentations. Instead of making vain attempts to write copious amounts of notes about new knowledge, many students mind-map the topic or follow the lecture more attentively. The students then develop their lecture notes after class upon viewing the lecture recording. This is important, as the new knowledge is still fresh in their minds.

Therefore, there must be a level of quality assurance (that is, usefulness arising from the recording quality viewpoint) when students view the lecture recordings later. If this is not done well (e.g., poor audio quality or bad camera work), then students may have their learning impeded through the service at worst; at best, the content is useless. In this case, the lecture recording initiative would not be deemed successful for student learning. This is the *'video production'* aspect of the key question, that is, to ensure that the quality of the video recording provides useful benefits that allow students to review, relearn and achieve success in their studies.

To ensure good camera angles and shots, tracking cameras were installed in the 'best seat in the house' locations in the LTs (Figure 13). At this position, the camera angle is at eye level. The camera is housed together with a large LED unit that acts as a teleprompter. This configuration ensures that when the teaching staff are teaching and looking at the LED teleprompter, they are looking both into the camera and out at the audience.From a professional video production viewpoint, this minimises instances in which the back of the presenter is captured.

In addition to good camera angles and facial-eye contact (significant when students are viewing the teaching staff member in the video for the purposes of better eye contact, rapport and engagement), the audio quality of the recording must be ensured. This is of prime importance, as a good video (image) recording with poor audio quality can render it almost useless.

Figure 13: 'Best seat in the house' location for the tracking camera integrated with a large LED unit

Photo Credit: Centralised Command Centre for Lecture Recording, Nanyang Technological University

The Centralised Command Centre for Lecture Recording (CCCLR) was established in 2010 to ensure a high standard of quality for lecture recordings (Figure 14). At the CCCLR, student helpers monitor both the video and audio quality of every recording in every venue remotely and in real time. A large video wall mirrors and aggregates the views of the individual monitoring stations. Any recording quality issues are rectified immediately.

The lecture recording initiative is also a *'network project'*. Although a lecture recording may be done well, it may be subjected to network latency issues when streamed. The recording may pause due to network congestion, in which case the image suffers pixilation effects. Such visual disruptions impede learning. When this happens, the lecture recording becomes ineffective for learning, as the network has failed in its delivery quality. NTU adopted content delivery network (CDN) architecture to manage this problem. Another economical option is to avail podcast and vodcast versions (by allowing students to download the lecture recordings for viewing on their own time from their PCs, smart phones or tablets). However, such off-line viewing will make usage tracking difficult.

The UniWood project has proved effective at supporting student learning. Its popularity among students represents its usefulness in helping them to understand and learn from a lecture upon review.

In addition to its technical design in terms of recording quality and delivery, the success of a lecture recording is based on its *freshness* or quick availability after the event. If a lecture recording took too long to be made available, its usefulness would be significantly reduced. Feedback from students indicates that they like to have same-day access to a video lecture, regardless of whether the lecture took place early in the morning or during the last session that afternoon, as it helps them to manage their time. The UniWood project is highly scalable and allows all lecture recordings to be made available in less than an hour (typically 15 minutes) after class.

Figure 14: Centralised command centre for lecture recording

Photo Credit: Centralised Command Centre for Lecture Recording, Nanyang Technological University

From July 2005 to June 2012, after the early pilot phases, 55,562 video lecture recordings were produced, achieving 6,946,304 viewing hits and an aggregated viewing time of 324.2 years. It should be pointed out that 'viewing hits' are not the same as the 'page view hits' on the Blackboard LMS. The most significant difference is that whereas the transaction times for page views are very short (typically sub-seconds, except for file downloads, which may be in the order of tens of seconds), viewing hits are much longer (ranging from a few minutes spent watching a video segment to a full hour spent watching the whole video). A different CDN architecture with multiple-edge video servers creates a better viewing (and hence learning) experience.

In Figure 15, the lecture recording data are presented with a year-on-year view from July 2009 to June 2013. The different stacks in the histogram represent the data for Semesters I and II of the respective academic years. Note that the CCCLR was commissioned in August 2010, prior to which lecture recording was performed locally at each LT control room with the aid of student helpers. After the CCCLR was completed, the lecture recording process was automated based on timetabling schedules, with quality monitoring done centrally.

The introduction of this centralised automated process, which used fewer student helpers at the CCCLR, caused the number of new recordings to jump from 7,811 (2010) to 11,842 (2011), an increase of 51.6%, demonstrating the scalability of the lecture *capture* process and platform.

During the same period, there was a significant increase in viewing hits, which doubled (114%) from 554,091 to 1,189,850, and the total viewing time reached 80.2 years in 2012. These data demonstrate the scalability of the video *delivery* made possible by CDN architecture. Additional low-cost edge servers can be installed to allow even lower latency with more simultaneous video-on-demand streams and higher robustness.

Figure 15 Data for video lecture usage by students

Source: Centre for Excellence in Learning and Teaching, Nanyang Technological University

4.3.3 Learning space design for new tutorial rooms (TR+s)

An initiative to redesign the traditional TRs was undertaken in 2010. Based on the emergence of *learning space design concepts*, various campuses and resources were visited and studied. These included EduCAUSE (Oblinger, 2006), MIT's technology-enabled active learning classrooms (Yehudit, Belcher, J, Bessette, M, & McKinney, 2003) and JISC (JISC, 2007). The intention was to rethink the design of the TRs in a learner-centric context to facilitate social learning and have a meaningful effect without making their usage overly complex and the operation of audio-video technology difficult for professors. In the spirit of simplification, we called this the 'TR+ Initiative' to support the flipped classroom model.

The traditional TR had an 'all seats facing the front' configuration. This suited a didactic mode of delivery, with students expecting teaching staff to be positioned at the front of the classroom to teach and ultimately provide solutions to tutorial questions. The TR+ concept sought to create a learning environment in which students were participative and collaborative. A clustered sitting arrangement was considered, with students working in groups of six (Figures 16 and 17).

Figure 16: Traditional TR layout

Photo Credit: Nanyang Technological University

Figure 17: New TR+ layout

Photo Credit: Nanyang Technological University

As they sat together in small groups, it became natural for students to work together. Generation Y students liked this mode of learning, as it facilitated discussion. Seeing this,

teaching staff changed their teaching persona from the 'sage on the stage' to that of a mentor guiding the students. Students presented their group responses after discussion. A large LED screen linked to each cluster presented the discussion outcomes provided by group scribes on a shared screen. This configuration supported the flipped classroom mode of teaching very well.

TR+ facilities have the following features.

- Students sit in clusters of six. This arrangement facilitates active learning, group work and peer learning. The furniture is also configurable to other desired arrangements, such as rectangular and U-shaped arrangements and traditional front-facing rows.
- Each cluster has six power sockets, a display cable (VGA, HDMI) and a network point. They also share one large screen display, allowing students to share and collaborate, with one student acting as a scribe. Adjacent whiteboards are available for students to use, and students can use non-permanent felt-tip pens to scribble or doodle on glass-covered tables.
- The TR+ embodies the dual principles of the *'noisy class-room'* and *'wandering professor'*. For this reason, the teaching staff table is located not in the centre of the classroom, but pushed to the front corner. In addition, the spacing between clusters is wide enough for teaching staff to walk around. Many teaching staff take advantage of the layout to shift (very often *naturally* and at their own initiative without prompting from management) their traditional didactic style of teaching tutorials to one that allows students to be more participative.
- The technology available in this setup includes display controls. By pressing a button under any individual screen, the teaching staff can mirror that screen to all of the other screens in the TR+ to facilitate group learning, sharing and collaboration. This easy-to-use and useful function can be performed without the need to go to the teaching staff table

at the front corner of the room. Interactive whiteboards are also installed for the primary screen, which teaching staff can use to enlarge and move images easily.

CELT took a few important steps to ensure that teaching staff would appreciate the affordances of the TR+ learning space design.

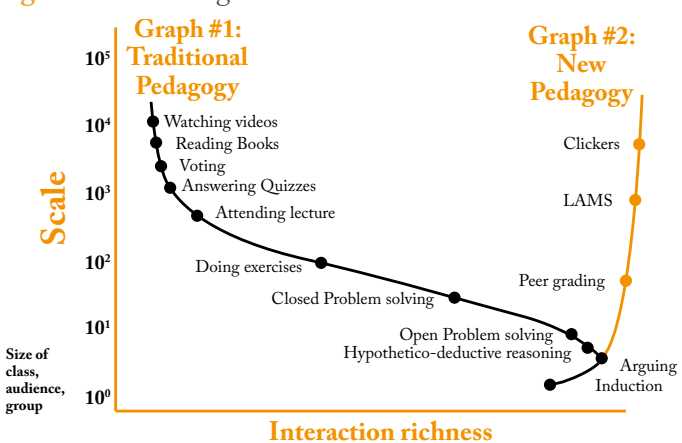
- A series of TR+ workshops was created under the *edUtorium* initiative, focusing on competencies such as facilitation skills, the use of the various technologies in the TR+, group dynamics and behaviour and student/classroom management. This included providing teaching staff toolkits to manage dominating alpha students, support quieter students and focus on learning outcomes rather than content.
- TRx was created as an early experimental version of the TR+. Although they were largely similar, these rooms experimented with slight variations to garner student and faculty feedback, including the use of glass rather than normal whiteboards, different interactive whiteboard technologies and audio-visual control designs. Focus groups comprising teaching staff were held to fine-tune the final TR+ design, which was eventually adopted for all of the other classrooms.
- Although it was announced that all TRs would be converted to the TR+ design in 2008, the implementation was phased in over three years. This allowed time for teaching staff to be trained and adjust their didactic teaching styles to styles that were more supportive and facilitated peer learning. In the timetabling schedule, teaching staff knew the type of layout by the venue taxonomy. For example, a TR20 classroom had the traditional layout, and a TR30+ classroom had the clustered layout. Of course, when the TR20 was upgraded, it was renamed the TR+20.

The TR+ concept resulted in a campus-wide shift in the face-to-face teaching model of blended learning at NTU. The term 'form supports function' generally held true, as teaching staff self-adopted a learner-centric peer-learning mode rather naturally and progressively.

5. Future plans and directions

The adoption of blended learning at NTU has yielded outcomes such as the high implementation of related services and increases in the learning quality of students engaging in on-line and face-to-face environments. As Generation Y and Z students enrol in universities around the globe, they will be more homogenous in their outlook and perspectives. Information will be more easily and commonly accessible, with the Internet having more content and a high availability of Open Educational Resources (OER). These students will have devices that are better and faster than the devices of today. The role of teachers will continue to change as students take more ownership of their learning.

Figure 18: Thinking outside the curve on the future of learning



Note: Modified from Dillenbourg (2014)

Figure 18 illustrates a good model for understanding future directions (Dillenbourg, 2014). Here, *interaction richness* (level of engagement) is plotted against audience *scale* (or class size). In general, for Graph #1, the larger the group size, the lower the levels of interactive engagement between the teacher and students. As the group size decreases, it affords higher levels of interaction. This characteristic is common in the traditional (Education 1.0) approach to teaching. It is essential to note that interaction richness is typically not scalable with increasing class size.

Graph #2 illustrates a different paradigm. In this case, interaction engagement scales with class size. Using this approach, methods and systems that will fit this profile are being sought after or created. Current and future technology-enabled platforms or systems may allow greater learning engagement as the group sizes increase, which would ideally contribute to the learning experience (as seen in crowd sourcing). This concept is adopted using the socio-constructivist learning paradigm, as afforded in the Education 2.0 and 3.0 models.

Although Graph #1 represents the traditional teacher-centric focus, Graph #2 explores and represents new learner-centric pedagogies supported by technology. When achieved, the learning outcomes will be nearer to a response to Bloom's 2 challenge. Graph #2 will be affected by approaches that are productive for learners and also efficient and productive for teaching staff. The latter will be achieved by ensuring the presence of a 'professor-friendly' filter when exploring new approaches.

The second development is the role that massive open on-line courses (MOOCs) will play in future campus environments. MOOC providers will probably become a clearinghouse for universities, acting as providers of alternative advanced content. In a push for quality and economies of scale, MOOC providers

may become publishers or traditional textbook publishers may become MOOC providers (or both). The outcome would be highly developed MOOC content with quality approaching that of good textbooks. Students would then enjoy being taught via high quality video recordings by the best in the field and richly facilitated by the local teaching staff. This idea of 'webucation' is not new; it was first mentioned by Peter Drucker in a *Forbes* article in May 2000 (Michaels, 2000).

6. Conclusion

There are many ways to implement blended learning in a university or a school. At NTU, a social learning environment was designed and created to achieve it. CELT adopted an integrative campus-wide approach, wherein different systems and tools seamlessly complemented and supported one another to create a sustainable holistic student learning experience. Students not only partook in participative learning better as individuals, but also worked as teams and groups both on-line and in face-to-face situations in learning spaces that afforded opportunities for collaboration and flipped classroom modes. The transition from face-to-face interactions between students and teaching staff in a formal classroom and other students in an informal classroom to on-line connections and interactions is designed to be almost seamless in this social learning environment.

As good content increases and becomes more available via lecture videos, publishers, MOOCs and OER providers, it is becoming more learning centric. A systematic approach to supporting this transition is crucial for effective and productive discourse, as teaching staff explore and transition from an instructivist mode to constructivist and socio-constructivist modes. This transition is facilitated by new learning space

designs and supported by learner-centric faculty development. Recognition and reward systems in addition to student feedback and teaching staff evaluations should also be reviewed and recalibrated accordingly.

The 'professor-friendly' philosophy, which can be applied to the processes, platforms and practices of the various social learning platforms, is a key factor influencing the high adoption and usage rates of those platforms. Adopted at the design stage of all projects and initiatives, it ensures due diligence and consideration to ensure that the benefits and usefulness afforded to students are also productive for faculty.

Although many of us are familiar with the term 'e-learning' in association with this environment, we at NTU use the term 'we-learning' to denote a socio-constructivist learner-centric environment in which learning takes place when students are participative and collaborative and teaching staff/facilitators are competent. Although technology is used extensively, its presence is weaved into the material to enable and empower both learners and teaching staff.

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7. Professional Development for Blended Learning in a Faculty: A Case Study of the Education University of Hong Kong

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Abstract

This case study examines how blended learning professional development for teaching staff is driven and implemented in the Faculty of Education and Human Development (FEHD) at The Education University of Hong Kong (EdUHK). Professional development at EdUHK was first implemented by equipping teaching staff with the technical knowhow to incorporate blended learning into their teaching practices. This Institute-based attempt resulted in a growing number of teaching staff using blended learning. The technology-driven professional development approach was rethought to encourage more teaching staff to adopt blended learning in their courses. Based on strategies identified from the literature, a faculty-driven approach for professional development was developed in the FEHD. This approach included pedagogically focused capacity building strategies that aimed to enhance learning engagement and outcomes and scale up blended learning practices in the faculty. Concerted efforts have also been made at both the institutional and faculty levels to create an environment conducive to supporting blended learning. Based on the challenges identified, future directions are discussed in this paper.

1. Introduction

Higher education institutions have adopted blended learning as a learning and teaching approach to engage students and enhance their learning outcomes. Blended learning draws

on the opportunities of on-line and face-to-face learning and teaching to enhance traditional 'classroom' teaching and support interactive, creative, constructive and appropriately designed learning anytime and anywhere. A high quality and sustainable professional development programme provides the necessary conditions for supportive teaching staff to address the challenges associated with blended learning implementation and transform their learning and teaching practices. Therefore, professional development is a central component of blended learning initiatives to improve higher education learning and teaching (Guskey, 2002, p. 381).

People learn best when they are engaged in active, constructive, intentional, authentic and cooperative learning (Howland, Jonassen, & Marra, 2012). Therefore, professional development for teaching staff should involve more than the episodic training of instructional delivery techniques; indeed, it should involve the *'the sum total of formal and informal learning experiences throughout one's career'* (Fullan, 2007, p. 326). In line with such thinking, blended learning professional development programmes must be holistic and comprehensive and incorporate a wide spectrum of diverse delivery modes. However, many blended learning programmes fail to do so. This case study examines how the blended learning professional development of teaching staff is driven and implemented in the Faculty of Education and Human Development (FEHD) at The Education University of Hong Kong (EdUHK).

2. Background information

EdUHK is a publicly funded tertiary institution dedicated to the advancement of learning and teaching through a diverse offering of academic and research programmes in teacher education and complementary social sciences and humanities

disciplines. The FEHD is one of three faculties at the Institute, along with the Faculty of Humanities and the Faculty of Liberal Arts and Social Sciences. The Institute has 16 departments that employ about 450 teaching staff. EdUHK has experienced a quantum leap in world university rankings in recent years. In the 2015/16 Quacquarelli Symonds (QS) World University Rankings, EdUHK emerged as 12th in the world and 2nd in Asia in the area of education (EdUHK, 2016).

EdUHK introduced blended learning in 2002. The Institute initially piloted Blackboard, a Learning Management System (LMS), to complement its face-to-face learning and teaching practices. Over the years, EdUHK has offered Moodle (which replaced Blackboard in 2013), Mahara, Turnitin and Video-Based Learning Community as core services to its teaching staff to enable blended learning. Blending learning started at the Institute with ad-hoc efforts made by a few pioneer teaching staff members. Its adoption at the institution level was initially slow. In recent years, EdUHK has taken an institution-led approach to blended learning by developing an e-learning policy, an associated physical infrastructure and an organisational structure and implementing professional development programmes. As teaching staff play a pivotal role as gatekeepers of innovation, professional development has been identified as a key strategy for promoting blended learning at EdUHK.

3. Institutional professional development: initial attempts

Professional development at EdUHK was originally planned to equip teaching staff with technical skills and knowledge. It was initially thought that technical challenges were the major factors hindering the implementation of blended learning. Therefore, by

keeping teaching staff up-to-date with on-line learning technologies and equipping them with the knowhow to incorporate these technologies, it was thought they would have the capacity to engage in blended learning practices.

In line with this thinking, the Office of the Chief Information Officer (OCIO) and Centre for Learning, Teaching and Technology (LTTC) at EdUHK organised hands-on technology-focused workshops (e.g., the functions and features of Moodle, Mahara, Echo 360, Adobe Connect and Turnitin) for teaching staff and teaching support staff. These workshops were conducted regularly and designed to cover a range of on-line tools for use by staff with different levels of expertise and experience. All new teaching staff, regardless of their previous teaching experience, were required to attend the induction workshop on blended learning. In addition, on-line self-learning materials (such as Moodle video tutorials, guidelines for using external Web 2.0 services and frequently asked questions) were identified and consolidated by the LTTC and made available for all teaching staff.

User statistics have shown that these technical training programmes have helped to encourage steady and significant growth in the blended learning user base at EdUHK. For example, in the 2014-2015 academic year, 83% of teaching staff (202 out of 243 staff members) in the FEHD used Moodle for blended learning. However, the actual 'blendedness' of the learning fell into question when user statistics further revealed that the majority (79%) of on-line activities on Moodle involved the uploading of resources for students to download. These teaching staff members were using Moodle as a platform to provide access to hand-outs and learning resources, allow students to submit assignments and issue plagiarism checking reports. The statistics suggested that current users did not always appreciate the full potential of Moodle as a platform for supporting exploratory and participatory on-line learning involving face-to-face activities.

An investigation was conducted to determine why this potential was not better harnessed. One challenge was that balancing teaching and research work imposed time constraints on teaching staff. Exploring how to creatively, appropriately and effectively use blended learning to enhance the quality of learning and teaching and cater to individual student needs can be a time-consuming process. Another challenge was that the professional development courses and programmes provided at the institution level focused only on technical knowledge and skills and not the pedagogical knowledge and skills required in the blended learning environment.

Good blended learning must be learning led and technology enabled. Rather than simple technological knowhow, a combination of transformed learning design and sound pedagogical practices is required to effectively drive and support a paradigm shift in learning and teaching. To achieve this, the current professional development model must be rethought.

4. Key principles for blended learning professional development

We can learn much from the literature to gain a better understanding of the more effective approaches of professional development programmes for blended learning and their outcomes.

The literature consists of large- and small-scale studies. These include in-depth case studies of blended classrooms that determine future professional development directions (e.g., Wall & Ahmed, 2008); conceptual discussions that evaluate specific approaches of professional development to improve learning and teaching in a blended learning environment (e.g., King, 2002); and surveys of the perceived effectiveness of professional development programmes to improve blended learning practices (e.g., Comas-Quinn, 2011).

The literature critiques the traditionally fragmented, technology-centred approach to the professional development of technology integration. The traditional approach does not meet the on-going pedagogical needs of teaching staff and is often disconnected from day-to-day classroom practices. Researchers have also highlighted that the best professional development activities are spread out over time and present opportunities for follow-up practice and feedback (Gross, Truesdale, & Bielec, 2001).

The literature recommends three major approaches to the professional development of teaching staff. An institution may adopt any of these three approaches to support blended learning practices.

4.1 The situated approach via learning by doing

Professional development activities are ineffective when they fail to connect with actual teaching practices (Bradshaw, 2002; Wells, 2007). Teaching staff may not adopt a blended learning approach when they cannot see how the on-line technologies complement and support their face-to-face teaching practices (Garrison & Vaughan, 2013). In response to this concern, professional development that adopts the situated approach via learning by doing provides teaching staff with opportunities to learn how to use on-line technologies meaningfully to meet their curricular needs (Cole, Simkins, & Penuel, 2002; Mitchem, Wells, & Wells, 2003; Yamagata-Lynch, 2003). According to Kubitskey, Fishman and Marx (2003), teaching staff are more likely to take ownership of a new approach when they actively engage in and reflect on how the approach transforms their own teaching practices. In doing so, they are more likely to commit to blended learning professional development and hence more likely to integrate blended learning elements into their course activities.

4.2 Peer coaching and mentorship

Studies have shown that peer coaching and mentorship have a positive effect on the practices of teaching staff in blended learning environments (Cole et al., 2002; Kariuki, Franklin, & Duran, 2001). In peer coaching, professional dialogue occurs when both parties reflect on what they have observed in their own teaching practices and expand, refine and build their capacities together (Showers & Joyce, 1996). A collaborative professional development culture is fostered as a result (Hargreaves, 2001).

The beliefs of teaching staff can be a barrier to successfully integrating learning technologies into classrooms. At the same time, these beliefs play a critical role in a teacher's decision to adopt learning technologies in conjunction with face-to-face teaching (Ertmer & Ottenbreit-Leftwich, 2010). Mentorship paired by 'innovators' and 'early adopters' can help to promote positive beliefs about technology-enhanced learning (a term that includes blended learning) (Kopcha, 2012). Studies have found that mentored teaching staff become more confident with technology and integrate technology more frequently over time than teaching staff who work without a mentor (Swan & Dixon, 2006; Zhao & Bryant, 2006).

4.3 Just-in-time support or professional development

Just-in-time support or professional development means that teaching staff are provided with a set of skills appropriate for carrying out a particular task when required. This involves having the right material (professional development resources) at the right time (when the skills are needed) and in the exact amount (a focused, specific resource targeted to one skill). By providing support at the point of blended learning implementation, the latency and loss of learning opportunities is reduced (Burns, 2010). Moreover, such an approach focuses

on effective and meaningful technology integration and not on learning the technology tool *per se*.

5. Blended learning professional development at the FEHD

Based on the needs for blended learning professional development at EdUHK and the recommendations in the preceding literature review, a suite of professional development strategies have been planned and implemented in the FEHD. First, a team of specialists known as the Blended & Online Learning & Teaching (BOLT) team was formed to take the blended learning professional development strategies forward. The BOLT team adopts a bottom-up approach and aims to build professional learning communities in the academic departments by encouraging professional dialogue and sharing. The team consists of a blended learning consultant, a blended learning specialist, 13 blended learning ambassadors and the team leader. The team leader is a professor of curriculum and innovations and has had extensive experience and expertise designing technology-enhanced learning environments. The blended learning ambassadors are from the six departments in the faculty. They were selected based on their outstanding teaching practices (many of them have won teaching awards at the faculty and institute levels.). The blended learning consultant and specialist commit all of their time to the team and have experience in learning technologies, instructional design and higher education teaching.

Figure 1: A pedagogically focused seminar conducted in the FEHD on innovative blended learning practices

Photo Credit: Tianchong Wang

The BOLT team offers a spectrum of pedagogically focused blended learning seminars, workshops and sharing sessions to showcase innovative blended learning practices in the FEHD (Figure 1). These sessions complement the technical workshops offered by the OCIO and LTTC. Such activities raise awareness of blended learning practices among teaching staff and their effect on learning and teaching in the FEHD. The activities have been carried out at the faculty, department, programme and course levels to increase the outreach of the professional development efforts.

In addition, there is a diversity of approaches to teaching, learning and assessment across faculties or departments at EdUHK. These approaches are tantamount to the belief that 'one size cannot fit all'. In the FEHD, the BOLT team works with the department or programme teams to develop customised in-house professional learning opportunities. Individual academics can contact the BOLT team for in-depth personalised support, such as reviews of their blended learning practices from different pedagogical perspectives and suggestions for improvement (Figure 2). These consultations may also focus on redesigning courses in the blended learning format to better engage students. To maximise their effectiveness, these immersed in-house consultations are not one-off events, but are on-going. Teaching staff with similar needs can team up with their peers for support and collaboration.

Figure 2: An example of an FEHD teaching staff member working with a BOLT team member

Photo Credit: Danlin Yang

Teaching staff across departments are encouraged to engage in various knowledge exchange activities related to blended learning, which are crucial for developing a professional learning culture (Figure 3). These activities include roundtable discussions and symposiums that help to exchange perspectives on the use of blended learning based on the staff's own backgrounds in their specific disciplines. Teaching staff also have the opportunity to observe their colleagues implementing blended learning activities and reflect with one another on alternative styles and practices and their underlying beliefs and philosophies.

Figure 3: An example of a roundtable discussion conducted with FEHD teaching staff at EdUHK

Photo Credit: Tianchong Wang

Teaching staff who are frontrunners in implementing blended learning in their courses are appointed as blended learning ambassadors of the FEHD. There are at least two ambassadors in each department. They are expected to lead professional development efforts by sharing and showcasing their practices

and mentoring and peer coaching teaching staff in their departments who are less experienced in blended learning. These ambassadors share a common vision of fostering a culture of learning and teaching enhancement through blended learning in the faculty. The ambassadors also attempt to build informal communities of practice (Wenger, 1998) among teaching staff to exchange ideas and reflect on their own practices with one another. These communities of practice are supported by social networking sites and mobile instant messaging (e.g., WhatsApp and WeChat) groups. The information gained from the communities of practice may support teaching staff and create a culture conducive for blended learning. It is hoped that the communities will offer teaching staff long-term support free from reliance on the BOLT team.

Attendance at the aforementioned activities is not compulsory. Policies such as decreasing professional development hours or non-instructional/academic responsibilities are currently being implemented to assist teaching staff and alleviate their workloads. In addition, the FEHD's Faculty Teaching Award Scheme and President's Award for Outstanding Performance (Teaching), which comprise a certificate and a monetary award, serve as incentives that reward teaching innovations such as blended learning (Figure 4). These incentive policies and schemes are conducive to a culture of learning and teaching enhancement, which is essential for the sustainability and scalability of blended learning.

Figure 4: President's Award for Outstanding Performance (Teaching)

Photo Credit: Communications Office, The Education University of Hong Kong

6. Building an environment and supporting a culture conducive to blended learning at EdUHK

These professional development efforts at the faculty level are supported by the holistic approach the Institute has adopted towards blended learning. Such an approach is more likely to ensure the sustainability and scalability of blended learning in the FEHD and across faculties at the Institute.

6.1 Vision and mission

As the successful implementation of blended learning in higher education institutions requires a clear vision, it is essential for EdUHK to establish this vision.

The EdUHK Strategic Plan 2013-16 (EdUHK, 2012a) states its vision of providing *'[enhanced] student-focused learning through the promotion of innovative curriculum design, the application of*

Information and Communication Technology, new pedagogies and assessment that facilitates learning' (p. 15). To achieve this, the Institute Learning and Teaching Plan 2013-2016 (EdUHK, 2012b) states the need to '*formulate the e-Learning Policy and Strategies to ensure that information and communication technology (ICT) is used in line with pedagogies, as well as learning and teaching innovations*' (p. 6).

The blended learning strategy in the FEHD is aligned with the Institute's strategic and learning/teaching plans. The FEHD positions itself as a leader of e-learning practices (including blended learning) in its vision statement. In fulfilling this role, it adheres to the following mission statements.

- All students in FEHD courses and programmes will have the opportunity to engage in e-learning that supports them in meeting the intended learning outcomes.
- All teaching and academic staff in the FEHD will develop and implement courses and programmes that are mediated by e-learning tools to support students in meeting the intended learning outcomes.
- The FEHD will offer on-line courses or programmes for its students, the education community and/or general public.
- The FEHD will evaluate and document the e-learning practices in its courses and programmes and share them locally and internationally.

6.2 Policies and organisational structure

The leaders of EdUHK demonstrate their commitment to promoting and supporting blended learning with the new configuration of the Institute's organisational structure. A Working Group on e-Learning was established under the Committee on Learning and Teaching to develop pedagogically based e-learning policies and strategies for the Institute.

The committee comprises the Vice President (Academic), the Vice President (Administration), the Registrar, the Dean of Students, the Graduate School Dean, the Faculty Deans, the CIO, the Director of the LTTC, representatives from the Library and student representatives. Data related to the effects and challenges of e-learning at the Institute are presented to this committee to revise and fine-tune the e-learning policies and strategies and for the faculties and graduate school to develop localised solutions in support of the Institute's policies and strategies.

The Institute does not make the adoption of blended learning mandatory. However, at the faculty level, the FEHD expects that all course outlines and assessment criteria must be uploaded on Moodle by all teaching staff within two weeks of the start of their courses.

6.3 Curriculum and assessment

The demands of the knowledge economy have driven curriculum reforms such as the 3-3-4 curriculum reform in Hong Kong. The Hong Kong government introduced the 3-3-4 system in 2012. Under this system, undergraduates spend four years in higher education institutions and receive a 'total learning experience'. At EdUHK, this is achieved by helping students to achieve the Generic Intended Learning Outcomes (EdUHK, 2015b), including *problem-solving, critical thinking* and *communication skills*. In terms of blended learning, the Institute nurtures engaged and reflective learners via e-portfolios, which offer students a platform to manage, monitor and reflect on their own learning during their undergraduate studies at EdUHK. Students are required to use e-portfolios to document their formal and informal learning experiences in general education, language enhancement, co-curricular learning and overseas exchange opportunities. Students who are enrolled in teacher

education programmes must also use e-portfolios to document their field experiences in schools.

The array of technologies and information now readily available to students means that their technological skills and abilities to identify, evaluate and use information to develop their own understanding (digital literacy) are becoming critical to both their academic tenures and careers. Students are required to pass either the IT E-Portfolio Test or Information Technology Competence Test as a graduation requirement.

6.4 Infrastructure and resources

EdUHK has invested in infrastructure and resources that support blended learning practices. The OCIO ensures that necessary technologies and resources are readily available for use by teaching staff and students (e.g., equipping more classrooms ready for lecture capture service). The LTTC leads and supports learning and teaching innovations at the Institute by providing professional development and consultations. To meet the basic requirements and changing needs for the adoption of blended learning, the OCIO and LTTC work together on enhancing the features and functionalities of the centrally supported LMS by adopting new plugins and system upgrades, improving the user experience and ensuring better integration with the current ICT infrastructure and Student Information System (SIS). Timely technical and pedagogical support for the use of learning technologies by the OCIO and LTTC play a critical role in encouraging teaching staff to adopt blended learning in their pedagogical design.

The FEHD fulfilled a recent initiative to establish the Technology-enhanced Learning Hub (TEL-Hub). TEL-Hub aims to support blended learning within the faculty. With a deep understanding of the needs of the teaching staff in the FEHD, TEL-Hub serves as not only a support centre aligned

with pedagogical and instructional design issues, but also an experimental ground for piloting emerging technologies to enhance learning and teaching. TEL-Hub is staffed by a team consisting of a blended learning consultant, a blended learning specialist and a senior research assistant.

6.5 Partnerships

Optimising an institutional change process for better innovation implementation requires coordinated efforts by all stakeholders (Fullan, 2007). The partnerships between FEHD, the LTTC, the OCIO and the Estate Office and between departments within the faculty have been important pillars supporting blended learning at the Institution. These relationships have involved facilitating dialogue and working together on logistical issues such as obtaining space and facilities in addition to professional development issues such as the sharing of experiences and concerns and division of labour.

In terms of external partnerships, EdUHK is working with four other institutions in Hong Kong, including The University of Hong Kong, The Hong Kong University of Science and Technology, The Hong Kong Polytechnic University and Hong Kong Baptist University, to form professional learning communities and create a common vision for blended learning. These partners are working together to develop a blended learning professional development prototype in Hong Kong higher education institutions. They also benefit by forming a collective suite of blended learning professional development resources.

Other external partnerships include working with scholars and practitioners from Hong Kong and international education communities to share innovative blended learning practices.

6.6 Research and evaluation

Research and evaluation are considered necessary for guaranteeing the quality and enhancement of blended learning initiatives at EdUHK. They also strengthen the research-practice nexus through teaching scholarships, promote evidence-based practitioner research and disseminate promising blended learning practices and lessons within EdUHK and across institutions.

The Teaching Development Grants (TDG) scheme at EdUHK is open to all full-time teaching staff, whom it encourages to adopt and experiment with innovative approaches to enhance student learning. Blended learning is a focal area of the TDG scheme. In the 2013-2014 academic year, 13 blended learning projects were funded under the TDG scheme in the FEHD.

6.7 Student support

EdUHK provides services to support students in the blended learning environment and enhance their fluency in the use of technological tools to complete specific learning tasks. These services include:

- help-desk services offered by the OCIO;
- walk-in consultancy with the LTTC and Library;
- training workshops on using the LMS and e-portfolios;
- on-line support via the SIS and hotline enquiries; and
- one-on-one tutorials for students.

7. Concluding remarks: challenges, plans and directions

Professional development has been a key strategy of promoting and supporting blended learning at EdUHK. The Institute's attempt at professional development involves equipping teaching

staff with the technical knowhow to incorporate blended learning into their teaching practices, which has resulted in a growing number of teaching staff adopting blended learning in their courses. The FEHD has developed its own suite of professional development strategies to complement those of the Institute. These strategies are pedagogically focused and more localised to the needs of the teaching staff in each department. At both the institution and faculty levels, concerted efforts have been made to create an environment conducive to supporting a professional learning culture for blended learning.

Despite the progress that has been made in building the blended learning capacity of teaching staff, changing the mind-set of staff in terms of adopting on-line technologies to support rather than transform their current teaching practices remains an on-going challenge. Future plans and directions could include working with all of the course and programme teams to redesign courses and programmes in a way that makes blended learning an integral rather than additional feature. The intended learning outcomes of the courses and programmes could also be re-examined to better align them with the opportunities provided by blended learning environments. Students' learning experiences would be enhanced as a result, and their learning needs would be better met, ensuring better learning engagement and outcomes.

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8. Partnerships and Innovation for Blended Learning at Seoul National University, Republic of Korea

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Abstract

At Seoul National University (SNU), blended learning has been adopted to foster creative global leaders. SNU has developed a learning management system to support blended learning and has implemented flipped learning courses in addition to massive on-line open courses. SNU's Centre for Teaching and Learning (CTL) has played an important role in adopting and scaling up blended learning. The CTL cooperates with other SNU organisations and has partnerships with the Korean government, companies, alumni associations and other universities. These partnerships have enabled the university to develop an infrastructure for on-line and blended learning, provide pedagogical and technical support to faculty members and conduct research and development to build a smart campus. Despite the importance of these partnerships, there are tensions between SNU and its partners and between SNU organisations. These tensions present not only challenges but also opportunities to improve the blended learning system in a dynamic way. SNU must strive to decrease these tensions and develop sustainable partnerships that can lead to the growth and diffusion of blended learning across the campus. It is recommended that a network of universities share their experiences of blended learning and collaborate to resolve challenges in adopting, scaling up and sustaining the new pedagogy.

1. Introduction

Blended learning is a pedagogical innovation that fosters the development of key twenty-first century competencies. International organisations like UNESCO, the OECD and the EU have asserted the importance of such competencies as creativity, critical thinking, collaboration, digital literacy and citizenship (Voogt & Roblin, 2012). These competencies are necessary to live, work and learn in a knowledge-based society where new technology and innovation are constantly created and rapidly diffused. The development of mobile technologies and social networking services allows people to easily create, share and remix information and knowledge through the Internet. These societal changes require higher education systems to transform their curricula and pedagogies and develop the twenty-first century competencies of learners. Blended learning, which integrates on-line learning with face-to-face teaching (e.g., flipped learning), can be a catalyst for transforming higher education.

Despite the potential of blended learning, many universities face such barriers as a lack of access to technology and the high cost of curriculum development. According to the Complex Adaptive Blended Learning System model (Wang, Han, & Yang, 2015), blended learning consists of multiple subsystems including learners, teachers, contents, technology, learning support and institutions. These subsystems also include their own subsystems, and the components of a blended learning system interact with one another in a dynamic and non-linear way. Unless the subsystems support one another, blended learning may not be successfully implemented. In particular, to adopt and scale up a blended learning initiative, institutions should clearly determine their goals for blended learning and develop strategies to implement it efficiently. Institutions must secure sufficient resources and create policies in support of blended

learning. Graham et al. (2013) suggested that institutions should consider the issues of technological infrastructure, intellectual property ownership, classroom seat time, faculty incentives and blended learning evaluations. It is also necessary to provide faculty with pedagogical and technical support to develop on-line courses and conduct blended learning activities.

Partnerships with other institutions are helpful in planning and implementing blended learning initiatives. Adopting blended learning at an institution-wide level requires a great deal of resources and different types of expertise. Institutional leaders are often concerned about the high cost of establishing the technological infrastructure, such as computers, wired and wireless networks and servers, required for blended learning. At the early stages of blended learning adoption, institutions also have difficulty clarifying their goals for blended learning, making policies to support blended learning, building governance structures and providing pedagogical and technical support (Graham et al., 2013). These issues can be addressed effectively through partnerships with other institutions. Universities can share their expertise and collaborate to address the challenges involved in blended learning implementation. In addition, institutions can receive financial support from governments, companies and alumni associations that are interested in the pedagogical improvement of higher education.

Despite the importance of such partnerships, little research has considered the role of partnerships in pedagogical innovations such as blended learning. It is also challenging to develop and sustain partnerships with other institutions that may have different interests and goals. This chapter explores the future direction of institutional partnerships to support blended learning by examining the case of Seoul National University (SNU) in Republic of Korea. SNU was founded in 1946 as Republic of Korea's first national university and

has developed into a leading research university globally. It consists of 16 colleges, 1 graduate school and 10 professional schools that include approximately 2,600 staff members, 16,700 undergraduate students and 11,500 graduate students. Its Centre for Teaching and Learning (CTL) has played an important role in blended learning adoption by providing pedagogical and technical support and developing on-line courses. This chapter describes the current status of blended learning at SNU and discusses the university's partnerships with the government, companies, alumni associations and other universities.

2. Blended learning at SNU

SNU's vision is to foster creative global leaders, and its blended learning goals are to strengthen learning competency and build creative and critical thinking skills. Although many organisations at SNU have developed and made use of blended learning, two organisations (the CTL and Office of Information Systems and Technology [OIST]) have mainly been responsible for its management, including the management of e-learning, at a university-wide level. The CTL is primarily responsible for the educational dimension of blended learning, and OIST is in charge of the technical dimension. At SNU, these two organisations focus on blended learning, and their work can be examined in terms of the following aspects: curriculum, professional development and research for teaching staff, student support, infrastructure, hardware and software and other programmes developed via collaborations with external institutions.

First, the blended learning curriculum can be divided into passive and active applications. A typical example of a passive application is the use of a Learning Management System (LMS) in face-to-face classes. In support of face-to-face classes,

the main menu of SNU's LMS includes a bulletin board for notices, discussion and dialogue; an archive to provide learning materials; an assignment submission point with deadline and other elements. On-line activities conducted using the LMS result in greater learning efficiency and effectiveness than off-line activities and are implemented at a level that supports off-line activities. However, flipped learning is a representative example of active blended learning. In flipped learning or the flipped classroom, learners listen to the lecture in advance via on-line videos. When they fail to fully understand parts of the on-line video, they actively engage in problem-solving activities either through discussions with their co-learners or with the help of teaching assistants and teaching staff during class (Bates & Galloway, 2012). SNU piloted two flipped learning courses in fall 2013 and has voluntarily implemented flipped learning courses since 2014: six such courses were run in spring 2014, six in fall 2014, three in spring 2015 and more than ten in fall 2015. Although blended learning based on an on-line rather than off-line approach has not been implemented thus far, there are plans to run such a course for the summer/winter semesters or for students in the army.

Second, professional learning and research associated with blended learning includes regular workshops, consultation via microteaching and faculty meetings. In fact, these programmes extend beyond blended learning and have increased along with an increased interest in learning that takes advantage of technology. Regular faculty workshops have dealt with instructional strategies and smart device usage for blended learning. Consulting and microteaching are conducted based on analysis of lecture videos, educational material and student surveys. In addition, the CTL has facilitated faculty meetings to study innovative teaching methods such as flipped learning and smart education. Faculty members who teach similar courses also collaborate to apply new learning and teaching activities and reflect on their practices.

Third, student support for blended learning includes regular workshops and learning counselling. These programmes, such as professional learning programmes, are applicable to blended learning and have increasingly focused on technological literacy. Thus, regular workshops related to blended learning have included topics such as 'Learn how to learn' and 'ICT literacy development'. The first teaches learning strategies, time management and presentation skills, and the second teaches the use of diverse software programs such as MS Office and Premiere. The CTL also provides students with learning counselling sessions that address study methods, grades, test anxiety and depression. During these sessions, students can take a number of psychological tests such as the MBTI and learning styles tests.

Fourth, the blended learning infrastructure includes supports for organisations and technical equipment. The CTL provides the main support for blended learning at SNU; it has studios for lecture video recording and facilities for developing and managing on-line courses. In addition, a few colleges have their own centres for improving pedagogy including blended learning, such as the Global Education Centre for Engineers in the College of Engineering and the National Teacher Training Centre for Health Personnel in the College of Medicine. In terms of technical equipment, the SNU campus offers high-speed and wireless Internet, including state-of-the-art gigabyte equipment for 18 zones on campus and 10-Gbps high-speed optical cables for backbone networks.

Fifth, the hardware and software required for blended learning include e-Teaching and Learning (eTL), Seoul National University Open educatioN (SNUON), the Smart Support System for Creative Problem Solving (S3CPS) and digital content in the form of on-line lecture videos at SNUON. eTL is a Moodle-based LMS used for regular courses, mainly to

support off-line classes. Its usage rate has been increasing annually, and the access number for mobile Web purposes more than quadrupled in 2014 over 2013. SNUON is an on-line university-level lecture system that includes an LMS and a Learning Contents Management System. It is also a Moodle-based system that links eTL and SNUON. In particular, SNUON has a mobile application for Android and iOS, which the public can use to study on-line lectures and courses. S3CPS is a system for developing creativity based on the creative problem-solving model (Treffinger, Isaksen, & Dorval, 2000). In terms of the on-line lecture videos, special lectures and some lectures in regular courses were mainly developed and operated before 2012. However, since the end of 2012, the method has changed into developing full semester courses due to the effect of flipped learning and massive on-line open courses (MOOCs). Fifty-two courses were developed and operated from the end of 2012 to August 2015, and this number is expected to gradually increase. According to the top 10 course enrolments in spring 2015, demand is highest for courses related to economics, basic engineering and basic natural science.

Lastly, SNU implements other programmes through collaboration with external institutions mainly related to MOOCs, including edX and K-MOOC. edX is a global MOOC organisation whose co-founders are MIT and Harvard. edX and SNU reached an agreement in May 2013. SNUx, which is the name of SNU in edX, opened four courses in March 2014. K-MOOC is a Korean MOOC that has been sponsored and managed by the Ministry of Education project since 2015. Ten major universities in Korea participated in the pilot project. SNU is scheduled to provide two courses from October 2015, including 'Foundation of Economics' and 'Universe and Life'. In fact, although MOOCs are generally subject to 100% on-line learning for the public, they can be used as a type of learning resource for blended learning at SNU.

In short, although blended learning at SNU has supported face-to-face education and remained in the background, it will be implemented actively and diversely in line with learning technology developments, increases in the various teaching-learning methods that use learning technology and the emergence of stakeholders' needs. At the centre of this implementation is the university's ability to enter into and sustain partnerships with various institutions.

3. Partnerships

A noteworthy strategy for effective blended learning at SNU is the securement of systematic and organic partnerships with internal and external institutions. Within university systems, which are familiar to traditional university education, faculties tend to show negative or lukewarm attitudes towards innovative teaching methods such as on-line lectures or flipped learning. Even in the case of Korea, despite the on-going development of the Internet and dissemination of information and communications technology (ICT) since the mid-1990s, a number of university leaders and professors have demonstrated the belief that face-to-face education is more effective than on-line learning. SNU is no exception, and in 2010 the university's strategies and practices for integrating on-line learning with face-to-face education were at an early stage. The needs of external institutions in this situation finally prompted SNU to implement blended learning.

3.1 External partnerships

Government partnership

One of the first external drivers that led to a change in traditional face-to-face education at SNU was the government and particularly the education policy for advanced universities implemented by

the Ministry of Education. The Korean government began to support and guide the educational reform of universities through the 'University Education Competency Empowerment Project' in 2008. This national project aimed to support each university's systematic plan to enhance its competency for effective educational programme development and implementation, and 64 universities were involved in the first year (2008).

SNU participated in the project from 2008 to 2013 and tried to innovate its education system. One of the results of this project was SNU's change from using a commercial LMS in *Blackboard* to a Moodle-based (open-source system) LMS, which began development and customisation in 2011. This resulted in the establishment of an on-line environment that supported face-to-face courses at the university level. In terms of the partnership between SNU and other institutions for blended learning, this case effectively took advantage of financial support and guidance from the Ministry of Education. Aside from the 'University Education Competency Empowerment Project', SNU participated in a government-implemented project supporting the establishment of information infrastructure for national universities. Through its partnership with the government, SNU began developing and providing a few higher demand on-line liberal arts courses to students in 2011. Throughout the experience, SNU acquired the competency to effectively pursue the development of a variety of on-line courses and blended learning projects in the future.

Since the government terminated its financial support of the 'University Education Competency Empowerment Project' in 2013, SNU has continued its partnership with the government through another initiative, the 'Metropolitan University Specialisation Project', since 2014. On-line course development, improvement of the LMS and flipped learning course development have continued to support innovations in teaching methods and educational programmes for the two participating college units and the university as a whole. In

2015, SNU was actively involved in the K-MOOC project, which was organised by the Ministry of Education for the proliferation of MOOCs in Korea. Thus, SNU has taken full advantage of its position as a national university corporation and proactively responded to the government's commitment to leading innovation in higher education. As a result, SNU successfully demonstrated a form of partnership between universities and the government, specifically for the realisation of blended learning at the university.

Partnership with SNU alumni

Another partnership was formed with the SNU Alumni Association to ensure the effective implementation of blended learning. The Alumni Association provides on-going financial support for education and research at SNU in various forms. Since 2012, the focus of support has changed to a specific educational programme development and operation scheme. One of the initiatives was to develop and provide open (free) on-line courses for the general public and resident students. SNU and the Alumni Association have forged a close partnership by creating a successful steering committee. As a result, SNU developed 52 courses in SNUON (SNU Open Education) from 2013 to spring semester 2015, and those courses have been used in blended learning.

Students take these on-line courses on their own time before and after the face-to-face lectures. A few courses were implemented in the flipped learning format and video clips of the courses were used effectively. This also gave SNU the opportunity to participate along with the edX in the MOOCs described later. The partnership between the SNU Alumni Association and the SNU driving system made the initial development and implementation of on-line courses and blended learning possible.

Partnerships with companies

At SNU, efforts to implement blended learning have been made through partnerships with two external companies. First, a partnership was signed with edX, one of the leading global MOOC institutes, in 2013. This occasion saw the full-scale introduction and spread of the MOOC. SNU discussed participation in the MOOC and as a result decided to join edX as its first Korean university partner. As a participating partner university, SNU has been in close communication with edX through the CTL, and the university launched its first MOOC service through SNUx courses in 2014. The rapid decision to participate in a MOOC resulted from both analysis of global higher education trends and the experiences of developing on-line courses through partnership with the Alumni Association. In its partnership with edX, SNU has successfully integrated the principles and experiences of edX for developing and implementing effective MOOCs. For instance, SNU recommends that its professors apply the design principles of standard MOOCs, such as segmenting on-line content into short periods of 15 minutes or inserting a practice problem between content presentations for their on-line lecture development. SNU has successfully diffused the idea of effective on-line courses through its partnership with edX on MOOCs.

SNU's partnership with another external company, Samsung Electronics, is also promoting educational research and the development of smart education or mobile learning in university environments both in general and in the SNU context. The partnership began in 2013 and took two years to prepare. In 2015, it officially launched with a focus on the research and development of smart education in a university setting. Such studies offering in-depth analysis of the effects and negative consequences of smart education, virtual reality technology-based smart education, smart-education-based content development and various smart education application

studies are expected to continue for the next five years. Through this partnership, SNU will lead the technology-based and educational technology research that can support the blended learning type of smart education and apply it practically. In this way, it will offer a model for the university-industry partnership to implement blended learning.

Figure 1: Seoul National University Open Education (SNUON)

Source: http://snuon.snu.ac.kr

3.2 Internal partnerships

As described previously, SNU has established cooperative partnerships with three types of external institution, including the Korean government, the SNU Alumni Association and companies such as edX and Samsung Electronics, to develop and implement blended learning at the university. SNU has effectively led blended learning initiatives through internal partnerships in which the CTL plays a crucial role.

The partnership between CTL and OIST led to the systematic diffusion of blended learning. This office is in charge of information and operations within the university as a whole. It is

responsible for establishing a campus-wide information system, and the practical implementation of education projects related to e-learning and blended learning has taken place within the system through the CTL. For example, OIST plans financing strategies and the long-term development of on-line courses, and the CTL is responsible for actual course development and management. This partnership between the CTL and OIST has been considered successful because the division of roles and responsibilities between the two institutions has been established under the framework of SNU's information strategies.

Another internal partnership has been created between the individual colleges and the CTL as a university headquarter. The CTL is basically responsible for ICT in education and blended learning management at the university-wide level. However, the unique characteristics and requirements of each college should be addressed and reflected in their blended learning operations. For example, the College of Engineering has been operating its own evaluation system to improve its faculty teaching skills, and the CTL provides coaching services as a medium for on-line teaching activities for its professors. The CTL also provides special workshops for flipped learning, smart education and LMS, which individual colleges demand for their faculty members. As such, the partnership between the CTL and the individual colleges is based on ensuring correspondence between the blended-learning-related requirements at the college level.

In short, SNU can primarily be viewed as a case study of a university relying on partnerships with external institutions to develop blended learning and supersede traditional face-to-face university education. In accepting the demands of the government, the Alumni Association and enterprises to change the university education system, SNU has established

an effective partnership in the early adoption and diffusion of blended learning. There are also effective internal partnerships apparent between the CTL and other SNU institutions such as OIST and the individual colleges. However, in building these effective partnerships, conflicts occurred between SNU and its partner organisations in conjunction with those discussed in the following section.

4. Issues and challenges

SNU has cooperated with the government, companies, alumni associations and other universities to adopt blended learning. According to Engeström (2001, p. 136), blended learning is conducted within a network of systems that have diverse viewpoints and different historical and cultural backgrounds: "The multi-voicedness is multiplied in networks of interacting activity systems. It is a source of trouble and a source of innovation, demanding actions of translation and negotiation." Considering how to design and implement blended learning, there are contradictions or tensions both between SNU and external institutions and within SNU itself. Partnerships for blended learning face the following challenges:

- quantity versus quality of lecture videos;
- technological innovation versus the educational system;
- partnership sustainability;
- different perspectives on the use of limited resources at SNU; and
- sharing blended learning visions with colleges.

SNU established partnerships with the government, companies and its Alumni Association to implement blended learning. These institutions share a common goal of creating pedagogical innovations in higher education so as to develop the creative human resources required in the twenty-first century. Despite

their shared goal, the stakeholders have different motives and perspectives on blended learning, which have sometimes led to tensions between SNU and its partners. For instance, the Alumni Association disagreed with SNU as to how to develop lecture videos for SNUON. The university made a plan to develop high quality lecture videos that would be helpful for student engagement and learning but required many human and physical resources. In contrast, the Alumni Association placed more emphasis on the number rather than quality of the lecture videos, requesting that a few lecture rooms be equipped with automated video recording systems that would decrease the cost of developing lecture videos. Although the university emphasised the educational usefulness of lecture videos, the Alumni Association focused on the efficiency of developing lecture videos.

Through its partnerships with companies like Samsung Electronics, SNU had the opportunity to conduct research and development for blended learning with advanced technologies such as smart devices. In such a cooperative relationship, companies are more likely to emphasise the development of new software and devices rather than instructional models and policies. The companies are interested in commercialising technological innovations as outputs of the partnership with the university or testing the effectiveness of their educational software and smart devices at the university. However, from the university's perspective, blended learning strategies, structures and institutional supports are equal in importance to technological innovations. Advanced blended learning software may not be useful if a university has a policy of restricting the allocation of credits to on-line learning activities. Although companies tend to focus on short-term outputs such as new software and hardware, universities must make long-term plans for the use of blended learning in the education system,

as the outcomes of new pedagogical techniques do not appear within a short period. This difference creates a tension in the partnerships between universities and companies.

Partnership sustainability presents another challenge. Partnerships with companies and alumni associations can change due to the aforementioned tensions. Relationships with the government can also vary depending on educational policies such as the University Education Competency Empowerment, Metropolitan University Specialisation and K-MOOC projects. The Ministry of Education regularly evaluates universities to decide which universities the government will either provide or suspend financial support for educational reforms. This approach enables the government to effectively influence the reform of higher education by increasing competition between universities (Kim & Cho, 2014). To maintain a sustainable partnership with the government, universities should strive to achieve high scores on the government evaluations. The Korean government has recently been interested in MOOCs and pedagogical innovations in higher education, which has encouraged universities to implement blended learning. However, this educational policy may change over time. For instance, SNU developed a new LMS through government support for the University Education Competency Empowerment Project, but this project ended in 2013. Therefore, SNU is seeking new resources to maintain and improve the LMS. Universities must consider how to sustain blended learning when government support disappears.

The tensions in these partnerships exist not only between SNU and external institutions but also within the SNU system. The Complex Adaptive Blended Learning System model indicates that blended learning subsystems interact with one another in dynamic and non-linear ways (Wang et al., 2015). At SNU, the blended learning system consists of a few subsystems such

as the CTL, OIST and colleges at the institutional level. The subsystems divide their pedagogical and technical work for blended learning and continuously interact with one another so as to conduct blended learning efficiently without conflict or redundancy between their tasks.

Organisations at SNU have encountered a few challenges in deciding how to use their limited physical and technological resources. In terms of this issue, organisations are likely to have different opinions on their purposes, roles and tasks at the university. For example, the CTL and OIST have different perspectives on on-line courses. The CTL has an important role in developing on-line courses, maintaining an LMS and providing instructional and learning support, and OIST maintains the campus-wide network infrastructure and information resources. When developing SNUON, the CTL requested that OIST provide a video on demand (VOD) server that would enable many people to view on-line lecture videos simultaneously. However, OIST did not provide the VOD server because SNUON was expected to create heavy traffic, which would have negatively influenced other university websites. As a result, the CTL has used YouTube to share on-line lecture videos since 2013. Unless blended learning is the top priority of the university, OIST may not provide the CTL with more technological resources than provided to other organisations and colleges.

In addition, the CTL has had difficulty sharing its blended learning vision with the various colleges. Compared with the CTL, the colleges can provide faculty members with more domain-specific and immediate support for blended learning. Although the CTL must collaborate with colleges on adopting and sustaining blended learning, it is not easy to build a partnership with every college. Some college leaders do not perceive the need for the new pedagogy and on-line courses

and may believe that classroom lectures are always superior to on-line courses, which lack interaction between students and teaching staff. To scale up blended learning across the campus, it is important for college leaders to share the blended learning vision and encourage faculty members to participate in pedagogical innovation. The CTL must have regular meetings with college leaders to share its blended learning experience, discuss issues, make decisions and evaluate instructional practices. Graham et al. (2013) found that universities at the mature stage of blended learning had robust governance structures in which deans and department chairs participated in making decisions about blended learning.

5. Future plans and directions

As a national university, SNU has a mission to develop the competencies of students who will become leaders in diverse areas, including the government and companies in Korea. Blended learning is considered an effective method for achieving this mission. SNU has made efforts to develop infrastructural, technical and pedagogical support systems and instructional models for blended learning. Partnerships with the government, companies and the Alumni Association have facilitated the adoption and scaling up of blended learning. These institutions have provided financial support and negotiated with SNU on the direction of blended learning. SNU's subsystems have actively interacted with one another to achieve the mission of blended learning. In particular, the CTL plays an important role in blended learning implementation by providing faculty members with workshops and instructional support in addition to developing on-line courses and the LMS.

Despite the importance of partnerships, SNU has sometimes encountered tensions with its partners due to their differing motives and perspectives on blended learning. These tensions present not only a challenge to adopting blended learning, but also opportunities to create pedagogical innovations within the current system (Engeström, 2001). To decrease the tensions, SNU must enhance its cooperative relationships and build trust with its partners over time. It is important to identify what creates the tensions between SNU and its partners and continuously negotiate to resolve these tensions. Universities can have regular meetings with partners and allow them to participate in making decisions on blended learning. To sustain these partnerships, all of the parties should find meaning in blended learning implementation.

Tensions also exist between SNU subsystems such as the CTL, OIST and the colleges. To scale up blended learning, university leaders must make it a high priority and create a long-term plan in a systematic way. This plan should consider the multiple subsystems involved in blended learning, including learners, teachers, contents, technology, learning support and institutions (Wang et al., 2015). As these subsystems have complex and dynamic mutual relationships, the CTL may not be able to effectively support blended learning by itself. Governance structures should enhance the cooperative relationships between multiple organisations as they pertain to blended learning (Graham et al., 2013). Through regular meetings, university leaders must discuss issues and collaboratively make decisions to monitor and facilitate blended learning implementation.

Lastly, universities must create a network to share their experiences of blended learning. Although universities may have different purposes and contexts, they can learn from the successful or unsuccessful cases of other universities. These cases can demonstrate what makes blended learning successful,

what hinders its implementation and how the tensions between subsystems can be resolved. In addition, a network of universities can share their on-line courses and educational resources to facilitate blended learning. The Korean Association of Centres for Teaching and Learning is a network of CTLs that plays a crucial role in implementing blended learning in universities. This association, which includes 193 CTLs, can help universities to address the challenges and issues involved in adopting and sustaining blended learning. Through the network, universities should collaborate to develop a sustainable blended learning system.

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9. Blended Learning in a Converged Model of University Transformation

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Abstract

The implementation of blended learning requires a major shift in teaching practice and has implications across many core university services including content, learning interactions, assessment, credentialing, student support and technology. This shift requires that the role of the teaching staff member and student be redefined and the responsibility for learning be renegotiated. The influence of blended learning implementation across the system as a whole can be viewed as integral to and inseparable from other key drivers of the vision of a future university. This chapter describes how student support and blended learning are empowered by a university-wide ecosystem known as 'Curtin Converged' to transform learning and teaching, an ecosystem that has been implemented in the largest university in Western Australia. It describes the four principles of the model and illustrates how they are embedded in an ecosystem of policies and practices and how they support blended learning and the student experience. Student support is used as a case profile illustrating the application of the converged model in the context of whole-of-institution change.

1. Introduction

In 2013, Curtin University embarked on a strategic initiative to transform education and position itself competitively in the global higher education market. Technology-enhanced quality blended learning was identified as the key to providing greater access to an engaging educational experience. The need to cater to a diverse student cohort in an international

market provided the catalyst for a model of blended learning known as 'Curtin Converged'. Curtin Converged encompasses a vision for delivering education anytime, anywhere and on any device while simultaneously driving student and employer satisfaction (Downie, 2012). The model dispenses with the distinction between an on-line and on-campus experience to reimagine a university's approach to education by focusing on a quality educational experience that prepares students through innovative, richly interactive, personalised learning experiences wherever they are located.

The blended learning ecosystem is situated in a policy framework that shapes the role of blended learning and the student experience within a total system of transformation. The converged model exemplifies the executive-level vision of the university and provides a foundation for combining synchronous and asynchronous delivery, the heart of blended learning, in campus-based, on-line and distributed learning contexts, including delivery approaches that use massive open on-line learning experiences and Open Educational Resources (OER). The principles behind the converged model can be defined as:

- shared learning experiences (e.g., blending face-to-face and on-line);
- flexibility (e.g., any time, anywhere and on any device);
- scale and automation (e.g., digital simulations, game-inspired massive courses and learning analytics); and
- global outreach (distributed learning, pathways and partnerships).

Blended learning arose in the early 2000s as a term for instructional delivery that combined 'face-to-face instruction with computer mediated instruction' (Bonk & Graham, 2006). Research has indicated that combining face-to-face and computer-mediated learning has the potential to deliver the 'best of both worlds' (Dziuban, Hartman, & Moskal,

2004). A recent US Department of Education meta-analysis of comparative studies between on-line and face-to-face learning found that on-line learning was at least as effective as face-to-face learning and that blended learning approaches were considerably more effective than one or the other used in isolation (Means, Toyama, Murphy, Bakia, & Jones, 2010). Given this finding, the Curtin Converged model aims to take the conventional blended learning approach to a more complex level by integrating digital simulations, gamification and intercultural competencies through global classroom partnerships.

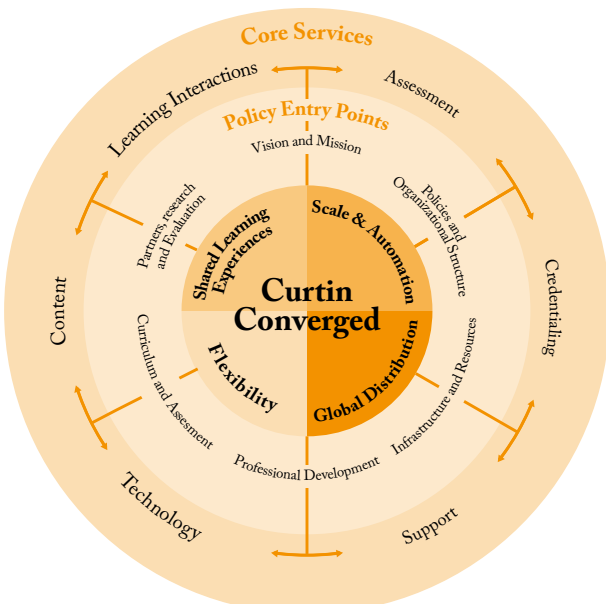
A range of policies has been affected by the implementation of the Curtin Converged model. The policy entry points identified within the university include both top-down and bottom-up strategies of governance and influence that extend across all of the aspects of the structure of the institution as a learning organisation, including its

- vision and mission;
- policies and organisational structure;
- curriculum and assessment;
- professional development;
- infrastructure and resources;
- partnerships, research and evaluation; and
- student support.

The overall ecosystem (see Figure 1) is composed of three socially organised subsystems that support and guide blended learning at Curtin. At the core of the model are the Curtin Converged principles that support the executive vision. These coupled with key policy entry points lead to a structure of policy and practice drivers, which also creates a system for analysing the core services of higher education, including content, learning interactions, assessment, credentialing, student support and technology (Anderson & McGreal, 2012).

This chapter examines how the Curtin Converged model is embedded in the core services of higher education for each of the entry points. It weaves these sources together using specific examples of policy and practice at Curtin University, the largest university in Western Australia.

Figure 1: Curtin Converged as a driver of policy and core services



Source: http://blogs.curtin.edu.au/odvce/2013/01/curtin-converged-a-new-model-of-teaching-and-learning/

2. Institution-wide blended learning policies, strategies and initiatives

Embedding Curtin Converged at several points of entry for policy within the university has required executive leadership, vision and resource allocation to stimulate and support

continuous organisational change. This has affected classroom culture and the expectations of students and has encouraged creative responses from staff in relation to opportunities for new thinking, creativity and engagement in transformational innovation. In terms of the six core services provided by higher education, which include content, interaction, assessment, credentialing, support and technology, future global education trends indicate a migration of services. Some educational programmes will divide into free offerings and globally shared resource spaces, and some will develop a sharper focus on core competencies in basic research, the application of knowledge and excellence in learning and teaching. This new thinking about educational products and their delivery can be discussed through the policy entry points.

2.1 Vision and mission

The university's vision sets a context for strategic planning and decision making that includes blended learning initiatives. Table 1 applies the vision and mission to the core services of the university as a context for blended learning and student support.

2.1.1. Curtin's vision

A recognised international leader in research and education.

Curtin will be a beacon for positive change, embracing the challenges and opportunities of our times to advance understanding and change lives for the better.

We will provide richly interactive and personalised learning experiences for our students, equipping them with leadership skills for the future and valuing them as partners in education and research. Our future graduates will act as long-term influencers of change within society.

Through highly influential research conducted in areas of strategic importance, we will deliver outcomes of significant value to our communities locally, nationally and globally.

2.1.2. Curtin's mission

To change minds, lives and the world through leadership, innovation and excellence in teaching and research.

Table 1: Vision and mission

Policy Entry Point	Effects on Core Services Trends
Vision and mission	*Content* - Most learning content will be free and come from and contribute to OER. The face-to-face phases of blended learning will focus on 'embracing the challenges and opportunities of our times' and achieving 'highly influential research in areas of strategic importance.' *Learning interactions* - The 'richly interactive' component requires active learning and new delivery channels that integrate on-line and face-to-face learning. Blended learning addresses both of these requirements. *Assessment* - 'Personalised learning experiences' are founded on Curtin knowing its students by assessing their knowledge and capabilities. *Credentialing* - A Curtin credential requires a relationship to 'outcomes of significant value to our communities'. *Student support* - Curtin values students 'as partners in education and research'. *Technology* - Distributing knowledge and educational opportunities to the world at any time and in any place requires advanced technologies and, in particular, global leadership in educational technology.

2.2 Policies and organisational structure

As a superior research-based methodology, blended learning (Bonk & Graham, 2006; Stacey & Gerbic, 2008) is viewed as essential to the success of on-line and face-to-face teaching and is highlighted as a policy for preventing the loss of the personal touch of teaching staff across a programme of study. Without a commitment to blended learning, programmes offered exclusively on-line may proliferate for scalability reasons

while risking the loss of human interaction, socialisation and touch points for personalisation that differentiate the university experience. Blended learning offers learning experience in an effective, caring institution that gets to know its students and mentors them towards success. The key to the Curtin Converged model is to maintain a healthy and flexible mix of delivery options at as many points as possible across a programme of study so that students can exercise choice and are able to self-design the most effective study patterns that meet their current life situations. Table 2 illustrates the major effects of policy and organisational structure on the core services of the university as a context for blended learning and student support.

The vision for blended learning and the Curtin Converged model is the responsibility of the Deputy Vice Chancellor (Academic) and is primarily implemented by Curtin Teaching and Learning, a centralised support service provided to the faculties in all aspects of curriculum, assessment and student engagement in learning.

Table 2: Policies and organisational structure

Policy Entry Point	Effects on Core Services Trends
Policies and organisational structure	*Content, learning interactions, assessment* - Course approval processes and curriculum mapping have embedded checks for every aspect of the Curtin Converged model. *Credentialing* - Unbundling of courses, badging and new micro-credentials are embedded into the university's 'digital delivery strategy.' *Student support* - Blended approaches are embedded into student services and instruction. For example, on-campus and on-line services are combined into holistic experiences. *Technology* - All of the university's data sources and applications are unified via an enterprise 'bus' that allows flexible data communications. This essential infrastructure is needed to enable rapid, scalable, personalised curriculum and supports the many variations required for blended learning in a globally distributed environment.

2.3 Curriculum and assessment

Dedicated academic development teams devoted to assisting teaching staff in transforming programmes and courses have been established within a central learning and teaching quality improvement area known as Curtin Teaching and Learning. The university has four faculties (Health Sciences, Science & Engineering, Humanities and the Curtin Business School) and a Centre for Aboriginal Studies. In each faculty, there is also a Faculty Learning Engagement Team (http://www.curtin.edu.au/learningfortomorrow/future_of_learning/flet.cfm) that provides planning and implementation support for curriculum redesign, offers localised professional development, transforms courses into on-line delivery formats and integrates massive open on-line courses (MOOCs) with other university-wide programmes. Dedicated assessment and curriculum design teams from the central learning and teaching area assist the faculty-based teams as needed.

To provide a structured framework and achieve consistent outcomes, guidelines were created to promote student engagement in blended learning environments, including the following criteria:

- the establishment of benchmark engaging learning and teaching practices in on-line environments;
- the provision of a guide for self- and peer reviews of on-line environments;
- learning activities designed to promote 'active' learning in on-line environments;
- consistency in advice given to teaching staff across the university on how to improve student engagement in on-line environments; and

- the promotion of self-directed professional development for teaching staff.

The guidelines distinguish six criteria: on-line environments, learning resources, learning activities, communication and collaboration, student support and assessment. Context 1 describes the minimum on-line engagement criteria and may be appropriate for a unit that is heavily reliant on face-to-face interactions. Contexts 2 and 3 describe the ways in which the affordance of on-line technologies can be exploited to facilitate 'active' learning and enhance student engagement in blended learning units (Figure 2).

Figure 2: Criteria and context levels for student engagement in blended learning environments

Online Environments		
Context 1	**Context 2**	**Context 3**
Students refer to the Blackboard unit to gain unit information and download lecture and tutorial materials. Online learning space provides the student with access to learning resources, assessment guidelines, and basic communication tools.	Students refer to the Blackboard unit for personal learning needs and as scheduled for collaborative learning activities. Online learning space provides the student with collaborative learning tasks, formative assessments, various communication tools and complex learning activities.	Students engage with the teaching staff and student community via appropriate collaboration tools and in a variety of authentic online learning activities. Online learning space allows the student to be an "active" learner who creates and interacts with the resources of the unity.

Learning Resources		
Context 1	**Context 2**	**Context 3**
• Learning outcomes explained (See Chp4) • Content easily navigable • Content in manageable segments e.g. modules • Tools and media are appropriately chosen to deliver learning resources • Timely and relevant learning materials e.g. lecture notes, tutorial worksheets • Supplementary resources in e-Reserve or hyperlinked • All resources are current, contextualised and copyright compliant	• Provides lecture recordings such as iLecture, desktop capture, podcasts • Course design takes full advantage of online tools and media • Links to discipline-specific professional associations • Learning materials include resources that require student interaction such as case studies, case examples and simulations • Provides informal learning opportunities	• Media rich resources e.g. videos, animations, simulations or Virtual labs • Student-generated materials augment/enhance learning materials • Students are not limited to the tools and resources used to develop and present understandings • Students are actively encourage to share understandings and resources

Learning Activities		
Context 1	**Context 2**	**Context 3**
• Clearly stated expectations of student participation • Activities align with unit outcomes and assessment • Instructions and feedback on satisfatory completion of learning activities	• Activities that facilitate student engagement e.g. blogs, wikis, journals • Learning activities are authentic • Online activities to support independent learning e;g; formative assessment via quiz tool or group collaboration area • Scaffolded activities culmating in a final product e.g. website, performance, demonstration	• Student centred learning tasks that extend student engagement and collaboration e.g. creation of digital interviews, peer-review, digital mash-ups • Learning tasks have depth, complexity and duration • Problem-based learning e.g. simulations • Opportunity for self-directed learning

Communication and collaboration		
Context 1	**Context 2**	**Context 3**
• Broadcast messages and alerts to students e.g. announcements tool • Peer to peer networking opportunities e.g. discussion boards, email • Reference to industry communities and networks	• Moderated discussions e.g. staff moderation of discussion boards • Social media such as journals, blogs and wikis • Virtual classroom - lecturer presentations and facilitated collaboration • Teaching staff to role model conduct	• Social media such as Twitter, Diigo, Flickr, YouTube, Slideshare • Virtual classroom - student presentations, student collaboration • Innovative opportunities for student engagement e.g. student conferences • Peer-review is part of the learning process

Student Support		
Context 1	**Context 2**	**Context 3**
• Staff contact information and contact guidelines • Student support services are included e.g. library tutorials, referencing styles • Faculty-specific help • Unit complies with Curtin accessibility policies and standards	• iPortfolio integration • FAQs • Staff and peer to peer support e.g. through social media or discussion boards	• Actively promoted linkages with industry professionals through an online community of practice

Assessment		
Context 1	**Context 2**	**Context 3**
• Assessment details expand on unit outline information • Sample/examplar assignments provided • Guidelines for assignment submission, return process, notification of marks and feedback provided (See Chp 6) • Links to academic resources	• Assignments submitted online e.g. through Blackboard Assignment Manager • Assignments submited via Turnitin • Feedback and results available to students online e.g. feedback and results recorded in Grade Center and available in My Grades • Formative assessments proveded e.g. online journal, pre-test quizzes with automated feedback	• Authentic assessment options include recorded presentations, essays/reports, blogs, podcast series, videos (See Chp 5) • Scaffolded peer assessment • Opportunities for reflection and self-assessment (See Chp 5) • Audio/video feedback

Source: http://www.curtin.edu.au/cli/local/images/diagrams/105_107.pdf

Table 3 illustrates the major effects of curricula and assessment on the core services of the university as a context for blended learning and student support.

Table 3: Curricula and assessment

Policy Entry Point	Effects on Core Services Trends
Curricula and assessment	*Content, learning interactions, assessment, credentialing* - In each faculty area of the university there are teams of experts in learning design, graphics and media production available to assist teaching staff in creating interactive learning activities. These experts understand the Curtin Converged model and apply it flexibly to various units within a programme of study. *Student support* - A 'retention task force' has been set up to define a policy framework for student support that focuses on student success and relies on the shared responsibility of teaching staff working alongside student services staff. *Technology* - The technology available to students is becoming increasingly mobile. Video recordings of lectures are made every day and can be reviewed by students if they miss a class. All grades are entered and accessible on-line, all of the details of a unit's outline and requirements are available on-line and all assignments are submitted on-line.

2.4 Professional development

Zmuda, Kuklis and Kline (2004) pose a shared vision of continuous improvement in which staff development is the key to transforming the institution into a competent system. The competent system at the institution level is built on the notion that teaching staff function more successfully collectively rather than individually. This vision requires teaching staff to be supported throughout the change process, in which a culture of collective autonomy and accountability is fostered.

The Curtin Learning Institute was established to provide and coordinate a range of professional learning opportunities to support staff in their academic endeavours. These opportunities are specifically designed to assist staff during the transformation of learning practices at Curtin; support the implementation of the Curtin Converged model of teaching; provide a foundation for teaching at Curtin for new staff; support academic career planning and development; enhance teaching quality; and build learning and teaching research capacity.

The criteria and contexts for student engagement in blended learning environments (Figure 2) are supported by on-going and embedded professional development. This means that learning and training opportunities that focus on active and highly engaged student learning are offered continuously. Blended learning is encouraged as a theme within faculty-led grants and is further encouraged in the structures and policies mentioned thus far. In this view, professional development is considered not as a singular freestanding workshop, but as an on-going and inseparable part of being an instructional leader at Curtin University.

One-on-one professional development is embedded into each faculty via Faculty Learning Engagement Teams that work to make learning experiences as compelling and engaging as possible through five strategies:

- methods of personalisation and support that adapt to students and require their decisions;
- activities that require higher-order thinking, problem solving and creativity;
- multimodal resources, some of which are constructed by students;
- collaboration that is culturally and globally diverse and engaged in at any time and in any place; and

- feedback that is timely, specific and oriented towards performance improvement.

Workshops that support the strategies are offered by the central learning and teaching directorate and within each faculty as led by the Dean of Learning and Teaching and supported by the Faculty Learning Engagement Team.

Faculty-led research into the effects of blended learning are encouraged by yearly grants from the Teaching Excellence Development Fund (TEDF –http://ctl.curtin.edu.au/research/tedf.cfm), which funds year-long projects that involve innovative, effective and sustainable teaching approaches to developing student interaction and engagement. For example, in 2015, a management teaching staff member in the Curtin Business School developed an exemplary unit that included templates and processes suitable for internal and on-line delivery and blended/flipped classroom modes for multiple courses in multiple locations.

Table 4 illustrates the major effects of professional development on the core services of the university as a context for blended learning and student support.

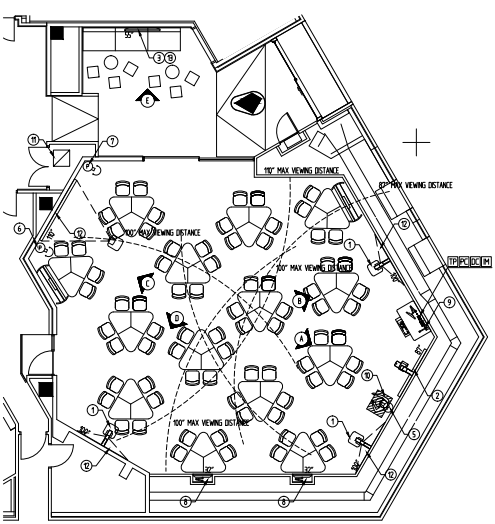
Table 4: Professional development

Policy Entry Point	Effects on Core Services Trends
Professional development	*Content* - Student engagement guidelines, which are made available in an on-line and printable format, guide professional development for blended learning. *Learning interactions* - Teaching staff are encouraged to integrate authentic, reflective and collaborative learning experiences when designing student-centred learning practices. In addition, the technology infrastructure is evolving to collect and use data from event-based interactions to provide learning analytics information and inform actions related to students, teaching staff and others. Event-based data are the most highly detailed source of learning interactions data. *Assessment* - An 'ecosystem' approach has been developed that places assessment at the centre of curriculum design, institutional improvement processes and instructional design and effectiveness. Curtin will build an adaptive assessment system with scalable automation at its core and train and develop teaching staff to use it. *Credentialing* As policy and procedure work has only just begun to focus on 'unbundling' and 'micro-credentialing', professional development has not yet started in this area. *Student support* - In each faculty there are a number of student support experts who deliver service directly to students and are available for professional development within each faculty. *Technology* - Professional development uses technology intensively to deliver on-demand information and on-line training and to build and sustain communities of practice. Required training is automated so that all teaching staff know which workshops they have completed and which remain to be completed. All of the types of training are available in blended modes, featuring face-to-face and on-line components.

2.5 Infrastructure and resources

The infrastructure and resources supporting blended learning include physical learning space redesign, high quality video conferencing and Internet access in classrooms, automated video recording of lectures, speech reinforcement technology and collaboration networking. In addition, it cannot be overemphasised that professional development structures such as embedded Faculty Learning Engagement Teams; on-line policy and practice support websites; and funding mechanisms are vital resources that support the continuous cultural shift required to make globally available blended learning a new norm of delivery. Curtin views synchronous on-line learning as a form of face-to-face learning and can thus distribute blended learning techniques across its entirely on-line delivery systems. This stands in contrast to the early forms of 'eLearning' that were largely asynchronous (and thus inferior to blended learning).

Figure 3: Floor plan for Room 105.107



Source: http://www.curtin.edu.au/cli/local/images/diagrams/105_107.pdf

Working alongside architects and information technology staff, a scholar with a research and teaching background in education has led the physical space redesign. Over 50 traditional classrooms and lecture halls have been converted into collaborative learning spaces with flexible seating, multiple displays and a variety of multimedia capabilities (Figure 3). All of the rooms are listed on-line (http://www.curtin.edu.au/cli/learning_spaces/cls.cfm) along with capacity and equipment details. Teaching staff can request these rooms through central timetabling when planning their programmes and courses (Figure 4).

Panoramic view of 105.107

Figure 4: Details for Room 105.107

Source: http://www.curtin.edu.au/cli/learning_spaces/building_105.cfm

Room Type:	Stage 2 Flexible Distributed - Video and Web-conferencing enabled
Room Capacity:	102 seats
Projector/S:	4 projectors

Additional Features:	• Dual data projectors installed at the front of the room (content and far end in distributed mode, primary and secondary display in presentation mode) • Video camera at front of room to capture students at each pod • Ceiling-suspended microphones to allow for furniture flexibility in video-conferencing mode • Pressure mat (capture zone) at front of room for presenter to stand on when presenting content from the front of the room to a far-end site (enables a close-up immersive camera shot from the lecturer camera) • NOTE: There are NO pod PCs in this venue • Document camera • Wireless desktop sharing from any guest media device* • Apple TV for true iOS desktop sharing* • Speech reinforcement through lapel microphone • Hearing augmentation for the hearing impaired • iPad mirror of touch panel control • Guest media interface @AVIP - HDMI and VGA • iLectures recording light • Ability to display two independent content streams on displays • Lecturer camera, lapel microphone and capture zone microphone routed to resident PC for software-based distribution

Radcliffe (2009) proposed that key aspects of pedagogy, space and technology were critical to the robust development of next-generation learning spaces. The physical space and on-line and embedded infrastructure provide permanent resources that support blended learning. Funding the professional development and resources required to stimulate innovative thinking and instructional experimentation further enhances the use of such spaces. Teaching and learning awards, grants, scholarships and fellowships are also part of the infrastructure and are designed

to offer opportunities for Curtin staff to build capacity and be acknowledged for their teaching practices and outstanding contributions to student learning. Staff can receive recognition through teaching awards granted at the faculty, university and national levels.

For example, eScholars (http://ctl.curtin.edu.au/research/escholars/eScholars.cfm) has funded numerous examples of blending and other innovations over the years, and its replacement, the new TEDF (http://ctl.curtin.edu.au/research/tedf.cfm), supports teaching staff to develop innovative projects and capacity-building initiatives that foster excellence and scholarship in learning and teaching. Video documentation of instructional staff projects is shared as a Web-based professional development resource (http://blogs.curtin.edu.au/cel/category/escholar/). In addition, a variety of grants are offered through the Australian Government's Office for Learning and Teaching. Table 5 illustrates the major effects of infrastructure and resources on the core services of the university as a context for blended learning and student support.

Table 5: Infrastructure and resources

Policy Entry Point	Effects on Core Services Trends
Infrastructure and resources	*Content, learning interactions, assessment* - Incentives created to stimulate the creation of blended learning with student support are integrated with physical and financial infrastructure and resources. *Credentialing* - Innovation in pedagogy stimulated by grants leads to new game- and challenge-based educational offerings, which in turn drive the discussion of alternative forms of credentialing. *Student support, technology* - Students have 24-7 access (during and outside class time) to session recordings automatically documented in the collaborative learning spaces.

2.6 Partnerships, research and evaluation

Curtin Teaching and Learning works in partnership with teaching staff and faculty leaders on the evaluation and research of funded innovation projects. As the literature related to blended learning is replete with examples, Curtin encourages new avenues in which blended learning may be just one part of a complex improvement project involving new technology, new assessment approaches and other innovations. Table 6 illustrates the major effects of partnerships, research and evaluation on the core services of the university as a context for blended learning and student support.

Table 6: Partnerships, research and evaluation

Policy Entry Point	Effects on Core Services Trends
Partnerships, research and evaluation	*Content* - As the world of information is increasingly becoming open, free and accessible to everyone, the future of higher education is wrapped up in its ability to harness this information to create value, improve livelihoods and continually expand the frontiers of knowledge. Partnerships are vital to this enterprise. *Learning interactions* - Curtin is working to create an enterprise-level system for adaptive curricula and assessments that has 'event-based' data related to every learner interaction during a learning process at its foundation. *Assessment* - Curtin is developing a global partnership to create 'Open Assessment Resources' for OER, with the aim of improving assessment practices and the value of learning objects that bring education and access to the world. *Credentialing* - Curtin became a partner of the edX Consortium in 2015, which seeks out new ideas about credentials, unbundling and working with global partners in the top 200 universities around the world. *Student support, technology* - Curtin's investment in games for future students aims to create new forms of partnership with parents and students, which is also the aim of the institution's efforts with employers via a partnership with the Chamber of Commerce. These projects are creating a Web-based engagement with students in non-academic areas that enhance graduate employability

2.7 Student support

Student support at Curtin is one of the liveliest and most sought-after resources on campus (http://life.curtin.edu.au/). A central website organises 'all things Curtin' that are of interest to students. The interaction of the academic experience with the rest of Curtin life is deep and on-going and provides many opportunities for students to assist and receive assistance from peers and experts. In this section, we outline how student support for academic innovation is organised and how Curtin is evolving new technologies that fit into the on-going work of the university. We comment on three paired relationships between the student support infrastructure and blended strategies in terms of the other three parts of the converged model: *flexibility, scale and automation* and *global distribution*.

To begin, student support in academic life has elements in each faculty and in a central team at Current Students (http://students.curtin.edu.au/). The central site is organised to help students find help for *'student essentials'* such as enrolment, examinations, forms, graduation, money matters and other necessary information; *'study resources'* such as bookshops, on-line studying, academic support labs, learning support teams, library resources, rights and responsibilities and scholarships; *'life at uni'*, including information related to housing, transportation, community and recreation; and a *'help is here'* section that provides links to information about careers, international students, security and more. Any issue arising as a result of a change in a programme or a course or due to the pressures of a flipped classroom in a blended learning unit (e.g., understanding the pre-work needed to succeed, creating a schedule for productive self-directed learning) can be addressed within the system. A formal complaint system allows students to lodge anonymous concerns, or a student can seek out personal help at a counter service.

Flexibility is offered via a 24-7 responsive service and on-line form-driven communications. Self-directed forms of instructional delivery are not new to the university. These strategies predate blended learning initiatives at Curtin, perhaps because the university has a significant proportion of international students (n=38%) with campuses and programmes in more than one time zone and country (e.g., Singapore, Miri, Perth, China and Sri Lanka). Over the years, this situation has led to an awareness of the need for always-on, always-available services and to the realisation that self-directed self-service is the preferred method of supporting people. The university has evolved to take advantage of on-line delivery and currently has 89 degree programmes available in blended and fully on-line configurations. Furthermore, 83% of courses at the university have 'flipped' components, where students experience on-line learning as preparation for face-to-face sessions. The Curtin Converged model holds that the student should be able to choose the optimum mixture of access and availability to meet their needs.

Flexibility in learning also extends into co-curricular opportunities. A recent innovation involved the university's co-curricular Leadership Centre, which developed a self-directed learning experience called the Leadership Challenge, delivered anywhere and at any time on desktops and mobile tablets. The authoring, delivery and data analytics platform known as the Curtin Challenge is designed to support mobile self-directed learning by individuals or teams and provides event-stream data about the choices and actions of learners and the products they create, providing high resolution details for analytics. Current offerings on the platform include leadership, career and English language support. If the student chooses, the mobile self-directed leadership activities can be made part of a special diploma opportunity – the Curtin Extra certificate – that rewards co-curricular learning. In this case, the on-line

portion is blended with in-person leadership activities. The on-line modules document the decisions and actions taken by the student during self-study and form an important model for the future of flexible content delivery in both informal and formal curricula.

Scale and automation are critical to reaching the university's mission of global distribution of personalised learning. Automation is used to enhance human-to-human interactions by replacing routine activities and enabling a massive scale without a loss of personalisation. For example, a formative quiz administered to stimulate practice and memory of the key terms in a field no longer requires grading by a human; rather, a survey of strengths, interests and aspirations for learning can be automatically analysed to provide recommended options for learning. Curtin University sees scalability and automation as an opportunity to reset the highly valuable role of teaching staff and mentors to enhance human interactions and the effectiveness of learning and teaching.

Global outreach of the university's knowledge and resources is greatly enhanced by the blended learning model. When thinking about 'anytime, anywhere' student experiences around the globe, the combination of on-the-ground and in-the-cloud learning brings the university's knowledge and expertise out to the world and brings the world to Curtin. One area of innovation of great interest to the university is the gamification of authentic team-based problem solving of regional and global challenges. Supported by blended learning experiences for on-campus students, students from anywhere can form collaborative teams and compete at any time to undertake grand challenges such as addressing the United Nations Sustainable Development Goals. The problem-solving context blends face-to-face pairs of students working with globally remote pairs in small teams who are competing for top prizes and recognition (including academic credit, badged skill acquisition and letters of commendation).

3. Issues and challenges

The primary challenge of implementing Curtin Converged is 'balance.' As not all delivery options can exhibit every possible flexible configuration, a balance is required. A related policy and strategy have been promoted through an improved programme review process known as the 'assessment, review and transformation' process. This process quickens the pace of review and takes stock of changes required at a global level to ensure that a programme addresses its requirements in the context of the Curtin Converged model.

Scalability involves changing the mind-set towards personalised massification and dealing with big data. How can programme, course and instructional delivery be scalable, more automated and yet personalised? How can we personalise education in an era of big data? The new breed of blended and digital learning experiences creates hundreds to thousands of times more data, as the event stream of a digital learning experience can typically create hundreds of records per minute. The capability required to make the most of this information through near-real-time and post hoc data analytics is transferrable to other parts of the university only if the university builds a capacity for learning analytics and conducts data-driven analyses of questions such as how it can find and recruit the best students; how teaching staff are supported to create the best possible learning options; how its learning resources are leveraged to achieve the maximum success for all students; how teaching staff grow and evolve as researchers and scholars of learning and teaching; and how alumni are engaged in outreach, mentoring and recruitment efforts.

To enable scale and automation without losing the human touch requires data science knowledge and teaching staff capacity for innovation and research into new digital media design approaches. These new approaches may include game-based learning design, which has features such as transparent goals; immediate automated feedback; student

agency and choice; and a compelling narrative that motivates engagement, practice and achievement, all of which support scalability. Creating a scalable learning experience requires a shift in thinking about learning design as a deliver-and-test model to an experience-the-challenge model. Such a shift in thinking requires experts in subject matter to become part of a digital storytelling and game designing team and for traditional instructional designers to embrace new methods of engagement and delivery. Curtin is committed to introducing these kinds of new approaches into the production of learning experiences via MOOCs, game-inspired learning units, small partially open learning experiences and open-ended challenges while enhancing traditional blended learning units.

Finally, of the many challenges confronting global outreach, perhaps the most acute include maintaining focus and vision while coordinating and collaborating with an increasing number of partners. Achieving such openness while maintaining vision requires executive leaders who are confident about the future, willing to take risks and active in advocating for change.

4. Conclusion

This chapter describes how a university vision of blended learning is empowered by an ecosystem involving three organised subsystems – a model of converged resources and processes for global influence; policy entry points for advocating continuous improvement and change; and the core services of the university. It explores the complexity of this model and presents the notion that blended learning within the university context must now be considered as an interrelated web of policies, practices and principles to successfully achieve whole-of-institution change.

Curtin University is committed to achieving its vision and mission. The university and its staff have engaged in a

transformational process with several collaborating and intersecting initiatives under the banner of Transforming Learning @ Curtin. Blended learning in the more complex Curtin Converged model has been and will continue to be an important part of the university's interlocked strategies and is a good example of the key precepts of being research based, data driven and courageous in innovation. These precepts combined with the guideposts of shared learning experiences, flexibility, scalability, automation and global distribution are required to help the university stay on track as it makes continuous investments for the future. These investments include the people, time and funding required to undertake sustained innovation, rethink the business and delivery models and use technology to fulfil the university's aspirations to be a recognised international leader in research and education.

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10. Case Study of Institutional Implementation of Blended Learning at Five Universities In China

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Abstract

This chapter contains a longitudinal study investigating institutional roles in the adoption and implementation of blended learning at five universities in China. These roles are examined based on the key components of the framework proposed in Chapter 1. A mixed method methodology is adopted to analyse the developmental processes of blended learning adoption and implementation across the five universities during the 2002 to 2015 period. The results show that these processes went through three stages, from awareness/exploration to adoption/early implementation and mature implementation/growth. All five cases point to four influential factors: infrastructure building, professional development, policy formulation and partnership, which affected their blended learning adoption and implementation at each of the three stages. We conclude that in the unique context of Chinese higher education and in view of the present blended learning development in Chinese universities, the institution is instrumental in the transition from one stage to another. A clearer institutional vision, stronger support of teaching staff and students and increased research and evaluation may be the next step in preparing teaching staff and students for blended learning.

1. Introduction

The research related to blended learning has accelerated in the last 10 years or so, mostly focusing on its frameworks, design and effectiveness in improving learning outcomes (e.g., Garrison

& Kanuka, 2004; Shea, 2007; Singh, 2003; Owston, York, & Murtha, 2013; Perez, Lopez, & Ariza, 2013; Kiviniemi, 2014). As a form of blended learning, the flipped classroom approach has also received increasing attention in the last few years (see Chen, Wang, Kinshuk, & Chen, 2014, for a review). However, as researchers have pointed out, little has been reported in terms of a systematic, institution-wide implementation of blended learning (e.g., Owston, 2013; Wang et al., 2015). This is probably one of the reasons why little research related to institutional roles in blended learning has been published until recent years, with a special issue by *The Internet and Higher Education* in 2013 on institutional involvement deserving of special mention. Studies by Graham, Woodfield and Harrison (2013) and Taylor and Newton (2013) and the ensuing study by Porter, Graham, Spring and Welch (2014) have painted a rough picture of the implementation of blended learning at an institutional level in developed countries such as the US. However, few studies have considered the institution-wide adoption and implementation of blended learning in higher education in developing countries such as China.

This chapter seeks to bridge this gap by investigating the blended learning implementation process at five universities in China between 2002 and 2015. The investigation has two aims: to explore 1) the main factors affecting the adoption and implementation of blended learning at an institutional level based on the framework proposed in Chapter 1, and 2) the roles of the institution in driving the adoption and implementation of blended learning from stage to stage.

2. Literature review

Graham et al. (2013) conducted a groundbreaking study of the institutional adoption and implementation of blended learning that investigated six blended learning implementation models

followed in US higher education and proposed a three-stage implementation framework (see Table 1). Porter et al. (2014) later adopted this framework to chart the development of blended learning in 11 US higher education institutions.

Table 1: Blended learning implementation stages summarised from the blended learning adoption framework

Stage	Description
Stage 1	Awareness/exploration. Institutional awareness of and limited support for individual faculties exploring ways to implement blended learning techniques in their classes.
Stage 2	Adoption/early implementation. Institutional adoption of blended learning strategies and experimentation with new policies and practices to support its implementation.
Stage 3	Mature implementation/growth. Well-established blended learning strategies, structure and support that are integral to university operations.

Source: taken from Porter et al., 2014, p. 186.

For each stage, Graham et al. (2103) also suggested three key implementation categories, strategy, structure and support, with each category containing a number of subthemes. Table 2 summarises these implementation categories and subthemes.

Table 2: Blended learning implementation categories and subthemes summarised from the blended learning adoption framework

Category and Subthemes	Description
Strategy (purpose, advocating, implementation, definition and policy)	Addresses issues relating to the overall design of blended learning, such as the definition of blended learning, forms of advocacy, degree of implementation and purposes of and policies surrounding blended learning.

Structure (governance, models, scheduling and evaluation)	Addresses issues related to the technological, pedagogical and administrative framework facilitating the blended learning environment, including governance, models, scheduling structures and evaluation.
Support (technical, pedagogical and incentives)	Addresses issues related to the manner in which an institution facilitates the implementation and maintenance of its blended learning design, incorporating technical and pedagogical support and faculty incentives.

Source: modified from Porter et al., 2014, p. 186.

We use this three-stage framework and its categories and subthemes in our research to trace the blended learning development stages at five universities in China. Our research contributes to this framework, which Graham et al. (2013) and Porter et al. (2014) found effective, by adding one subtheme to the support category: professional development. We argue that although pedagogical support is considered as a subtheme in the support category in this framework, professional development is more inclusive than pedagogical support. In this study, professional development for blended learning is operationalised as opportunities provided by an institution for their faculty members to develop a deeper understanding of blended learning and establish the pedagogical and technological competence to take greater advantage of such learning. Thus, professional development is an important indicator of blended learning success considered in this study.

3. Methodology

As this study focuses on the institutional roles involved in the adoption and implementation of blended learning in the unique context of Chinese higher education, it relies on a case study of five universities in China as its overarching methodology. However, a

mixed method methodology is adopted when investigating each university to collect and analyse both quantitative and qualitative data.

3.1. Study background

In accordance with its broad definition (see Chapter 1), blended learning in Chinese higher education started with the adoption of Learning Management Systems (LMSs) around the turn of the century. TsingHua Educational OnLine (THEOL), an LMS developed by the Educational Technology Institute of Tsinghua University in China, provides a case in point. This LMS has been adopted by more than 400 universities and colleges in China since 2001 (Han et al., 2014). Some of the data considered in this study were collected from this platform.

To attain the aforementioned research objectives, a case study approach was adopted (Baxter & Jack, 2008) that examined the implementation processes of five universities in China between 2002 and 2015. The following six criteria were applied to our case selection: 1) institutions across a range of rankings (from the top 20 to the top 300); 2) institutions representing different regions in China; 3) institutions representing both state- and province-run universities; 4) institutions that mainly used THEOL as their LMS to access data from the platform; 5) institutions that used THEOL for at least eight years to accumulate enough blended learning experience; and 6) institutions that reached at least Stage 2 of the three-stage blended learning implementation framework proposed by Graham et al. (2013). As a result, the following five universities were selected: Chongqing Technology and Business University (CTBU), Nanchang University, Nankai University, Shihezi University and Yangzhou University. Table 3 provides basic demographic information for each of these five universities.

Table 3: Demographic information of the five Chinese universities

Institution	Ranking	Region	Number of Years Using THEOL	Number of Undergraduate Students in 2015	Number of Faculty in 2015
Nankai University	Top 20,* state run	North	13	13,067	1,986
Nanchang University	Top 100, jointly run by State and Province	Central	12	37,092	3,530
Yangzhou University	Top 100, Province run	East	8	33,000	2,100
Shihezi University	Top 200, jointly run by State and Province	North West	11	22,576	2,550
CTBU	Top 300, Province run	South West	10	28,000	1,600

Note: * According to the Wu Shulian Ranking of Chinese Universities in 2015.

3.2 Data collection

Both quantitative and qualitative data were collected. Quantitative data related to THEOL platform usage between 2007 and 2015 were collected through THEOL platform logs. Similar to most LMSs, THEOL provides comprehensive functions and tools to support learning and teaching. For example, its content tools help teaching staff to publish course syllabi, notifications and learning materials; its interaction tools allow students to interact with one

another and their teachers through discussion boards and blogs; and its assessment tools help teaching staff to monitor students' learning progress through on-line assignments (e.g., the assignment system) and allow students to self-evaluate their progress through on-line tests.

We collected two kinds of log data from THEOL in relation to the five universities. The first group of data referred to platform visits by students and teaching staff, providing a glimpse into how often THEOL was used across the five universities during 2007-2015, a period in which platform visits began to increase steadily each year. To provide a closer view of the THEOL usage, we also collected information about the average daily on-line population in the spring semester of 2015.

The second group of log data related to the blended learning courses offered on THEOL at each of the five universities and revealed how blended learning was implemented at the course level between the fall semester of 2014 and the spring semester of 2015. These data included the total number of blended learning courses offered on THEOL for each university, the number of course visits, the number of on-line assignments in each course and the number of discussion posts for each course.

Qualitative data were collected from three major sources over a 13-year period, from 2002 to 2015. The document archives at each of the five universities provided a data source. These documents could be categorised into policies related to teaching innovation and planning, blended learning project initiatives, handbooks for blended learning course development, teacher training, teaching evaluation, university news announcements and incentives for teaching innovation.

The second important data source came from the reports prepared by THEOL provider and partner university the Educational Technology Institute of Tsinghua University for each of the universities at the end of each semester, starting from when THEOL was adopted.

One hundred and two reports were collected for this study. These reports usually contained two parts, including information about how THEOL was used for learning and teaching and how blended learning courses were best designed and implemented. Part one summarised THEOL usage information such as the total number of platform visits, total number of courses on THEOL, total number of course site visits for each course, students' use of the various tools on THEOL and problems encountered in learning and teaching using THEOL. Part two offered guidelines for blended learning course design and delivery, supported by exemplars of the best blended learning courses and practices from other universities. These reports clearly illustrate the trajectory of the blended learning developments at each university.

Our on-going communication since the adoption of THEOL with the directors and staff members of the educational technology centres and academic affairs administration offices at each university formed the third data source. As the LMS provider and partner of these universities, our research group maintained regular contact by providing technical support, professional development workshops and training seminars. Interviews and informal talks were also conducted for clarification where needed.

3.3 Data analysis

In terms of quantitative data, we analysed the log data from a learning analytics perspective to see how the THEOL platform was used to support learning and to triangulate the findings from the qualitative analysis. The THEOL platform log data, such as the number of platform visits and information about blended learning course offerings, were statistically analysed using SPSS.

In terms of the qualitative data, we used a case study approach to trace the sequential blended learning development at each university. Due to the complicated nature of these cases and the multiple sources of data gathered, we used the three-stage framework

(awareness/exploration, adoption/early implementation and mature implementation/growth), focusing on the implementation categories at each stage and the subthemes under each category to analyse the data, as proposed by Graham et al. (2013). The policy documents related to blended learning implementation, the semester-by-semester reports prepared by the Educational Technology Institute of Tsinghua University and the transcriptions of the interviews and informal talks with personnel from the academic affairs administration offices and educational technology centres at the five universities were first categorised through thematic analysis, coded using the three implementation categories (strategy, structure and support) and the subthemes associated with each category. These categories and subthemes were then double-checked along with the relevant personnel at each university when in doubt. Two researchers involved in the study then rated the categories and subthemes separately and compared notes to ensure the accuracy and credibility of the datasets.

4. Overview of blended learning implementation and its five stages at the five universities

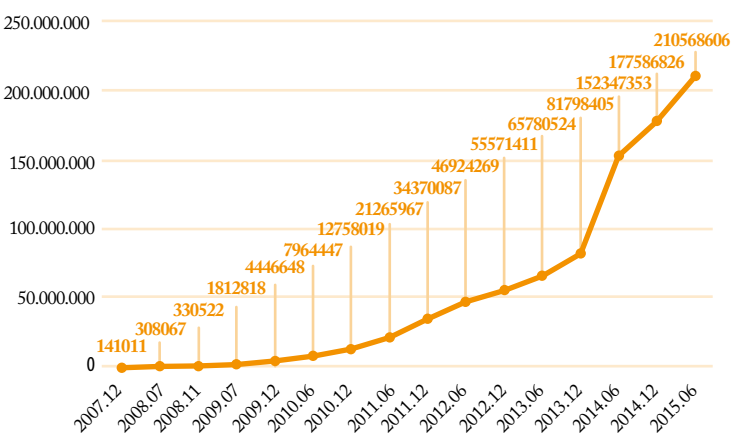
4.1 Overview of blended learning development across the five universities

This section presents data related to the general usage of THEOL and an overview of the blended learning courses offered by the five universities under discussion. The purpose of this presentation is to outline the trends and current status of each university's blended learning development.

As LMS usage is considered an indicator of blended learning implementation, we gathered LMS usage data from all five universities' THEOL platforms. The data between 2007 and

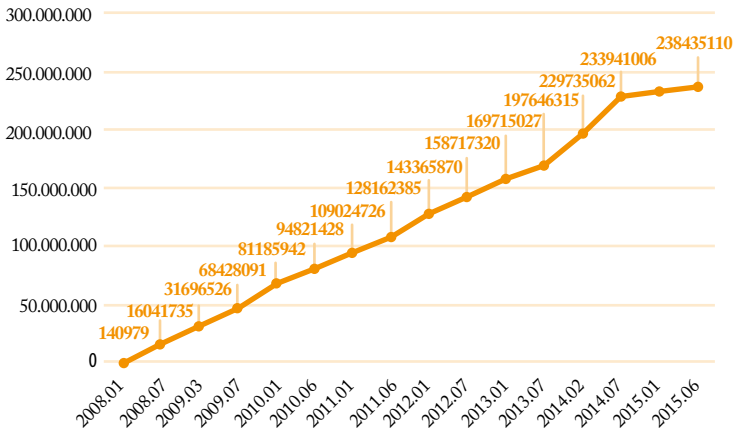
2015 (see Figures 1-5) showed that all five of the universities used THEOL to promote their learning and teaching practices on a regular basis. Furthermore, the average annual platform visits across all five universities increased steadily during the period. However, looking at the data more closely, we noticed that the total platform visits and average annual visits varied considerably across the five universities, with Yangzhou University and Nanchang University well ahead of the other three universities. Figures 1-5 also demonstrate an upsurge in platform visits between the fall semester of 2014 and the spring semester of 2015 across the five universities. To double-check this sudden increase, we also retrieved LMS usage data from each university in terms of the average daily on-line population during the spring semester of 2015 and found that the same trend remained, with Nanchang University and Yangzhou University in the lead (see Table 4).

Figure 1: Number of THEOL visits each year between 2007 and 2015 at Nanchang University



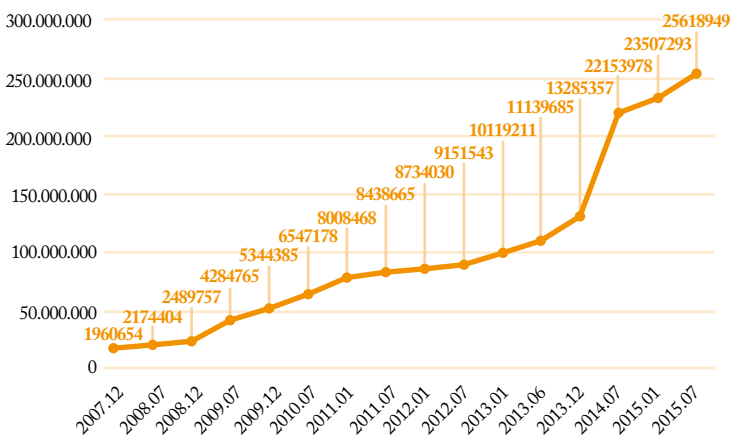
Source: Educational Technology Institute, Tsinghua University

Figure 2: Number of THEOL visits each year between 2007 and 2015 at Yangzhou University



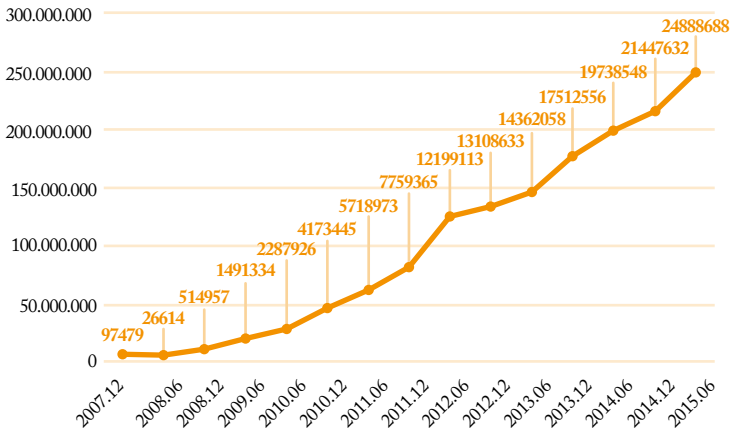
Source: Educational Technology Institute, Tsinghua University

Figure 3: Number of THEOL visits each year between 2007 and 2015 at CTBU



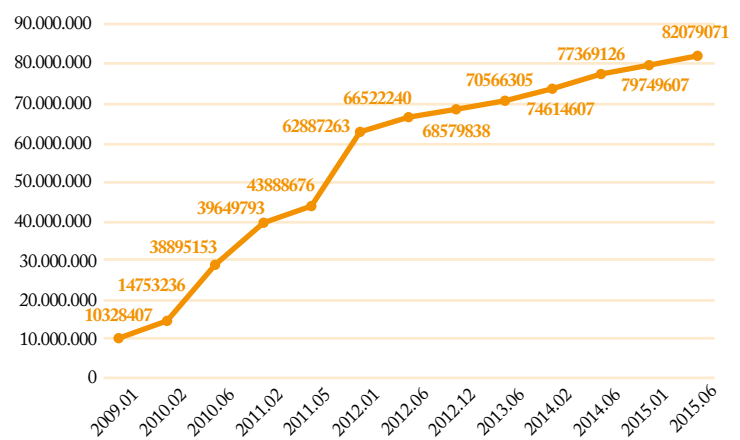
Source: Educational Technology Institute, Tsinghua University

Figure 4: Number of THEOL visits each year between 2007 and 2015 at Nankai University



Source: Educational Technology Institute, Tsinghua University

Figure 5: Number of THEOL visits each year between 2007 and 2015 at Nankai University



Source: Educational Technology Institute, Tsinghua University

Table 4: THEOL usage across the five universities between 2007 and 2015

Institute	Year THEOL was adopted	Total platform visits	Average annual visits	Average daily on-line population for spring semester 2015	Number of Faculty in 2015
Nanchang University	Jan 2003	210,568,606	16,845,488	870	1,986
Yangzhou University	Feb 2007	238,435,110	28,051,189	783	3,530
CTBU	Dec 2005	82,079,071	8,639,902	362	2,100
Nankai University	Aug 2002	25,618,949	1,969,231	175	2,550
Shihezi University	Jan 2004	24,888,688	2,164,233	293	1,600

Note: Data were accessed on 30 June 2015.

Table 5: Blended learning courses on THEOL at the five universities during fall 2014 and spring 2015

Institution	Number of courses registered on THEOL (C1)*	Courses with more than 300 visits		Courses with more than one on-line assignment		Courses with more than 10 discussion posts	
		Number of visits (C2)	Percentage (C2/C1)	Number of courses (C3)	Percentage (C3/C1)	Number of courses (C4)	Percentage (C4/C1)
Nanchang University	6,131	2,271	37%	1,846	30%	684	11%
Yangzhou University	1,382	294	21%	324	23%	116	8%
CTBU	1,282	218	17%	162	30%	30	2%
Nankai University	2,815	245	9%	264	13%	35	1%
Shihezi University	2,153	135	6%	167	8%	59	3%

Notes: Data were accessed on 30 June 2015. *'C' represents 'column'.

In summary, the data in this section illustrate how THEOL was used in supporting blended learning courses across the five universities. We can safely conclude that Nanchang University and Yangzhou University were well ahead of the other three universities in both THEOL usage and blended learning course offerings. The next section examines what each of the universities achieved in their implementations of blended learning following their adoption of THEOL.

4.2 Developmental stages of blended learning at the five universities

As the developmental stages of blended learning at the five universities were charted using the three-stage framework proposed by Graham et al. (2013) (see Table 1), we examine the three broad categories (i.e., strategy, structure and support) adopted in their study at each stage to accurately recount each university's blended learning implementation process. The findings in each category are also presented using the subthemes identified in the study by Graham et al. (2013) (see Table 2).

4.2.1. Stage 1: awareness/exploration

As shown in Table 6, Nankai University and Nanchang University were early adopters of blended learning, and Yangzhou University did not start its blended learning until 2007. In terms of strategy, none of the five universities reported blended learning implementation by individual faculties or administrators. None of them defined blended learning or formulated uniform blended learning policies per se, although some course-specific regulations and measures were issued in some of the universities (see Table 6). No emerging structure within the universities was reportedly designated to support blended learning model development, course scheduling and evaluation, although all of the universities partnered with the Educational Technology Institute at Tsinghua University

(THETI), primarily to support the use of THEOL in teaching and administration. In terms of support, although all of the universities supported the use of THEOL, professional development was limited to platform use and was offered only to teaching staff who were interested in blended learning. Only CTBU offered incentives for teaching staff using THEOL. On the whole, Stage 1 was characterised by the initial adoption of blended learning by all five universities as advocated and decided by their management. This is in distinct contrast to the findings of Graham et al. (2013) and Porter et al. (2014).

Table 6: Strategy, structure and support implemented by the five universities at Stage 1

Institution/ period	Strategy	Structure	Support
Nanchang University 2003- 2008	No blended learning initiatives from individual faculty. No uniform definition of blended learning proposed. No uniform blended learning policy in place.	Institutional decision to implement blended learning. Partnered with THETI for technical support. No blended learning model. No blended learning course scheduling. No blended learning evaluation.	Installation of THEOL in 2003. No faculty incentive structure for blended learning implementation.
Yangzhou University 2007- 2008	No blended learning initiatives from individual faculty. Institution proposed an implementation plan for on-line learning and resource development. No uniform definition of blended learning proposed. No uniform blended learning policy in place.	Institutional decision to implement blended learning. Educational Technology Centre was responsible for technical support. Partnered with THETI for technical and pedagogical support. No blended learning model. No blended learning course scheduling. No blended learning evaluation.	Installation of THEOL in 2003. Ad hoc training limited to teaching staff developing blended learning courses. No faculty incentive structure for blended learning implementation.

Institution/ period	Strategy	Structure	Support
CTBU 2005-2009	No blended learning initiatives from individual faculty. A policy for promoting the use of THEOL in teaching was issued in 2006, strongly encouraging all teaching staff and students to use the platform for Q&A sessions outside the classroom and for sharing teaching experiences. No uniform definition of blended learning proposed. No uniform blended learning policy in place.	Institutional decision to implement blended learning. The Educational Technology Centre established a teacher support centre for blended learning. Partnered with THETI for technical and professional development support. No blended learning model. No blended learning course scheduling. No blended learning evaluation.	Incentive was offered for Internet-supported teaching. The Educational Technology Centre provided professional development and training for technology-supported teaching to those interested in blended learning.
Nankai University 2002-2007	No blended learning initiatives from individual faculties. In July 2006, the Teaching Award for Excellent Online Course Development was announced, specifying key performance indicators and evaluation criteria in addition to award application procedures and the award amount. In July 2007, the university issued regulations to standardise blended learning requirements. No uniform definition of blended learning proposed.	Institutional decision to implement blended learning. Partnered with THETI for technical and pedagogical support. No blended learning model. No blended learning course scheduling. No blended learning evaluation.	THEOL was installed in 2002. University invested in software and hardware to support the running of THEOL. Training was provided for teaching staff and administrators interested in THEOL. Award for excellent on-line courses was offered.

Institution/ period	Strategy	Structure	Support
Shihezi University 2004-2011	No blended learning initiatives from individual faculty. Teaching innovation through technology was promoted in a document entitled 'The Implementation Strategies for Improving Teaching Quality and for Teaching Reform in Undergraduate Programmes at Shihezi University, 2007'. No uniform definition of blended learning proposed. No uniform blended learning policy in place.	Institutional decision to implement blended learning. Partnered with THETI for technical and pedagogical support. No blended learning model. No blended learning course scheduling. No blended learning evaluation.	THEOL was installed in 2004. Training was offered only for teaching staff and administrators interested in blended learning. No faculty incentive structure for blended learning implementation.

4.2.2. Stage 2: adoption/early implementation

Table 7 shows that most of the universities entered Stage 2 of their blended learning implementation around 2009, except for Shihezi University, which started in 2012. This period witnessed an increasingly active blended learning implementation process across the universities. Initial blended learning policies were reformulated and new policies were issued to encourage and regulate blended learning course registration, development and evaluation. Compared with Stage 1, blended learning structures grew increasingly mature. Incentives for blended learning became institutionalised, and the educational technology centres became more involved in providing technical support and consultancy to individual teaching staff members, offering more regular professional development workshops and seminars. On-going partnerships with THETI extended beyond partnerships with the THEOL provider. THETI participated in the blended learning course development of each of the

universities by offering curriculum consultancy and professional development services. More support from the institution was provided in terms of continuous infrastructure building and upgrading, on-going blended learning course development and incentives and professional development workshops, although attendance at these workshops was not compulsory.

Table 7: Strategy, structure and support implemented by the five universities at Stage 2

Institution/ period	Strategy	Structure	Support
Nanchang University 2009- 2011	Policies were formulated for blended learning course registration, approval, monitoring and evaluation. However, these policies affected only teaching staff involved in blended learning course development.	The Office for Academic Affairs Administration was designated for blended learning course registration. Blended learning project applications and evaluations were assessed by external blended learning experts, such as those from THEIT. THEIT provided customised support for blended learning course and professional development.	Computer rooms were built and made accessible to students participating in blended learning courses. Nine workshops were conducted each semester to cater to the diverse timetable requirements of the faculty.

Institution/ period	Strategy	Structure	Support
Yangzhou University 2009-2013	Policies were formulated for the use of THEOL for learning and teaching innovations and the selection and award procedures for excellent on-line courses.	The Educational Technology Centre was expanded to provide all kinds of services and support. THEIT provided customised support for blended learning course and professional development.	The university constantly upgraded its servers and other supporting hardware and software. The Educational Technology Centre offered consultancy services for THEOL platform use and blended learning curriculum advice via the telephone, e-mail and WeChat. It also ran year-round training activities for teaching staff to develop effective on-line teaching practices.
CTBU 2009-2015	In March 2015, the university announced a special award for excellence in Internet-supported teaching. In April 2015, it published another blended-learning -specific policy entitled 'On-line course development initiatives at CTBU'.	In 2012, the university redeveloped the previous Educational Technology Centre to found the 'Teaching Development Centre'. In 2015, a special grant for on-line course development on THEOL was set up to fund 18-20 on-line courses, with RMB3,000 allocated to each. THEIT provided customised support for blended learning course and professional development.	The university continued its investment in and maintenance of the THEOL platform, which was upgraded in 2015. The Teaching Development Centre provided all kinds of technical support and on-going training at various levels, including one-on-one support. It ran 45 lunchtime seminars with themes ranging from on-line learning to the flipped classroom and blended learning approaches.

Institution/ period	Strategy	Structure	Support
Nankai University 2008-2015	In 2013, the university issued a policy regulating an initiative for the development of digital resources and an award for excellence, with specific THEOL module development requirements. In 2014, the university announced the results of this initiative.	The university actively sought partnership with Tsinghua University to establish on-going communication and support mechanisms for curriculum consultancy and THEOL support. In 2014, the university awarded excellent courses, teaching units and individual teaching staff members with both certificates and monetary incentives. THEIT provided customised support for blended learning course and professional development.	The university continued its investment in and maintenance of its IT infrastructure, including ensuring the stability of its Web, data and media servers and the smooth running of the THEOL platform. The university invited blended learning experts from outside the university to conduct various types and levels of workshops and seminars, not only for teaching staff to share their ideas and experiences, but also for administrators to develop their IT competency.

4.2.3 Stage 3: mature implementation/growth

Judging by the definition proposed by Graham et al. (2013), only Nanchang University and Yangzhou University met the requirements of Stage 3 in the framework, signifying mature implementation and steady growth. As shown in Table 8, a university-wide push for on-line learning and teaching involving all of the teaching staff characterised this period. Robust policies, structures and support were put in place to push blended learning into every course. As a result, more blended learning courses started to appear on THEOL (see Table 5).

Table 8: Strategy, structure and support implemented by the five universities at Stage 3

Institution/ period	Strategy	Structure	Support
Nanchang University 2012-2015	University administration refined policies to promote on-line learning in every course, replacing the individual blended learning course registration process. The Nanchang University Course Quality Evaluation Framework for Undergraduate Programmes (2012) clearly stipulated the adoption of an on-line component in a course as a criterion for faculty members' promotion. At the college level, developing blended learning courses was also considered in the annual academic performance review.	Through department websites, the LMS and QQ, the Educational Technology Centre maintained constant contact with and support to the teaching staff. This included updates on new THEOL developments, new THEOL usage regulations and the publication of policies and standard operating procedures. THEIT continued its customised support for blended learning course and professional development.	On-going professional development workshops on blended learning were normalised and provided to all faculty members. In view of the individual needs of the different colleges at the university, blended learning advisors were sent to the individual colleges to provide discipline-specific training.

Institution/ period	Strategy	Structure	Support
Yangzhou University 2014-2015	The university's policies clearly defined and promoted blended learning as the new mode of learning, replacing the term 'on-line assisted learning'. The university set a specific annual target number of blended learning courses for each college to achieve and stipulated that the effectiveness of these courses should be evaluated and reported in the annual performance reports of each college.	In the last two years, the university ran competitions for model blended learning courses and micro video lectures on THEOL, and the winners qualified for similar competitions at the provincial level. THEIT continued its customised support for blended learning course and professional development.	In response to the rapid increase in video lectures on THEOL, in 2014 a server for streaming video was added to the application and data servers to support the conversion and play of the video lectures. Around 10 professional development workshops with specific themes were offered each semester. Weekly seminars were also held with different sessions on the same theme so that faculty members could book a suitable time on-line. Twenty teaching staff were awarded each year for their excellent blended learning courses.

5. Key elements affecting the implementation of blended learning at the five universities

This section identifies and discusses the key themes emerging from the implementation of blended learning at the five universities that have been instrumental and unique to the

development of blended learning in the Chinese context. The blended learning implementation process discussed in Section 4 reveals the most outstanding feature across the five cases: the strong leadership role of the institution in adopting and implementing blended learning at all three of the stages. This role was most prominent in four key components of the framework proposed in Chapter 1: infrastructure, facilities, resources and support; professional development; policy and institutional structure; and partnership. The other three components in the framework, including vision and philosophy, learning support and research and evaluation, did not emerge as strongly from our data. The four following subsections exposit the effect of the institution on these four key areas.

5.1 Effect of the institution on infrastructure, facilities, resources and support

The leadership role of the institution was clearly manifested in infrastructure building and/or upgrading, which were usually the first decisions the institution made to kick-start the use of information and communications technology (ICT) in teaching, learning and administration. As most of the universities in China remained in a brick-and-mortar learning environment at the turn of the century, installing an LMS (THEOL in the case of the five universities) became the precondition for blended learning adoption. Other infrastructure building requirements for blended learning included installing servers for THEOL and a campus intranet for learning and teaching purposes and building computer rooms at Stage 1. Along with the rapid increase in platform visits at the five universities beginning at Stage 2, as exemplified by Nanchang University and Yangzhou University, continuous upgrading of the servers and software to support learning and teaching became necessary. The university management in each of the five cases proved instrumental in initiating such university-wide infrastructure

building and upgrading at every stage of their blended learning implementation.

5.2 Effect of the institution on blended learning professional development

Unique to this study, the Stage 1 data indicated that blended learning across the five universities was neither advocated nor initiated by individual faculty members at the start. Rather, the faculty members appeared to be quite passive, and the institution actively promoted blended learning from the very beginning. This stands in distinct contrast to the study conducted by Graham et al. (2013), who reported that in Stage 1 individual faculty members implemented blended learning 'on their own terms using an eclectic set of models specifically targeted to their own course contexts' (p. 8).

The institution saw the needs of the faculty to develop a vision, pedagogy and technological competence for blended learning and met those needs with workshops and seminars at both the university and college levels. With the strong support of university management, professional development became integral to blended learning implementation at all five universities. Each university set up its own educational technology centre to provide not only technical support but also blended learning course design and delivery consultation, in the forms of both training workshops and one-on-one consultations. In the case of CTBU, which did not implement strong blended learning policies until 2014, training results were also evaluated and published upon conclusion of the training. All five universities invited blended learning experts from outside bodies such as THETI to provide consultancy on curriculum design and delivery and to share their vision of blended learning at various workshops and seminars.

Overall, all of these professional development activities were initiated from the top, that is, the institution. This accounts for why they were usually run more formally and systematically across the universities, even at the early stages. It stands in contrast to the study by Graham et al. (2013), according to whom '[s]tructures for learning about blended learning at Stage 1 institutions are predominantly informal and "faculty grown"' (p. 8).

5.3 Effect of the institution on policy and institutional structure

The leadership role of the institution emerged most strongly in blended learning policy formulation across the five universities. Three-stage analysis of the blended learning implementation at these universities portrayed a trajectory of policy formulation from no definite and uniform blended learning policy in Stage 1 to a series of specific and concrete policies in Stages 2 and 3. These policies can be divided into three categories: 1) blended learning course application, approval and evaluation; 2) blended learning teaching awards and incentives for excellent course design and content; and 3) institutionalisation of the adoption of blended learning courses as a performance indicator in annual faculty performance reviews. Due to space limitations, we mention only the key policies in Section 4. Numerous specific policies are not included.

Policies related to blended learning course registration, approval and evaluation changed from individual course registration to the compulsory redesign of every course to include an on-line component, as in the case of Nanchang University. Through policymaking, the universities awarded the best blended learning courses and recommended them for provincial or national competitions. The strongest measure for promoting blended learning through policy-making is the establishment

of various incentive schemes, such as awarding the best blended learning courses and teaching staff with certifications and/or monetary incentives as personal income. Different from the findings of Graham et al. (2013), no workload deduction was given in any of the universities. Nanchang University's policy went so far as to specify the adoption of an on-line component in a course as a criterion for the promotion of faculty members and a performance indicator in their annual performance reviews. Such a strong top-down approach has not been reported in the research.

5.4 Effect of the institution on partnership

From the beginning of their blended learning adoption efforts, all five of the universities formed long-term partnerships with THETI, not only because the institute was their LMS provider, but also because all of the universities realised the need for both the technical and pedagogical support it provided. As China's leading institute in educational technology research and development, THETI advocated blended learning to university leaders even before THEOL was purchased and was highly regarded for its expertise in blended learning research and practice. THETI also designated a strong blended learning team to work closely with each of the universities from the day THEOL was installed. Invited by the universities, THETI conducted professional development workshops throughout the three stages of the blended learning implementation and provided consultation on blended learning course design, delivery and evaluation. They also worked closely with university management to formulate blended learning policies and handbooks for course development. Without this strong and close partnership, it would have taken the universities more time to advance their blended learning agendas. Such strategic partnerships are unique to the Chinese higher education context.

In summary, all five of the cases discussed point to the strong leadership role of the institution during the three stages of blended learning implementation, especially in terms of infrastructure building, professional development, policy formulation and partnership. Without such a top-down approach, blended learning implementation in China could not have reached its current level. In a way, the universities' poor technological environments, teaching staff's low awareness of blended learning and traditional Chinese value of strong leadership necessitated the strong leadership role of the institution, especially in the early stages of blended learning implementation.

The other three components in the framework proposed in Chapter 1, including vision and philosophy, learning support and research and evaluation, were not strongly present. None of the five universities had a clear vision for a long-term blended learning strategy, although university management realised the importance of ICT-supported learning as reflected in their early adoption of THEOL compared with other universities in China. The university documents did not indicate that blended learning had become an integral part of their strategic plans. This probably explains why THEOL has gained popularity in the last few years, yet classroom teaching has remained more or less the same. Technology is still being marginalised in learning and teaching practices, especially at the three universities that remain at Stage 2 of their blended learning implementation. No data related to learning support and research and evaluation were collected, not only because they were not the focus of this study, but also because they were unavailable at this stage of blended learning development in China.

6. Conclusion and the way forward

The findings of this study contribute, both theoretically and in practice, to our understanding of blended learning adoption and implementation in universities in China in a number of ways.

The three-stage blended learning implementation framework used by Graham et al. (2013) and Porter et al. (2014) was further validated and found to be effective at charting the developmental stages of blended learning in the Chinese higher education context. More importantly, this study enriched the framework by adding professional development to the support category, as it considered professional development as an integral part of the blended learning implementation process.

In practice, this study advanced our knowledge of blended learning adoption and implementation in Chinese higher education. In this particular context, the institution proved to be pivotal at every stage of blended learning development, as it advocated, led and supported the process with stronger measures than had been reported in the research related to institutional involvement in the non-Chinese context. This top-down approach was particularly strong and crucial at the early stages of blended learning implementation in China. This study also revealed the four essential factors that advanced the development of blended learning in China, including infrastructure building, professional development, policy formulation and partnership.

In the context of Chinese higher education and in view of the current development of blended learning in Chinese universities, the institution remains instrumental in the stage-to-stage transition. As blended learning is still growing in China, future research and practice could focus on how the institution should develop a clearer vision and long-term strategic plans for blended learning, how it can better support both teaching staff and students and how it can help to advance blended learning research and evaluation.

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