

NON-EMPIRICAL RESEARCH

Open Access



Driving, sustaining and scaling up blended learning practices in higher education institutions: a proposed framework

Cher Ping Lim^{1*} , Tianchong Wang¹ and Charles Graham²

Abstract

Higher education institutions (HEIs) have recognised the role of blended learning (BL) in enhancing teaching and learning quality; many of these institutions have implemented BL initiatives as part of their quality enhancement efforts. Despite these efforts, HEIs face sustainability and scalability challenges and issues. There have been pockets of innovative BL practices but these practices are not prevalent across courses and programmes within institutions. In response, this paper proposes a framework to inform institutional strategic planning for driving, sustaining, and scaling up BL practices in HEIs. There are seven strategic dimensions in this framework: (1) *curriculum*; (2) *vision and policy alignment*; (3) *infrastructure, facilities, resources, hardware and support*; (4) *professional development*; (5) *student learning support*; (6) *partnerships*; and (7) *research and evaluation*. When the strategic planning of HEIs considers these strategic dimensions, they are more likely to drive, sustain and scale up BL practices in their institutions.

Keywords: Blended learning, Strategic planning, Institutional adoption, Practical framework, ICT, Higher education

Introduction

The application of information and communications technologies (ICT) has greatly changed the way we live and the way we construct, distribute and reconstruct knowledge. ICT-enabled developments such as video tutorials, open content, and social media challenge existing beliefs about what and how students learn in higher education institutions (HEIs). To harness the potential of these developments, HEIs have been adopting a combination of online and face-to-face modes of teaching and learning. Such hybrid approach to education is often referred to as blended learning (BL) (Garrison and Kanuka 2004; Graham 2006). While researchers of BL are still attempting to establish and verify the learning gains and benefits associated with this model of education (Siemens et al. 2015), there is growth in the adoption of BL in Asia (Eddy et al. 2014; Lim and Wang 2016), Europe (Hughes 2007), North America (Allen et al. 2007),

Oceania (Taylor and Newton 2013), and even in many developing and emerging regions (Alebaikan and Troudi 2010; Bati et al. 2014). Many higher education scholars and practitioners have claimed that BL is ‘*already the norm*’ (Collis and van der Wende 2002, p. 29), the ‘*new traditional model*’ (Ross and Gage 2006, p. 167), or the ‘*new normal*’ in course and programme delivery (Norberg et al. 2011, p. 207). Future learning systems may be differentiated less on whether they blend than on how they blend (Ross and Gage 2006).

With the premises that utilise the “best of both worlds”, HEIs adopt BL to enhance the education quality of improved learning engagement and outcomes, education equity of increased access and flexibility for learners, and/or education efficiency of improved cost-effectiveness (Graham 2006; Lim and Wang 2016). Many scholars and advocates for BL are hopeful that the new pedagogical possibilities of BL could transform student learning outcomes rather than just providing greater efficiencies (Bernard et al. 2014). By harnessing the strengths of each mode of learning (both face-to-face and online), empirical studies of BL have demonstrated its effectiveness in enhancing student learning engagement (Edginton and

*Correspondence: clim@eduhk.hk

¹ The Education University of Hong Kong, 10 Lo Ping Road, Tai Po, New Territories, Hong Kong, SAR, China

Full list of author information is available at the end of the article



Holbrook 2010; Holley and Oliver 2010; Jefferies and Hyde 2010; Martínez-Caro and Campuzano-Bolarín 2011; Wu et al. 2010) and outcomes (Dziuban et al. 2011; Overbaugh and Nickel 2011).

Although the adoption of BL is becoming more widespread across institutions, transformative BL practices are still relatively limited (Collis and van der Wende 2002; Graham and Robison 2007). This may be due to a lack of a system-wide approach towards BL implementation in HEIs where most of the BL practices exist in small pockets across programmes and/or faculties in the HEI. A holistic approach towards driving and support BL practices in the institution could ensure that these practices are sustained and scaled up (Moskal and Cavanagh 2014; Owston 2013).

In theory, the concept of BL might be straightforward; however, in practice, it is complicated to implement (Wang et al. 2015). The effectiveness of BL to enhance quality, equity and efficiency is dependent on the context in which it is adopted and how it is implemented (Garrison and Kanuka 2004). There are implementation challenges and issues at the institutional level that include frontline teaching staff not sharing their HEI's vision for BL to enhance teaching and learning quality (Bohle Carbonell et al. 2013; Taylor and Newton 2013), the gaps between the existing capacity of teaching staff for BL and institutional expectations of its adoption (Porter et al. 2014), staff workload issues (Tynan et al. 2015), and the limited institutional-level support for teaching staff to redesign their courses to a blended format (Kenney and Newcombe 2011). Due to these challenges and issues, HEIs often cannot maintain BL practices over a substantial period of time or cannot effectively adapt the practices to fit a wider and more diverse range of contexts; in other words, BL practices often have limited sustainability and scalability (Owston 2013; Porter and Graham 2016; Sayed and Baker 2014; Tshabalala et al. 2014).

At the same time, the barriers of driving, sustaining and scaling up BL practices in HEIs are often related to *change* (Collis and van der Wende 2002; Garrison 2011). Fullan (1999) suggests that to address this barrier, the institution should not control the change but should guide it (Fullan 1999). Addressing the dynamic nature of change requires HEIs to strategically create mutually supporting internal conditions that facilitate the adoption of BL (Fullan 2007). HEIs then have to engage in strategic planning to drive, sustain and scale up BL practices (Graham et al. 2013). Starting with a desired-end and working backwards to the current status, strategic planning is a practical planning process that concerns what must be done at current stage to reach the desired vision with flexibility in choice of means (Kotler and Murphy 1981). Strategic planning allows HEIs to build consensus around

the focal points of the concerned matter and the necessary steps that have to be taken in a group effort (taking care to involve both the people affected by focal points and those with the ability to designate them).

Therefore, this paper proposes a framework with clearly defined focal points to support institutional strategic planning efforts of BL. The significance of this proposed framework is twofold. First and foremost, the framework would be valuable for BL research community, as research studies of supporting BL at the institutional level have to be informed by a theoretical framework and hence, improving the rigour and validity of strategic planning efforts. Second, the strategic planning dimensions were generated from both researcher and practitioner perspectives through reviewing the literature as well as the promise practises and lessons learned in the region. Such understandings contribute to key directions to drive and support HEIs' BL adoption. In other words, this holistic framework could serve as a set of guidelines for HEI leaders, policymakers, and BL practitioners to develop a comprehensive picture of their current institutional BL adoption and develop more targeted strategies for HEIs to address their limitations, issues or challenges.

Proposing a framework for supporting institutional strategic planning of blended learning

As part of the United Nations Educational, Scientific and Cultural Organization (UNESCO)—Education University of Hong Kong (EdUHK) project, this proposed framework is the product of the collaborative efforts of BL scholars, policymakers and practitioners from leading HEIs in the Asia-Pacific region, in close consultation with higher education leaders, policy-makers and other key HEI stakeholders. It began with the notion that the potential for BL to transform higher education should not be synonymous with a simple desire to introduce BL tools such as a Learning Management System (LMS) to promote education quality and efficiency per se, but rather flow out of considerations of all possible benefits at the macro-level.

The method for developing this framework consisted of seven steps:

1. Gap identification through a landscape review of BL implementation literature.

The databases searched in this review included those identified as relevant to education, ICT and social science. Relevant literatures were, therefore, identified by searching on the ERIC, Citeseer, ScienceDirect, Web of Science, ProQuest, JSTOR, Scopus, Springer-Link and Google Scholar. As a landscape review, the inclusion was restricted not only to the peer-reviewed

journal papers but also reports from reputable sources (private providers, government agencies, large organisations) as well as high-quality popular media articles in the English language published between the years 2007 and 2017. The search terms and phrases for the title, abstract and keywords were searched and identified as related to BL adoption. Synonyms (e.g. 'adopt', 'use', 'harness', 'implement'), antonyms (e.g. 'success', 'failure'), abbreviations (e.g. 'Learning Management Systems', 'LMS'), singular/plural/verbal/adjective forms (e.g. 'challenge', 'challenges'), and broader/narrower terms (e.g. 'blended learning', 'flipped classroom') were also checked. The title and abstracts of the search results were assessed for relevance, and this was verified by another member of the research team.

2. Gap identification through semi-structured interviews with university leaders and teaching staff.

To maximise the valid sources of the gap identification, the researchers conducted semi-structured interviews with dozens of HEI leaders and teaching staff who have previously been involved in a local, joint university BL capacity building initiative in Hong Kong. This step not only allowed the researcher to learn about the challenges encountered and support needed from first-hand perspectives, but also triangulated the data that emerged from the literature.

3. Thematic analyses of findings for emerging categories of challenges.

Thematic analyses (Creswell 2009) of findings were carried out for emerging categories of challenges, regardless of whether those challenges are of a conceptual, pragmatic, non-contextual or contextual nature. Research practices such as member checks and peer examination were conducted to ensure validity and trustworthiness of the findings (Graham 2016).

4. Developing a prototype framework and subsequent strategies through extensive literature review.

Following the procedures mentioned in the first step, an extensive literature review of academic papers and reports on promising practice in BL implementation, as well as studies related to the challenges identified, stemmed from the analysis detailed in step three. The researchers examined literature related to not only teacher practice in implementing BL, but also higher education management strategies behind such implementation. Based on this review, the researchers then developed a prototype framework with tentative strategic

dimensions and possible focal points that concern institutional BL implementation.

5. Validation of prototype framework through focus group meetings.

Two focus group meetings with well-established BL experts in the Asia-Pacific and representatives from leading HEIs in the region were held to discuss the dimensions and focal points of the prototype framework. These meetings made the researchers critically evaluate the strategies identified in the literature review to determine their suitability and feasibility for implementation across HEIs.

6. Validation of prototype framework through case studies.

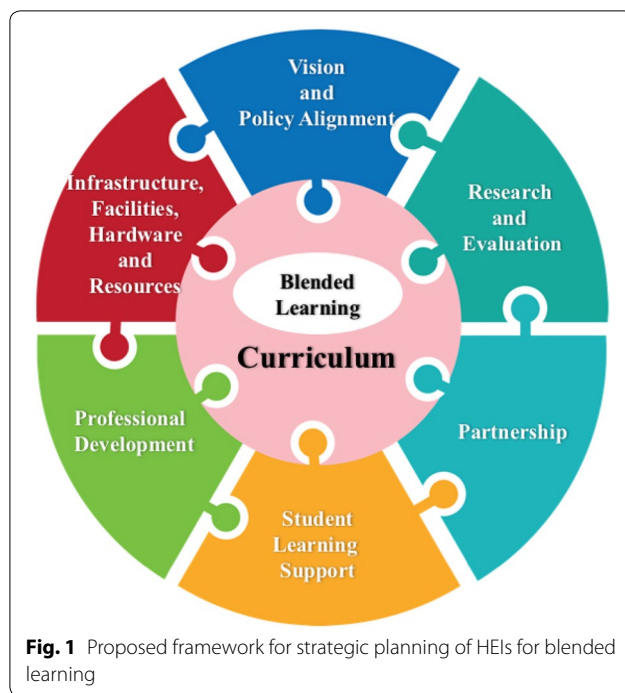
The prototype framework was adopted by selected partner HEIs in the region for this project as lens to make sense of the institutional policies and practices to drive and support BL and guided the documentation of the nine case studies. Most of these case studies focus on specific dimensions of implementation, while the rest, including Han et al. (2016) and Gibson et al. (2016), portray BL implementation at system levels by demonstrating how the framework could be operationalised and how to address gaps identified in the process. By further consulting with HEI leaders, policymakers and BL practitioners involved in these case studies, the researchers triangulated the data gained in steps five through seven and evaluated the potential of the prototype framework to facilitate effective adoption of BL among HEIs in Asia-Pacific.

7. Finalisation of the framework.

Based on the literature review, focus group meetings, case studies and consultations, the researchers gained insights into the opportunities and challenges of implementing BL in Asia-Pacific HEIs, hence allowing the researchers to confirm that the proposed framework was of an appropriate scope.

The proposed framework

The process described in the above section resulted in a framework that comprises of seven strategic dimensions: (a) curriculum; (b) vision and policy alignment; (c) infrastructure, facilities, resources, hardware and support; (d) professional development; (e) learning support; (f) partnerships; and (g) research and evaluation (see Fig. 1). These strategic dimensions are believed to be important avenues for the strategic planning of HEIs for BL.



Through the consideration of such strategic dimensions, there is more flexibility for HEIs to formulate their own conditions for change, therefore, maximising the learning potential of integrating BL in programmes and courses.

Strategic dimension 1: curriculum

Curriculum, in a broad sense, is a systematic and intended packaging of competencies that students need to acquire through organised learning experiences (UNESCO 2016). Curriculum not only gives direction to what will be learned, but also why it is learned and how this learning is facilitated. In higher education, according to Ralph Tyler, four key questions concerning curriculum must be asked: (1) What purpose shall the curriculum serve? (2) What experiences should the institution and its faculty provide to meet these expressed purposes? (3) How might the curriculum be organised most effectively? (4) How can one best determine the outcomes of learning—the purposes and attainment of the curriculum? (Tyler 2013).

Since content knowledge is continuously evolving and new knowledge is rapidly being generated, contemporary curricula can no longer be solely reliant on the transmission of content knowledge from teaching staff to students (Jonassen 2011). Instead, curriculum orientation and design should contribute to a balance between the acquisition of relevant knowledge learners must apply in the context of their lives and the development of *twenty-first century competencies* (Dede 2010; Pellegrino and Hilton

2013; Trilling and Fadel 2009), their universal toolkit to process, analyse and create the knowledge and cope with the developments of the knowledge economy (Levy and Murnane 2004). The hierarchical Bloom's revised taxonomy of learning domains (Anderson et al. 2001) asserts students need to progress from lower-order receptive cognition, for example, remembering and understanding, to higher-order productive cognition, which includes applying, analysing, evaluating, and lastly, creating.

The concluding stage of formal learning is higher education, which can be regarded as the penultimate institution of a student's educational career in cultivating his/her twenty-first century toolkit (Barnett and Coate 2004). HEIs, as a result, should go beyond the traditional scope of merely delivering content knowledge through PowerPoint presentations, but instead, encouraging higher-order thinking that ultimately develops both academic knowledge and twenty-first century competencies at all three levels of programme, course and classroom. BL, as a tool for realising such outcomes, therefore, must be appropriate pedagogically and may incorporate opportunities for using online tools that scaffold students' learning, to support or to be supported by face-to-face learning.

It is necessary to rethink curriculum matters beyond what is taught, how teaching staff deliver this content, how it is learned, and when and where learning occurs, so that students are assessed in a way that places learning at the centre of educational activities. An essential component of curriculum is assessment, and education in the knowledge era places a high value on creating a system where *assessment of learning*, used for reporting, selection and accountability, is balanced with *assessment for learning*, which is mostly employed for interpreting learning processes and seeking learning improvements. Assessment signals to teaching staff and students what is important about the learning, and vice versa. The assessment tasks need to be aligned to the teaching and learning activities so that they valid and meaningful.

In such a system of interrelationships, assessment tasks should be redesigned to take up the opportunities of ICT. For example, students' learning can be supported through formative assessment, to overcome inhibiting circumstances within their learning, including rectifying misconceptions with positive and constructive feedback and providing opportunities to act upon this feedback through the learning process (Shute 2007). Formative assessment, in addition, offers valuable information such as 'feed forward,' allowing teaching staff to refine their teaching as necessary (Yorke 2003). BL offers new possibilities for formative assessment, as it allows for timely and personalised responses from teaching staff and peers (Gikandi et al. 2011). For such potential to be

materialised, however, teaching staff need to be experienced in a range of online technologies to keep track of student learning progress and offer formative feedback in numerous channels, for example, via e-portfolios or discussion forums in the LMS. In addition, promising BL practice requires teaching staff to identify and carry out suitable assessment approaches and strategies for both face-to-face lessons and online components of learning experiences (Laurillard 2014). Learning that focuses on students' understanding, their ability to reason and to apply knowledge, for example, should include open-ended questions as opposed to commonly used multiple-choice questions, because these exercises require more input from students.

Strategic dimension 2: vision and policy alignment

A vision is a descriptive picture of an HEI's future. Although it may not specify BL explicitly, the vision informs the formulation of policies and practices that drive and support BL. For example, the vision of an institution is to provide all students with access to high-quality teaching and learning. The institution then adopts BL to work towards the realisation of this vision. To support teaching staff to adopt BL in their courses, the institution revises its teaching workload policy to ensure that the workload for face-to-face lessons is similar to online ones, and develops a professional development policy that requires all teaching staff to engage in 50 h of professional development per academic year.

Therefore, in order for HEIs to successfully implement BL, they need a clear vision of BL environments grounded in their underlying philosophies for teaching and learning. Using educational arguments that are clearly articulated and uniformly accepted in support of BL, teaching staff will have the ability to advance the institution's vision and educational philosophy forward and, thus, offer students learning experiences that are more engaging and meaningful. In addition, to make the articulated vision implementable and sustainable, open communication with institution members is important.

Shared vision for blended learning in higher education

HEIs must construct a shared institutional vision on how it can alter ICT-supported learning environments for students to be engaged, as well as develop their twenty-first century competencies (Bates and Sangra 2011). For this to happen, HEIs could begin with envisioning the ultimate aims and outcomes they wish to achieve from institutional, teaching staff and student perspectives (Moskal et al. 2013). The main reasons HEIs adopt BL are often to refine learning outcomes, offer students greater access and flexibility, and improve cost-effectiveness (Graham 2006). However, teaching staff and institutional leaders

may prioritise these objectives differently, which can result in counter-productive tension between the two entities. This necessitates the careful consideration and the redesign of learning environments and experiences supported by the determined efforts of all staff within the HEI.

Underlying rationale for teaching and learning in blended learning environments

In the present society, students are often required to have capabilities of the problem identification and the ability to enquire to find solutions (Levy and Murnane 2004). At the core of meaningful learning experiences is student enquiry, which can be fostered by two extricable linked components—reflection and discourse (Garrison 2011). Asynchronous online learning experiences provide students with opportunities to meaningfully reflect on the material they have covered. Campus-based classrooms that have large student–teacher ratios usually do not offer students a condition conducive to reflection. If learning is provided in two modes, and activities are conducted in a planned, pedagogically meaningful manner, these modes work symbiotically to increase learning potential. To put such thinking into practice, BL in higher education must first of all focus on learning, and subsequently, through technology, learning enhancement. Learning outcomes decide how ICT can be adopted to cater to student learning needs.

Reconsidering the role of blended learning in HEIs

HEIs have, since the post-war era, transformed themselves from simply preparing students for academia, that is, to develop, conserve and transmit academic knowledge, to teaching professional knowledge for employment. The information economy and knowledge society of today, however, has shown that HEIs have the responsibility and educational goal to focus on developing students' twenty-first century competencies, which are the set of crucial competencies graduates must hold so to survive and be employed in the knowledge society (Ananiadou and Claro 2009). BL has to be aligned to meet this educational goal.

Additionally, because of new possibilities that are the result of emerging technologies, HEIs and their teaching staff would require to continuously emerge new interpretations of *blending* and *learning*, including activity types and the proportion of a course delivered online (Sharpe et al. 2006). In other words, HEIs can adapt and use BL as they see fit and develop their unique approach. For example, the introduction of online virtual laboratories beyond the limits of an HEI's physical laboratory space allows new types of learning opportunities for risk-free, repeatable experimentation and simulation (Diwakar et al. 2015).

The flipped teaching is another recent example of BL that reallocates the time between lectures and classroom discussion. In flipped teaching, students access lectures (often video-based) at home to prepare for face-to-face classroom discussions, which facilitate student reflection and enquiry to cultivate deeper thinking, and also support adaptive teaching in a learner-centric paradigm.

The alignment of policy and institutional structure

Policies with an appropriate organisational structure can facilitate organisational change and development (De Freitas and Oliver 2005). HEIs need to articulate their BL master plan, corresponding policies, guidelines and mechanisms aligned with the vision, to encourage their teaching staff to be actively involved in BL. For instance, since freedom and autonomy are essential in motivating teaching staff to innovate (Pink 2011), grassroots BL projects should be allowed to flourish through policies that enable, not inhibit, teaching innovations. Incentives are another important factor because they send an obvious indication to teaching staff of what the HEI appreciates. When teaching staff are aware that actively using BL contributes towards promotion and tenure, or that using BL is a fundamental part of regular staff assessment, there is a greater chance they will fully engage in BL practices. That being said, positive student evaluations also count toward career advancement among teaching staff, and some teaching staff may be reluctant to try a new modality due to an increased risk of receiving negative student evaluations. Teaching staff should, thus, be supported and rewarded for the steps in implementing BL strategies, which might differ significantly from their previous methods of practice. It is also crucial to notice that context, including student population and faculty culture, is a key factor for constructing reasonable and workable policies. It should be understood among teaching staff and institutional leaders that the impact of such policies does not always come quickly, but may be seen over a span of several years of continuous effort.

Institutional advocacy through the establishment of a new institutional structure could lead and support BL initiatives in HEIs (Porter et al. 2014). A BL Steering Committee, for example, that reports to the Provost/Vice-President (Academic or Teaching and Learning), has strategic leadership responsibility to provide oversight for BL initiatives in HEIs. A Coordinating Council, which reports to the Steering Committee, will have the responsibility to facilitate collaboration and oversee the development of shared standards that guide the work undertaken across administrative and academic units. Individual BL advocates or instructional designers may be positioned in each faculty, with the responsibility of guiding suitable BL practices that meet the disciplinary needs

of an HEI. In each of these groups, members should have considerable knowledge of the challenges teaching staff face in implementing new learning strategies, as well as the challenges students may have in adopting new learning methods, and understand that meaningful progress in BL implementation will require considerable time and energy at all levels.

Strategic dimension 3: infrastructure, facilities, hardware, resources and support

Integrating BL into existing teaching and learning practices in higher education needs the establishment of an appropriate plan for technological infrastructure, architecture and ongoing operations.

Infrastructure, facilities and hardware

Although the presence of ICT per se is not the motivator for changes to take place, HEI's ICT readiness is still fundamental for the success of BL (Niemiec and Otte 2010). Establishing BL requires conscientious management of physical infrastructure and human resources, supported with adequate financial resources. HEIs should plan cautiously with vendors to ensure they fulfil sufficient capacity and reliability to meet student and teaching staff needs at all times, and should have scalability blueprints to grow the infrastructure as usage and demand increase.

The crucial components of infrastructure, facilities and hardware comprise a campus-wide wireless network, technology-rich learning commons, redesigned classrooms with dynamic layouts and digital learning device ownership schemes for teaching staff and students. Bring Your Own Device (BYOD) initiatives can facilitate individualised and self-paced learning, as well as collaborative group work among students. Infrastructure and facilities require periodic updates to accommodate evolving teaching methods, and changes in the learning needs of teaching staff and students.

Teaching and learning resources

Teaching staff often individually develop their own teaching and learning resources using online tools, making them available to students. In many HEIs, it is not yet common practice for such resources to be shared among teaching staff or between courses. The resources developed are invaluable materials, additionally having the advantage of being recycled and/or improved upon. Archiving digital assets (e.g., in a repository) is essential to facilitate the sharing and managing of resources (Laurillard 2014). While many HEIs are exploring how a repository may be combined with their own institution-hosted LMSs, so that teaching staff can draw upon archives for course events, the last 3 years have also seen the system offered as a feature of cloud-based LMSs, with

reusable educational content from other institutions or the public domain—this can be a strategic asset especially for smaller institutions.

One way to optimise the use of archived course materials is allowing staff in teaching groups to delegate the development of teaching materials; each teacher is responsible for creating materials for specific course topics and then distributing these materials to the group. This facilitates the sharing of resources and, in turn, supports BL within courses. Besides the in-house archived digital assets, Open Educational Resources (OERs), either in the public domain or put into circulation under an open licence, may be employed to relieve shortages of online materials available for blended courses.

Technical and service support

Technical and service support is only adequate if a team of dedicated technicians, and possibly learning technology specialists, with relevant skills and experience are on hand. As the support required usually comprises step-by-step instructions and troubleshooting, it may be necessary, therefore, that team members provide one-to-one support for individual teaching staff to demonstrate what is technologically feasible and how ICT solutions may be utilised in a BL context (Davis and Fill 2007). This can be done in various forms, including telephone support, voicemail with call-back, e-mail, instant messaging, tutorial video, FAQ document, and walk-in service.

Strategic dimension 4: professional development of teaching staff

Crucial to the successful implementation of BL practices is the role of teaching staff (Garrison and Vaughan 2008). Despite being experts in their respective fields, teaching staff may not have the necessary expertise and experience to plan for and implement BL in their courses. The initiation of BL may be a challenge to teaching staff and, as a result, they may need to review their roles in ICT-supported learning environments. Hence, HEIs should be a provider of appropriate continuing professional development (PD) on BL. One-off workshops and seminars are insufficient to adequately support teaching staff in adapting their teaching and learning methods.

PD conditions and measures

Without motivated teaching staff who are dedicated and prepared to learn and adapt their teaching style and methods, it is most likely that BL initiatives in HEIs are likely to fail. “...*Teachers have to feel that there is some compelling reason for them to practice differently*” (Elmore 1996, p. 24). Hence, to support PD, teaching staff need to be convinced why BL is necessary. Because teaching staff are primarily driven by what is best for students (Porter

et al. 2016), it is important that they appreciate how BL can expose new opportunities to enrich their teaching and learning (Vaughan 2007). This involves emphasising the distinction between meaningfully incorporating e-learning technologies in a hybrid delivery mechanism, as compared to simply placing some course content online (Donnelly 2010).

In addition to understanding why BL is a superior educational approach, teaching staff should be equipped with the required technical skills. These may be acquired through workshops available to either all staff or customised to specific faculties/departments. Technical training must be done with caution as programmes with one-size-fits-all training methods—which assume all teaching staff have the same capacity to use technology—pose a higher risk of failure. Evaluations before the PD programme may help trainers to identify differentiated areas for improvement and provide adaptive instruction. Additionally, the subject of these workshops should be frequently reviewed and improved to suit teaching staff’s diverse needs for self-development.

Despite the possible benefits of these measures, it is possible that such workshops could be concerned more with the *how to* issues of implementation than with developing a deep understanding of the rationale. Therefore, establishing a separate unit for driving BL at central level, for example, Centre for Teaching and Learning, would contribute to lead PD beyond technical skills training. This is because teaching staff need to develop the awareness that PD, in addition to technical competencies development, strengthen their understanding of the paradigmatic shift in the nature of teaching and learning created throughout adopting BL within HEIs. The unit should also offer pedagogical advice and support for BL design, from conception to execution and review, and grant application aid to implement new BL tools or strategies.

Encouraging peer support is a prominent measure of PD (Kwo 2001). Peer support involves a collaborative process with components of help, trust and personal relationship. It may, therefore, be more suitable in addressing teaching staff’s individual needs. Teaching staff with experience of BL may model their practices to peers in the course team, department, faculty or HEI. When modelling is combined with peer coaching, it may assist in addressing the hesitation or resistance other teaching staff may have when integrating BL within their courses (Garrison and Vaughan 2008).

An environment that is nurturing and where teaching staff can self-reflect in mutually beneficial relationships can help to lessen the isolation of classroom practices. Fostering Communities of Practice (CoP) (Wenger 2000) may deepen the teaching staff members’ understanding

particular aspects of the BL paradigm. Group activities with staff members who share a concern and passion for BL can generate new or deeper levels of knowledge. Ultimately, the collective knowledge can be transferred into individual practices.

Reward and incentive schemes act as a necessary contributory condition for PD. Such schemes can include awarding PD grants on a competitive basis to teaching staff who show interest in implementing BL practices. Individuals or teams may propose PD activities with the aim of building communities, developing mentorships or redesigning their course(s) to fully integrate BL. Staff who participate in PD programmes from other PD agencies may be rewarded with subsidies. Teaching staff who have undertaken BL PD programmes or received PD grants and subsidies may, as a direct result, be factored into the staff appraisal system (Odden and Kelley 2002). Non-financial awards such as merits and recognition are another means by which teaching staff can be encouraged (Odden 2001); for teaching staff to be motivated to change, there must be sufficient recognition measures in place.

PD culture

The most important aspect of PD culture is the fundamental understanding that PD is a lifelong process and that teacher knowledge has to be continuously upgraded in order for keeping students engaged in learning (Darling-Hammond and Bransford 2007). Policies and strategies that are supportive and liberal could assist in developing PD culture. One example is the encouragement of sharing BL practices. As a norm, sufficient opportunities must be given for teaching staff—perhaps grouped according to their specific disciplines—to be involved in reflective conversations, constantly and regularly, to review their plan and practice together, to discuss challenging circumstances, to share new BL tools, etc. It should be noted that although ICT practices are often specific to certain disciplines, sharing innovations between disciplines can also help to promote effective BL implementation throughout the HEI. Moreover, well-connected and supportive PD culture can assist teaching staff in developing action plans that shape future practices.

Strategic dimension 5: student learning support

Although there have been claims that today's students would be classed as 'digital natives' (Prensky 2001) whose daily routines could be heavily influenced using technology, more evidences show a contrary reality; studies found that the patterns of access to and adoption of ICTs among students had shown considerable variation (Kennedy et al. 2008). That means, it has to be acknowledged

that not all students possess digital devices that can be used for academic purposes. This can hamper their ability to learn in a BL environment. Thus, learning support may start with loaning laptops or tablets to students in need, to bridge this digital divide within an HEI.

Additionally, studies have reported that students often have unbalanced development for using technology to assist in learning because they more often adopt it for entertainment and communication purposes than for constructing and generating knowledge (Duncan-Howell 2012; Wang et al. 2014). To strategically use technological tools for their own learning, students need technical support and educational guidance. They also need appropriate guidance to learn independently and at their own pace, particularly within the online learning environment. One part of the solution might be to introduce BL strategies in a freshman level skills course, or possibly during the orientation period, so that students could ease into what is likely to be an unfamiliar education paradigm. A gradual introduction to BL would also help to reduce unnecessary tension between students and teaching staff. This would, in turn, encourage teaching staff to continue employing the blended approach with greater confidence, as they would be less likely to receive negative evaluations from students who feel they are being forced to change their learning style without adequate guidance or support.

To make such efforts sustainable, student support that is just-in-time and ongoing needs to be freely available in HEIs, so that students can be guided and scaffolded to learn in a BL environment. Dedicated one-stop advisory centres where students can seek assistance, advice and training can be in position at HEIs. These centres can encourage students to grow into active, independent and self-regulated learners by means of sharing sessions and one-to-one coaching with professionally qualified counsellors. It is worth noting that "one size does not fit all", is also applicable to students, whose characteristics and needs are diverse. For example, since there are gender differences in learning strategies (Blum 2005), gender considerations must be acknowledged.

HEIs should still take responsibility to assist in developing students' digital wisdom (Prensky 2011), which goes beyond functional technology skills to describe a richer set of digital behaviours, practices and identities. Such assistance could include training in isolating relevant information from swathes of data and how to ethically use information. To facilitate this, HEIs can organise tutorials on these topics, for example, through the library service.

Strategic dimension 6: partnerships

Experience has shown that facilitating change is a team effort, and no HEI is likely to have everything needed to succeed in change (Hall and Hord 2015). It is often found that HEIs can build mutually beneficial partnerships that tap into each party's expertise and experience (Shubber 2008). Two types of partnership may be built in pursuit of BL: internal and external.

Internal partnerships more often than not involve faculties collaborating with the ICT-support unit and teaching and learning support unit to assist and promote BL practices. Inter-faculty collaboration, for example, sharing resources and best practices across disciplines, should be actively encouraged. This can help to reduce duplication of resources, and further optimise investment at faculty level. The previously mentioned coordinating council could play a key role in building and sustaining such a partnership.

Additionally, globalisation enables HEIs to unite across international borders and work collaboratively to obtain collective aims with regard to sharing technology, research, values or resources in order that best practices in BL are advanced. BL innovations may be more effective when ideas are shared between and among HEIs, for example, via an inter-institutional exchange or within a consortium.

External partnerships may involve consultation and dialogue with government agencies and NGOs to formulate a scalable funding mechanism to secure the financial resources needed to provide full support for BL. HEIs can also work with private-sector companies such as Microsoft, Intel and Apple, or open-source communities such as Moodle. Such partnerships offer HEIs opportunities to explore varying education technologies, with the capability to formulate the direction of future BL practices within the institution and with industry experts. Financial and professional support can be gained from the public- and private sectors attentive to the pedagogical improvement of higher education. Conversely, these entities benefit from research conducted by partner HEIs.

Strategic dimension 7: research and evaluation

BL practices need to be directed and supported by published research and evaluation. Therefore, the need to revise and refine for quality enhancement of teaching and learning in HEIs is ongoing (Fry et al. 2009). Piloted projects should be conducted to try out possibilities and potentials before large-scale implementation is deliberated. This important stage may assist HEIs in identifying and addressing potential complications and, in addition, gauge the feedback of teaching staff members and students to a new initiative before full-scale implementation.

Research and evaluation may also involve analysis of 'big' data from learning analytics (Ferguson 2012) and visualisation to provide evidence on engagement, collaboration and outcomes. This data-informed evidence may hearten additional teaching staff in adopting BL as a feasible learning method and encourage HEI leaders to support BL practices through policy initiatives. Furthermore, it could help HEIs to streamline their BL programmes by identifying effective implementations. Some data could also prove useful from a PD standpoint, in that it would provide individual teaching staff with evidence-based suggestions for enhancing their BL methods.

To better understand promising teaching practices, so that other teaching staff exploring the use of BL in their courses are better informed, case studies (Creswell 2009) could be undertaken by research groups at the institutional level (e.g. Graham and Robison 2007; King and Arnold 2012; Motteram 2006). Through action research (Elliot 1991), teaching staff motivated in BL may document their practices and results. Similar to PD and Policy, incentive schemes that promote and reward academic activities related to BL may also be provided. This would strengthen the research-teaching nexus.

Conclusions and future directions

With an understanding of the challenges currently faced by HEIs, this paper proposes a framework to support institutional strategic planning for driving, sustaining, and scaling up BL practices in HEIs. Seven strategic dimensions are included within this framework and are discussed in detail: curriculum; vision and policy alignment; infrastructure, facilities, resources, hardware and support; professional development; student learning support; partnerships; and research and evaluation (see Fig. 1). We believe that when the strategic dimensions of our framework are considered thoroughly, and with the concerted effort of relevant HEI stakeholders, the promising practices of BL in higher education may be achieved and facilitated in a sustainable, scalable manner.

Informed by the dimensions of the framework, the key strategies for HEIs to drive and support BL are:

1. Review and revise the existing curriculum to take up the opportunities of blended learning for enhanced access to quality higher education. Mainstreaming BL in HEIs necessitates a revision of the existing curriculum, assessment and teaching and learning strategies. BL provides HEIs with the opportunities to integrate the development of twenty-first century competencies into their curriculum as expected institutional learning outcomes. In order for BL to support students to monitor and manage their own learning, HEIs have to move away from the overem-

phasis on assessment of learning towards assessment for learning. Teaching and learning strategies then have to be aligned to such transformations in the curriculum and assessment where students are at the centre of the learning environment and process.

2. Formulate new institutional policies and/or revise existing ones to drive and support blended learning in the HEI to fulfil the institutional vision. Institutional policies have to be aligned to the vision to establish buy-in and motivate teaching staff to engage in BL. Misaligned policies may create tensions between institutional leaders and teaching staff or among teacher staff that hinder the adoption of blended learning in the HEI.
3. Manage infrastructure, facilities, hardware and resources to support teaching staff who are engaged in blended learning. Teachers are more likely to adopt BL when the learning environment is conducive for them and their students to engage in blended learning. The support available not only includes infrastructure, facilities, hardware and resources, but also technical support from students helpers or technical staff. When teaching staff feel supported, they are more likely to explore different online tools to enhance their blended learning practices.
4. Design, develop and implement a professional development program, and nurture a professional development culture. The professional development program has to build the capacity of teaching staff by providing staff with opportunities and support as they engage in blended learning practices. The teaching staff should feel safe and supported as they explore how blended learning could enhance student learning engagement and outcomes. A nurturing professional development culture will provide such a safe and supportive environment where colleagues share promising practices, challenges and lessons learnt, and peer coach one another in a professional learning community.
5. Plan for and provide student learning support. Because many students may not have the experience of using ICT to learn in an educational context, HEIs will need to support students learning online by offering workshops to use the online tools and platform, and, more importantly, strategies for learning online. To accommodate students' diverse ICT and learning competencies, well-scaffolded courses to guide students as they engage in BL should be a key aspect of curriculum design and planning.
6. Build and sustain internal and external partnerships to support the blended learning initiative and practices. As the implementation of BL is a considerable endeavour, HEIs need to ensure robust partnerships

at the institutional level, along with mutually beneficial external partnerships with private and public organisations. Working with technology corporations, government bodies and education-related NGOs both domestically and abroad, HEIs could build better infrastructure and acquire up-to-date hardware, and engage in collaborative research to enhance BL practices.

7. Engage in and plan for research and evaluation of the blended learning initiative and practices. To justify the investment on BL and to continually improve upon BL-related policies and practices, research and evaluation have to be part of the institutional strategic plan for BL. The policies and practices have to be informed by research findings and the impacts of BL practices on student learning engagement and outcomes have to be evaluated and documented.

As we are in the frontline of advocating for an institutional approach towards the adoption of BL, our ongoing and future work will include evaluating how effective the framework and its strategies are in addressing the challenges of BL adoption by HEIs in the less developed areas of the Asia–Pacific region (e.g. Lim et al. in press). This will help us to gain a deeper understanding of the unresolved tensions and issues within and across the dimensions of the framework in contexts where BL has never been adopted. Ultimately, we hope the framework could serve as an empowering tool for driving, sustaining and scaling up BL practices in HEIs across different contexts.

Authors' contributions

CPL is the first and corresponding author with 75% of the contribution. TW contributed 15% and CG 10%. All authors read and approved the final manuscript.

Funding

This paper is one of the outputs of the project co-funded by UNESCO Asia–Pacific and EDUHK-FEHD (Grant No. R2150): Building the Capacity of Asian Universities for Blended Learning.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Author details

¹ The Education University of Hong Kong, 10 Lo Ping Road, Tai Po, New Territories, Hong Kong, SAR, China. ² Brigham Young University, Provo, UT 84602, USA.

Received: 29 January 2019 Accepted: 3 October 2019

Published online: 06 November 2019

References

- Alebaikan, R., & Troudi, S. (2010). Blended learning in Saudi universities: Challenges and perspectives. *ALT-J Research in Learning Technology*, 18(1), 49–59. <https://doi.org/10.1080/09687761003657614>.
- Allen, I. E., Seaman, J., & Garrett, R. (2007). *Blending in: The extent and promise of blended learning education in the United States*. Needham, MA: Sloan-C.
- Ananiadou, K., & Claro, M. (2009). 21st century skills and competences for new millennium learners in OECD countries. *OECD Education Working Papers*, 41.
- Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., et al. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Pearson, Allyn & Bacon.
- Barnett, R., & Coate, K. (2004). *Engaging the curriculum in higher education*. London: McGraw-Hill Education.
- Bates, A. T., & Sangra, A. (2011). *Managing technology in higher education: Strategies for transforming teaching and learning*. San Francisco, CA: Jossey-Bass.
- Bati, T. B., Gelderblom, H., & Van Biljon, J. (2014). A blended learning approach for teaching computer programming: Design for large classes in Sub-Saharan Africa. *Computer Science Education*, 24(1), 71–99. <https://doi.org/10.1080/08993408.2014.897850>.
- Bernard, R. M., Borokhovskiy, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education*, 26(1), 87–122. <https://doi.org/10.1007/s12528-013-9077-3>.
- Blum, K. D. (2005). Gender differences in asynchronous learning in higher education: Learning styles, participation barriers and communication patterns. *Journal of Asynchronous Learning Networks*, 3(1), 46–66.
- Bohle Carbonell, K., Dailey-Hebert, A., & Gijssels, W. (2013). Unleashing the creative potential of faculty to create blended learning. *The Internet and Higher Education*, 18, 29–37. <https://doi.org/10.1016/j.iheduc.2012.10.004>.
- Collis, B., & van der Wende, M. (2002). *Models of technology and change in higher education: An international comparative survey on the current and future use of ICT in higher education*. Enschede, The Netherlands: Center for Higher Education Policy Studies, University of Twente.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Newbury Park, CA: Sage Publications.
- Darling-Hammond, L., & Bransford, J. (Eds.). (2007). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco: Jossey-Bass.
- Davis, H. C., & Fill, K. (2007). Embedding blended learning in a university's teaching culture: Experiences and reflections. *British Journal of Educational Technology*, 38(5), 817–828. <https://doi.org/10.1111/j.1467-8535.2007.00756.x>.
- De Freitas, S., & Oliver, M. (2005). Does e-learning policy drive change in higher education?: A case study relating models of organisational change to e-learning implementation. *Journal of Higher Education Policy and Management*, 27(1), 81–96. <https://doi.org/10.1080/13600800500046255>.
- Dede, C. (2010). Comparing frameworks for 21st century skills. In J. Bellanca & R. Brandt (Eds.), *21st Century skills: Rethinking how students learn* (pp. 51–75). Bloomington, IN: Solution Tree Press.
- Diwakar, S., Kumar, D., Radhamani, R., Nizar, N., Nair, B., Sasidharakurup, H., & Achuthan, K. (2015). Role of ICT-enabled virtual laboratories in biotechnology education: Case studies on blended and remote learning. In *Proceedings of 18th international conference on interactive collaborative learning (ICL2015)* (pp. 915–921). Florence, Italy.
- Donnelly, R. (2010). The nature of complex blends: Transformative problem-based learning and technology in Irish higher education. In Y. Inoue (Ed.), *Cases on online and blended learning technologies in higher education: Concepts and practices* (pp. 1–22). Hershey, PA: IGI Global.
- Duncan-Howell, J. (2012). Digital mismatch: Expectations and realities of digital competency amongst pre-service education students. *Australasian Journal of Educational Technology*. <https://doi.org/10.14742/ajet.819>.
- Dziuban, C., Hartman, J., Cavanagh, T. B., & Moskal, P. D. (2011). Blended courses as drivers of institutional transformation. In A. Kitchenham (Ed.), *Blended learning across disciplines: Models for implementation* (pp. 17–37). Hershey, PA: Information Science Reference.
- Eddy, L. J., Nor-Aziah, A., & Jasmine, J. (2014). Blended learning: Examining concepts and practices. In E. Mohamed-Amin (Ed.), *Blended & flipped learning: Case studies in Malaysian HEIs*. Bangi: Pusat Pengajaran & Teknologi Pembelajaran, Universiti Kebangsaan Malaysia.
- Edginton, A., & Holbrook, J. (2010). A blended learning approach to teaching basic pharmacokinetics and the significance of face-to-face interaction. *American Journal of Pharmaceutical Education*, 74(5), 1–11. <https://doi.org/10.5688/aj740588>.
- Elliot, J. (1991). *Action research for educational change*. Milton Keynes: Open University Press.
- Elmore, R. F. (1996). Getting to scale with good educational practice. *Harvard Educational Review*, 66(1), 1–26. <https://doi.org/10.17763/haer.66.1.g73266758j348t33>.
- Ferguson, R. (2012). Learning analytics: Drivers, developments and challenges. *International Journal of Technology Enhanced Learning*, 4(5–6), 304–317. <https://doi.org/10.1504/IJTEL.2012.051816>.
- Fry, H., Ketteridge, S., & Marshall, S. (2009). *A handbook for teaching and learning in higher education: Enhancing academic practice*. New York: Routledge.
- Fullan, M. (1999). *Change forces: The sequel*. Philadelphia, PA: Falmer Press.
- Fullan, M. (2007). *The new meaning of educational change* (4th ed.). New York: Teachers College Press.
- Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice*. New York: Routledge.
- Garrison, R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7, 95–105. <https://doi.org/10.1016/j.iheduc.2004.02.001>.
- Garrison, D. R., & Vaughan, H. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Francisco: Jossey-Bass.
- Gibson, D., Broadley, T., & Downie, J. (2016). Blended learning in a converged model of university transformation. In C. P. Lim & L. Wang (Eds.), *Blended learning for quality higher education: Selected case studies on implementation from Asia-Pacific* (pp. 235–263). Paris: UNESCO.
- Gikandi, J., Morrow, D., & Davis, N. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57(4), 2333–2351. <https://doi.org/10.1016/j.compedu.2011.06.004>.
- Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco: Pfeiffer Publishing.
- Graham, C. R. (2016). Case studies: An authentic research method. In C. D. Dziuban, A. G. Picciano, C. R. Graham, & P. D. Moskal (Eds.), *Conducting research in online and blended learning environments: New pedagogical frontiers* (pp. 97–113). New York: Routledge.
- Graham, C. R., & Robison, R. (2007). Realizing the transformational potential of blended learning: Comparing cases of transforming blends and enhancing blends in higher education. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 83–110). USA: The Sloan Consortium.
- Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *The Internet and Higher Education*, 18, 4–14. <https://doi.org/10.1016/j.iheduc.2012.09.003>.
- Hall, G. E., & Hord, S. M. (2015). *Implementing change: Patterns, principles, and potholes* (4th ed.). Upper Saddle River, NJ: Pearson Education.
- Han, X., Wang, Y., Li, B., & Cheng, J. (2016). Case study of institutional implementation of blended learning at five universities in China. In C. P. Lim & L. Wang (Eds.), *Blended learning for quality higher education: Selected case studies on implementation from Asia-Pacific* (pp. 265–296). Paris: UNESCO.
- Holley, D., & Oliver, M. (2010). Student engagement and blended learning: Portraits of risk. *Computers & Education*, 54(3), 693–700. <https://doi.org/10.1016/j.compedu.2009.08.035>.
- Hughes, G. (2007). Using blended learning to increase learner support and improve retention. *Teaching in Higher Education*, 12(3), 349–363. <https://doi.org/10.1080/13562510701278690>.
- Jefferies, A., & Hyde, R. (2010). Building the future students' blended learning experiences from current research findings. *Electronic Journal of e-Learning*, 8(2), 133–140.
- Jonassen, D. H. (2011). *Learning to solve problems: A handbook for designing problem-solving learning environments*. New York: Routledge.
- Kennedy, G. E., Judd, T. S., Churchward, A., Gray, K., & Krause, K. L. (2008). First year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology*. <https://doi.org/10.14742/ajet.1233>.
- Kenney, J., & Newcombe, E. (2011). Adopting a blended learning approach: Challenges encountered and lessons learned in an action research

- study. *Journal of Asynchronous Learning Networks*, 15(1), 45–57. <https://doi.org/10.24059/olj.v15i1.182>.
- King, S. E., & Arnold, K. C. (2012). Blended learning environments in higher education: A case study of how professors make it happen. *Mid-Western Educational Researcher*, 25(1–2), 44–59.
- Kotler, P., & Murphy, P. E. (1981). Strategic planning for higher education. *The Journal of Higher Education*, 52(5), 470–489. <https://doi.org/10.2307/1981836>.
- Kwo, O. W. Y. (2001). Peer support for professional learning: Rewards and challenges. In D. Kember, S. Candlin, & L. Yan (Eds.), *Further case studies of improving teaching and learning from the Action Learning Project* (pp. 307–320). Hong Kong: Action Learning Project.
- Laurillard, D. (2014). *Thinking about blended learning*. London: UCL Institute of Education. Retrieved from http://kvab.be/denkensprogramma/files/DP_BlendedLearning_Thinking-about.pdf.
- Levy, F., & Murnane, R. J. (2004). *The new division of labor: How computers are creating the next job market*. Princeton, NJ: Princeton University Press.
- Lim, C. P., & Wang, T. (2016). A framework and self-assessment tool for building the capacity of higher education institutions for blended learning. In C. P. Lim & L. Wang (Eds.), *Blended learning for quality higher education: Selected case studies on implementation from Asia-Pacific* (pp. 1–38). Paris: UNESCO.
- Lim, C. P., Wang, T., Nith, B., & Mak, N. (in press). Adopting blended learning to close the urban-rural higher education quality gap: A STEM course in three Cambodian Universities. In C. P. Lim & C. R. Graham (Eds.), *Blended learning for quality access in Asian universities*. Singapore: Springer.
- Martínez-Caro, E., & Campuzano-Bolarín, F. (2011). Factors affecting students' satisfaction in engineering disciplines: Traditional vs. blended approaches. *European Journal of Engineering Education*, 36(5), 473–483. <https://doi.org/10.1080/03043797.2011.619647>.
- Moskal, P. D., & Cavanagh, T. B. (2014). Scaling blended learning beyond the university. In A. G. Picciano, C. D. Dziuban, & C. R. Graham (Eds.), *Blended learning: Research perspectives* (Vol. 2, pp. 34–51). New York: Routledge.
- Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education*, 18, 15–23. <https://doi.org/10.1016/j.iheduc.2012.12.001>.
- Motteram, G. (2006). 'Blended' education and the transformation of teachers: A long-term case study in postgraduate UK Higher Education. *British Journal of Educational Technology*, 37(1), 17–30. <https://doi.org/10.1111/j.1467-8535.2005.00511.x>.
- Niemiec, M., & Otte, G. (2010). An administrator's guide to the whys and hows of blended learning. *Journal of Asynchronous Learning Networks*, 14(1), 91–102.
- Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *On the Horizon*, 19(3), 207–216. <https://doi.org/10.1080/10748121111163913>.
- Odden, A. (2001). Defining merit. *Education Matters*, 1(1), 16–24.
- Odden, A., & Kelley, C. (2002). *Paying teachers for what they know and do: New and smarter compensation strategies to improve schools*. California: Corwin Press.
- Overbaugh, R. C., & Nickel, C. E. (2011). A comparison of student satisfaction and value of academic community between blended and online sections of a university-level educational foundations course. *The Internet and Higher Education*, 14, 164–174. <https://doi.org/10.1016/j.iheduc.2010.12.001>.
- Owston, R. (2013). Blended learning policy and implementation: Introduction to the special issue. *The Internet and Higher Education*, 18, 1–3. <https://doi.org/10.1016/j.iheduc.2013.03.002>.
- Pellegrino, J. W., & Hilton, M. L. (Eds.). (2013). *Education for life and work: Developing transferable knowledge and skills in the 21st century*. Washington, DC: National Academy of Sciences.
- Pink, D. H. (2011). *Drive: The surprising truth about what motivates us*. New York: Riverhead Books.
- Porter, W. W., & Graham, C. R. (2016). Institutional drivers and barriers to faculty adoption of blended learning in higher education. *British Journal of Educational Technology*, 47(4), 748–762. <https://doi.org/10.1111/bjet.12269>.
- Porter, W. W., Graham, C. R., Bodily, R., & Sandberg, D. (2016). A qualitative analysis of institutional drivers and barriers to blended learning adoption in higher education. *The Internet and Higher Education*, 28(1), 17–27. <https://doi.org/10.1016/j.iheduc.2015.08.003>.
- Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education*, 75, 185–195. <https://doi.org/10.1016/j.compedu.2014.02.011>.
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1–6.
- Prensky, M. (2011). From digital immigrants and digital natives to digital wisdom. *Innovate*, 5(3), 1–9. http://marcprensky.com/writing/Prensky-Intro_to_From_DN_to_DW.pdf.
- Ross, B., & Gage, K. (2006). Global perspectives on blended learning. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 155–167). San Francisco: Pfeiffer Publishing.
- Sayed, M., & Baker, F. (2014). Blended learning barriers: An investigation, exposition, and solutions. *Journal of Education and Practice*, 5(6), 81–86.
- Sharpe, R., Benfield, G., Roberts, G., & Francis, R. (2006). *The undergraduate experience of blended e-learning: A review of UK literature and practice*. York: The Higher Education Academy.
- Shubert, K. J. A. (2008). Ingredients of successful partnerships among higher education institutions: The case of University of Westminster. In A. Y. Al-Hawaj, W. Elali, & E. H. Twizell (Eds.), *Higher education in the twenty-first century: Issues and challenges* (pp. 143–148). Boca Raton, FL: CRC Press.
- Shute, V. J. (2007). *Focus on formative feedback*. Princeton, NJ: ETS.
- Siemens, G., Gašević, D., & Dawson, S. (2015). *Preparing for the digital university: A review of the history and current state of distance, blended, and online learning*. Retrieved from <https://linkresearchlab.org/PreparingDigitalUniversity.pdf>.
- Taylor, J. A., & Newton, D. (2013). Beyond blended learning: A case study of institutional change at an Australian regional university. *The Internet and Higher Education*, 18(3), 54–60. <https://doi.org/10.1016/j.iheduc.2012.10.003>.
- Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. New York: Wiley.
- Tshabalala, M., Ndeya-Ndereya, C., & van der Merwe, T. (2014). Implementing blended learning at a developing university: Obstacles in the way. *Electronic Journal of e-Learning*, 12(1), 101–110.
- Tyler, R. W. (2013). *Basic principles of curriculum and instruction*. Chicago: The University of Chicago Press.
- Tynan, B., Ryan, Y., & Lamont-Mills, A. (2015). Examining workload models in online and blended teaching. *British Journal of Educational Technology*, 46(1), 5–15. <https://doi.org/10.1111/bjet.12111>.
- UNESCO. (2016). *Curriculum*. Retrieved from <http://www.unesco.org/new/en/education/themes/strengthening-education-systems/quality-framework/core-resources/curriculum/>.
- Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on ELearning*, 6(1), 81–94.
- Wang, Y., Han, X., & Yang, J. (2015). Revisiting the blended learning literature: Using a Complex Adaptive Systems Framework. *Educational Technology & Society*, 18(2), 380–393.
- Wang, S.-K., Hsu, H.-Y., Campbell, T., Coster, D. C., & Longhurst, M. (2014). An investigation of middle school science teachers' and students' use of technology inside and outside of classrooms: Considering whether digital natives are more technology savvy than their teachers. *Educational Technology Research and Development*, 62, 637–662. <https://doi.org/10.1007/s11423-014-9355-4>.
- Wenger, E. (2000). *Communities of practice: Learning, meaning and identity*. Cambridge, UK: Cambridge University Press.
- Wu, J., Tennyson, R. D., & Hsia, T. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers & Education*, 55(1), 155–164. <https://doi.org/10.1016/j.compedu.2009.12.012>.
- Yorke, M. (2003). Formative assessment in higher education: Moves towards theory and the enhancement of pedagogic practice. *Higher Education*, 45(4), 477–501. <https://doi.org/10.1023/A:1023967026413>.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.