Creating Mature Blended Education: the European Maturity Model Guidelines

Katie Goeman[1] & Wiebe Dijkstra[2]

[1] KU Leuven, Faculty of Economics and Business, Teacher Education, Brussels, Belgium

[2] Delft University of Technology, Teaching and Learning Services, Delft, The Netherlands

Correspondence: Katie Goeman, KU Leuven, Faculty of Economics and Business, Teacher Education, Brussels, Belgium.

Abstract

In recent decades, higher education has embraced the concept of blended teaching, the design and facilitation of online and face-to-face learning activities. As such initiatives are embedded in the formal context of an institution, educational managers and other decision makers are in search of evidence for creating sustainable conditions that facilitate and support blended teaching. In this paper, the authors present the guidelines articulated by the European Maturity Model that address such concerns. These were developed during a three-year joint effort between seven European project partners. For each guideline, background information in line with the foundations of the European Maturity Model is included, as well as examples and references to predominantly open access resources. It is hoped that the results might inspire key actors within higher education or scholars that are investigating models for continuous improvement in the field of blended teaching and education.

Keywords: blended education, blended teaching, maturity model, EMBED, maturity, guidelines

1. Introduction

Worldwide, higher education institutes (HEIs) are accommodating blended formats of teaching and learning (BT&L) as these are considered future-proof (Castro, 2019; Duvivier, 2019). Implementing such educational innovation brings along a series of issues regarding quality and sustainability, including organizational management and culture (Alebaikan & Troudi, 2010; Osguthorpe & Graham, 2003). When higher education leaders decide to deploy blended programmes and courses, it challenges them to review and adapt existing institutional strategies, structures and support (Porter et al., 2014).

Institutional readiness studies, e.g. Keramati et al. (2011) or Aydin and Tasci (2005), advocate particular organizational characteristics such as culture, rules and human resources, and impact BT&L implementation. Gregory and Lodge (2015), alongside Lim and Morris (2009) speak of necessary institutional reforms in terms of staff support, workload and training, leadership, as well as policy development and strategies oriented at continuous improvement of BT&L. Garrison and Vaughan (2013) note that success stories are „properly resourced, achievable and sustainable" (p. 25), and they emphasize the important role of collaborative leadership at a strategic level. So are the institutions ready for blended teaching and learning? This remains an open question.

Analyses of seven cases of synchronous hybrid teaching as described in Bower et al. (2015) resulted in the Blended Synchronous Learning Design Framework. Among the critical issues are technology, support and logistics. Similarly, Gedik et al. (2013) refer to support mechanisms presumed indispensable for the creation and maintenance of BT&L environments, namely: logistics, technical and managerial support. The critical role of e-learning system infrastructure (i.e. channel management, security and integration) to create organizational value is demonstrated in Alsabawy et al. (2013).

Graham and Robison (2007) note three hurdles to reaching the full potential of BT&L: (1) failure to create added value, (2) a lack of focus on purpose(s) and (3) putting efficiency and productivity above effective, innovative pedagogies. As a consequence, not enough time and costs are deployed and discouragement within the faculty will undermine the willingness to continue with BT&L. In this regard, Laurillard (2015) discerns institutional

drivers and *enablers*. The interplay between these will determine the sustainability of change. The drivers giving way to the prioritization of activities are not sufficient for effective action without the „enablers‟, i.e. the mechanisms necessary to respond effectively to the drivers. Laurillard further recommends HEIs to (pp. 7-8):

1. require each agency responsible for the drivers to report on how it would change its approach to ensure that academics prioritize innovation in blended learning

2. update the principal drivers in the education system to harness digital technology and so drive the development of new practices

3. develop the enablers to make the new practices effective.

Empowering HEIs to promote such sustainable change involves deliberate interventions or reforms, otherwise "the system will continue to rely on piecemeal local innovations in teaching and learning that have no large systemic effect" (Laurillard, 2015, p. 16).

2. The European Maturity Model for Blended Education

Against this backdrop the European Maturity Model or EMM was conceived, developed and validated. During a period of three years (2017-2020) seven European project partners worked together to achieve different objectives related to the introduction and sustainable implementation of blended education and teaching. One of the major aims was to develop and validate a conceptual and operational framework which could be employed by designers of blended courses and programmes or decision bodies in higher education (HE). In May 2020, the European Maturity Model for Blended Education (EMBED) was published (see https://embed.eadtu.eu/). The model is the result of an extensive literature review, a screening of proven practices and interviews with different stakeholders, followed by a 3-round Delphi study among European experts (Goeman & Ubachs, 2018; Goeman et al., 2019; Van Valkenburg et al., 2020; Goeman et al., 2021). Its original aim was to map practices in a systematic manner and, ultimately, to identify tracks for optimization or change. Accordingly, implementation guidelines (Dijkstra & Goeman, 2021) were developed and the MOOC „Making blended education work‟ was deployed.

During consecutive years, Porter, Graham and different co-authors (Graham et al., 2013; Porter et al., 2014; Porter & Graham, 2016) developed and tested a framework for BT&L implementation in HEIs. Harnessed by the adoption literature and buttressed by empirical evidence, their model includes markers to determine blended practices across three general stages of development (from awareness to mature implementation). The EMM incorporates a similar line of reasoning but extends the scope of analysis and reporting. In particular, it comprises more dimensions at different levels of action. In 2017, Adekola et al. pointed out the importance of a holistic framework to guide institutional transitions towards enhanced BT&L, informed by diverse stakeholders‟ views and experiences. The EMM is drawn up as a multi-layered framework, consisting of three action levels: course, program and institution. Consequently, it distinguishes maturity at three levels, namely the course, program and institution levels. In line with Marshall (2010) maturity is regarded as „the degree to which activities contributing to core work are explicit, understood and systematically controlled and improved by the organization‟ (p. 144). For each level of maturity multiple dimensions and indicators are established. It is assumed that a higher level of maturity indicates a more holistic approach, informed by evidence and framed by instruments and procedures for continuous quality improvement (CQI). There are two major CQI mechanisms that bridge theoretical underpinnings and practices in blended education: (1) design-based research and (2) learning and academic analytics (Aldowah et al., 2019; Kuromiya et al., 2020; Ustun & Tracey, 2020).

In this paper, the institutional level is addressed. It explains how a college for higher education or a university may frame the conditions that target BT&L. It complements a previous contribution which described the maturity of blended courses (see Goeman & Dijkstra, 2021). In the following sections, the authors present the EMM framework and the guidelines that are articulated by the EMM.

2.1 The EMM Framework Regarding the Maturity of Institutional Conditions

The EMM framework defines three levels of maturity at the institutional level (ad hoc, consolidated and strategic) and eight dimensions considered crucial for assessing institutional conditions oriented at BT&L. Lower levels of maturity refer to an initial awareness and limited provisions for single departments, individual staff members or separate student groups. Higher maturity levels are assumed to be characterized by institution-wide implemented conditions and a comprehensively documented strategy. Moreover, it includes a fully articulated, data-driven CQI cycle aimed at concerted actions. By means of quality assurance (QA) standards and feedback loops the institutional conditions for BT&L are continuously improved, through management, governance, or both (Steinhardt et al., 2016). Maturity at the institutional level is assessed in terms of eight dimensions: (1) support,

(2) strategy, (3) sharing and openness, (4) professional development, (5) quality assurance, (6) governance, (7) finances and (8) facilities. Table 1 presents the European Maturity Model at the institutional level in a comprehensive manner (see Appendix 1).

2.2 The EMM Framework and its Guidelines

The guidelines are intended to serve as a guiding resource for key actors within higher education institutions. For each of the eight dimensions, examples and references to predominantly open access resources are provided. The guidelines are specified with the aim of tackling questions such as „how do you assess the state of affairs regarding blended education?", „how can our HEIs bring their blended education to the next level, and make sure that it keeps improving?"Using a validated framework, leaders in higher education will assess the maturity level of blended education at their higher education institution. Thereupon, they are expected to draw up an action plan. This will allow their institutions to (further) progress towards a higher level of maturity in blended education.

Dimension 1: Support

Maturity level 2 of this dimension (Consolidated) requires from an institution that it offers dedicated support for BT&L to all teaching staff and students across departments. This may be a complex endeavour. Relevant publications include the JISC guide which includes recommendations and uses cases to organise support (JISC, 2015) and SURF"s decision aid (2018) in which five different approaches for institution-wide support are explained in greater detail. In order to attain the highest level of maturity (Strategic), institutional support is fully integrated into the standard services of the HE institution. Aligned with Garrison and Kanuka (2004), this suggests there are no dedicated support desks for BT&L; help is considered to be a standard, regular service with one dedicated support desk. CQI processes and products that target support are embedded within this regular service. These are based on various data sources, among other things user questionnaires and interviews, complemented by data regarding the most frequently asked questions, the search queries or most often visited pages of the support website or application. Such information may be generated by means of business intelligence platforms, website analytics or similar tracking via support ticketing systems.

Dimension 2: Strategy

The institutional strategy describes the extent to which BT&L is embedded in the vision, the educational model and goals of an institution. At lower levels of maturity, a strategy is characterized by *ad hoc* decision making. A strategically more mature approach ensures that various aspects of BT&L (e.g. legal, ethical, privacy and data management) are embedded in the standard rules and regulations, as well as action plans and guidelines of the HEI. BT&L in a formal HE context is strengthened by a shared vision of its actual and future purpose(s) (Korr et al., 2012). According to Chew and Jones (2009), there are two strategic aspects of special importance: (1) a single strategy for BT&L promotes an institution-wide adoption without confusion; (2) an institutional strategy ought to be clear, simple and driven by research and support from an interdisciplinary centre.

In order to reach maturity level 2, a dedicated BT&L strategy is established by the HEI. The UK-based non-profit organization JISC offers a number of resources and tools to start developing a vision and making explicit a strategy. These include the „Vision and Strategy Toolkit"(JISC, 2020a), the „Digital learning in Higher education" (JISC, 2020b) and „Innovation in Higher Education" (JISC, 2020c). At the third maturity level 3 (Strategic), the strategic options regarding BT&L are integrally anchored within the institutional strategy. The strategy is implemented in such a manner that it is actively shared and promoted across the institution, with different departments and faculties incorporating it into their regular policies, plans and procedures. Alignment of BT&L approaches is achieved, for example, by anchoring „kernel routines"; these are precisely specified routines supported by well-defined tools and strategies (Resnick et al., 2010). These put at the centre of common understanding, access and mutual trust and promise gradual, although quick, changes in BT&L practices. They are designed to have users „adapt the routine to their particular conditions and capabilities" (p. 293), avoiding disruptive changes which could lead to conservative reactions (and no change at all). Such a strategy seems to be adequate for handling ongoing issues, defined by Bunn (2013) as „the culture and core values of the institution", which are „embedded in the strategic thinking of administrators, faculty, and staff, and they influence what actions are considered appropriate responses to different external events" (p. 56). Different stakeholders at various levels in the institution are actively involved (teaching staff, students, administrative and supportive services, management). For successful implementation, HE leaders and administrators recognize and advocate the importance of BT&L (Porter et al., 2014). Therefore, they should use internal and external communication channels, e.g. consultations, conferences and meetings, education days or events, in newsletters, and so forth.

Dimension 3: Sharing and openness

The creation of a culture of openness and sharing of practices, materials and courses, improves cost-efficiency and increases quality in an institution‟s blended approach. By having policies that facilitate communities and platforms for distribution, a HEI may benefit from an increased number of enrolments and gain international recognition (Jansen et al., 2015). To achieve this, it is recommended that practices of open education be used to propagate its vision and mission (Dos Santos, 2019).

On the second maturity level (Consolidated), professional communities are facilitated. These may be inspired by models such as the „Community of practice‟ for strengthening networking and sharing of experiences between instructors (Wenger, 2011; Farnsworth et al., 2016). Platforms may facilitate such actions, for example within one institution (e.g., Online learning Hub at TU Delft, CELT Toolboxes at UTwente or OpenED from The University of Edinburgh). Also, at an international level platforms were created with similar objectives (e.g., SURF Communities, EADTU Empower). Besides this, standardized templates enable an institution to exchange best practices (Alwazae et al., 2015). By establishing an open courseware (OCW) website an institution demonstrates a mature dimension of sharing and openness. Examples include MIT, University of Michigan, Harvard or TU Delft. At the maturity level 3 (Strategic) professional communities are more purposefully built and maintained, for example by „community facilitation teams‟. Such teams schedule meetings, organise events, edit publications, and so forth. Moreover, pertinent QA regarding sharing and openness is in place. As such, the standards and processes may be based on a framework such as „OERTrust‟ (Almendro & Silveira, 2018) or the „Quality Assurance of Open Educational Resources‟ (SURF, 2020).

Dimension 4: Professional development

To provide dedicated pedagogical and technological professional development (PD) for staff, it is vital to create effective BT&L in HE (Owens, 2012). It is important to note that besides organising an array of training possibilities, the competences and achievements of teaching staff in BT&L are formally recognized and awarded by the HEI.

At maturity level 2 (Consolidated), the PD of teaching staff is organised by way of online and offline workshops, short courses, showcases and other formats such as lunch meetings. In „Building blocks for effective professional development‟ one finds scenarios, as well as thirty-seven building blocks for the PD of HE instructors (Zone Facilitating Professional Development for Lecturers, 2020). Blended education at the third maturity level (Strategic) signifies that all teaching staff have received dedicated PD. These are incorporated into mandatory training for educators, for example as a part of University Teaching Qualifications, or in a portfolio of continuous PD. The European Digital Competence Framework (Redecker & Punie, 2017) includes relevant guidelines in this regard. It presents six categories with 22 competences deemed necessary for instructors to acquire when involved in digital education. In addition to this publication, one finds in „Evolving as a digital scholar‟ three different tracks for continuous PD of teaching staff in HE (Van Petegem et al., 2021). Finally, the TPACK model has the merit of making explicit how „technology-related professional knowledge is implemented and instantiated in practice‟ (Koehler et al., 2013, p. 18). Recognition and appreciation of teaching staff‟s PD is institutionally embedded at maturity level 3, in contrast to maturity level 2. Both may be organized, for example, by using the open-access resource „The Career Framework for University Teaching‟ (Graham, 2018). Among other aspects, this source presents a framework and a reward system that HEIs may embed in their approach regarding teaching staff qualification, PD and career progression. Although it is not explicitly mentioned in the maturity model, it is also important to embed CQI procedures in-house in order to evaluate PD initiatives. Furthermore, a peer review involving external organisations may assess critically the array of PD opportunities (see VSNU, 2018).

Dimension 5: Quality assurance

The fifth dimension, quality assurance, (QA) refers to the process during which conditions related to BT&L are evaluated and revised on a regular basis. A common practice is first to define the expected outcomes and then assess the contribution of processes, systems and services in a HEI towards their achievement (Varlamis & Apostolakis, 2010). In this respect, one can rely on different frameworks stemming from the literature (see for example the PDPP model of Zhang & Cheng, 2012) or quality criteria which are often benchmarked. QA shows improved maturity if the actual QA standards are grounded in a theoretical base that „promotes coherence between quality assurance and improvement processes‟ (Barrie et al., 2005, p. 641).

In line with the EMM, maturity level 2 (Consolidated) requires that dedicated QA processes are implemented. It is advisable to use frameworks for this purpose, like the generic „Standards and Guidelines for Quality Assurance in the European Higher Education Area‟ (ENQA et al., 2015), alongside specific QA guidelines for blended learning programmes such as the Irish „Statutory Quality Assurance Guidelines‟ (QQI, 2018). Besides quality

frameworks, the use of validated instruments to evaluate courses or innovation projects can also be used in the quality assurance process. Lai and Bower (2019) provide an overview of validated instruments to evaluate educational technology. To reach maturity level 3, labelled as „Strategic", quality assurance for blended education is encapsulated in the standard QA approach of an HE institution. Continual improvement is a taken-for-granted practice in the event that a „quality culture" has been established within a HE institution. The report „Quality culture in European universities: A bottom-up approach" (EUA, 2006) provides insight into this and related matters. Besides striving towards full-blown CQI or a quality culture, the third maturity level expects that an institution has a research agenda for its blended courses and programmes, Individual researchers or that a department may be involved for this purpose. Zeichner (2005) shows how to design and execute such a research agenda. Collaboration with other higher education institutions or research institutions can enhance research and the dissemination of findings and results. The „UCD Quality Framework" of University College Dublin (2018) is a relevant example.

Dimension 6: Governance

Governance refers to the way in which the vision and strategy of a HE institution are translated into rules, regulations, action plans and guidelines regarding blended education. Maturity level 2 (Consolidated) describes how these are developed and implemented. During their development process, different key actors are involved; educators, students, policy officers, educational advisers, deans and/or (vice)rectors. To identify the key actors, Mirriahi et al. (2012) offer a useful approach. Among other things, firm governance assumes that standardized models for BT&L are in place. It is strongly recommended that recognition is provided directly from the top management and that excellence in education and research is valued in relation to BT&L, as indicated by Chew and Jones (2009).

Dobbins et al. (2011), in addition to Mader et al. (2013) offer some insights into effective governance. In addition, the guide „Developing organisational approaches to digital capability (Killen et al., 2017) explains how to develop a culture, infrastructure and practices regarding digital capacity of the organisation. Robust models such as UTAUT (Venkatesh et al., 2016) and ISSM (DeLone & McLean, 2003) may inspire institutional actions to increase the adoption and diffusion of BT&L.

Maturity level 2 of the governance dimension describes how the final stage in terms of maturity level is the sharing of the models for blended course and programme design within the institution. This will lead to a more standardised approach to developing blended education. Maturity level 3 (Strategic) calls for policies, rules, regulations, action plans and guidelines to be embedded in the standard governance structure of a HE institution. There are no separate policies or regulations regarding BT&L; they are part of the default or standard education formats. The governance of a HE institution is also systematically reviewed and adjusted. In this context, Davies (2000) offers research methods to evaluate and review policies. Building upon level 2, key actors at different levels of the institution are involved in the process of reviewing, adjusting and developing policies. This necessitates the involvement of a series of stakeholders among other policy officers, students, instructors, and the educational management. Finally, the institution provides standardized models for the development of blended education.

Dimension 7: Finances

Financial support, project funding, incentives or other rewarding initiatives contribute to mature blended education (Oh & Park, 2009).

In order to reach maturity level 2 (Consolidated), financial resources are allocated ad hoc to develop, support, stimulate and improve blended learning and teaching. Besides external funds (e.g., from the government), it is important to allocate internal budgets to innovation. As Schophuizen and Kalz (2020) indicate, if experimentation is not only dependent on external funds, this will contribute to an increase in the adoption, implementation and long-term sustainability of initiatives.

Budgets can be used for hiring (more) staff, student assistants, for conducting experiments and pilots, for engaging an innovation team, for buying new educational tools, awarding grants, prizes, and so on. A study of five HE institutions in the Netherlands shows that funds are mostly used to employ people. Approximately half of a regular innovation budget (40 to 70%) goes to providing various types of support. Depending on the institution, between 15 and 40 percent is invested in facilities, licenses and tools (SURF, 2018). Also, some Dutch institutions have „education fellows" who experiment with innovative methodologies and technologies. They receive a budget for this purpose and each becomes a „champion of innovation" (Centre for Academic Teaching, 2020; TU Delft Teaching Academy, 2020). Such an approach accelerates innovation.

Maturity level 3 (Strategic) entails that financial resources are structurally allocated to innovation and BT&L, in addition to occasional or recurring funds. Nevertheless, it might be difficult to distinguish between both types of budgeting (SURF, 2018). Therefore, it is crucial to systematically assess and finetune the HEI's finances in this regard. This is executed by using clear criteria, budgets, results and timelines for projects (e.g., project plans), support staff (e.g., personal development plans), pilots (e.g., pilot plan), and so forth. Afterwards, qualitative and quantitative data are needed to evaluate the allocation of resources.

Dimension 8: Facilities

Tong and Trinidad (2005) explain that "providing appropriate and sufficient computer facilities and digital resource materials, reliable technological infrastructure, and on-site and just-in-time technical support for teachers" (p. 11) are necessary conditions for facilitating any kind of technology-enhanced education. The extent to which institutions are equipped with physical and digital facilities that make possible BT&L is described by means of the dimension "Facilities". On the one hand, this refers to physical spaces and equipment to create media for educational purposes, such as a video recording and editing studio, a lightboard (see Peshkin, 2020), or a virtual reality studio. These facilities are to be staffed and financially supported (see also the dimension "Support"). On the other hand, this refers to different classroom setups.

At KU Leuven, for example, different spaces were built and equipped for flexible hybrid teaching purposes. Joint systematic research is carried out in order to assess the impact of such spaces on teachers' and learners' experiences (Raes et al., 2019; Raes et al., 2020). Choosing consciously between different classroom setups can be challenging, but tools like the Education Spaces Viewer (TU Delft, 2020) can assist when doing so. Furthermore, the e-book "Learning Spaces" (Oblinger, 2006), the "Cookbook Education spaces" (Van der Zanden et al., 2018), as well as the "UK higher education Learning Spaces" (JISC, 2018) provide readers with inspiring ideas and guidelines in this regard. The dimension "Facilities" also refers to instructional tools for information processing, communication and interaction purposes. Typical digital facilities include the university-wide virtual learning environment (VLE), which has become indispensable for BT&L. Others are, for example, publicly available websites dedicated to the development of media such as video (e.g., Create at the University of Derby). All tools offered by a HE institution should align with those used in courses and programmes. Alhogail and Mirza (2011) describe the implementation of a VLE from a change management perspective.

Maturity level 2 (Consolidated) states that a wide variety of both types of facilities is available. At maturity level 3 (Strategic), instructors have an influence on scheduling (room) facilities. For example, instructors may choose the classroom set-up for their face-to-face sessions. This prevents, for example, a project-based course being scheduled in a lecture theatre. Level 3 also indicates that the range of teaching facilities, both physical and digital, is evaluated and adjusted systematically, based on clear criteria and multiple data sources. Contributions such as "A Rubric for Evaluating E-Learning Tools in Higher Education" (Anstey & Watson, 2018) and "Evaluating Virtual Learning Environments" (Dyson & Campello, 2003) provide adequate frameworks for the evaluation of digital facilities. The chapter "Assessing Learning Spaces" from Hunley and Schaller (2006), is helpful in assessing physical facilities and deciding upon the type of method to adopt for this purpose (e.g., photographic study).

3. Conclusion and Future Work

It seems that ever since the idea of institutional maturity with regard to BT&L was coined, relatively few publications have followed up on this. Only recently have we noticed the first systematic analyses of institutionalised BT&L in the European Higher Education Area (e.g., Mihai et al., 2021). These confirm the need for comprehensive institutional frameworks for BT&L, as well as strategic projects steered at the institutional level (Dale et al., 2021).

The present contribution has attempted to respond to this gap/call, by taking institutional maturity out of the closet and demystifying it in two ways. First, a multi-layered, multidimensional framework was developed under the umbrella of a European project with seven partners in HE, which led to the EMM. It aims to guide HEIs to address institution-wide implementation of BT&L, whether at the start or in a particular phase of transition. Similarly, scholars may use the EMM to assess systematically at what stage a HEI is situated. Therefore, specific indicators for each dimension and per stage are identified. Secondly, a series of examples and guidelines in line with the framework are searched for and presented. The series of weblinks, documents and articles articulate interventions for implementing (more) mature blended education. They intend to help decision makers and educational managers of HEIs carry through planned and well-governed change. Nevertheless, further work is needed in terms of specific examples of how the path to maturity has helped institutions to prosper in the digital age. As such, the authors of this contribution are eager to receive suggestions, examples or other information

from readers.

References

ACODE. (2014). *Benchmarks for Technology Enhanced Learning*. The Australasian Council on Open, Distance and e-learning. Retrieved from https://www.acode.edu.au/pluginfile.php/550/mod_resource/content/8/TEL

Adekola, J., Dale, V. H. M., & Gardiner, K. (2017). Development of an institutional framework to guide transitions into enhanced blended learning in higher education. *Research in Learning Technology, 25*, 1-16. https://doi.org/10.25304/rlt.v25.1973

Aldowah, H., Al-Samarraie, H., & Fauzy, W. M. (2019). Educational data mining and learning analytics for 21st century higher education: A review and synthesis. *Telematics and Informatics, 37*, 13-49. https://doi.org/10.1016/j.tele.2019.01.007

Alebaikan, R., & Troudi, S. (2010). Blended learning in Saudi universities: challenges and perspectives. *Research in Learning Technology, 18*(1), 49-59. https://doi.org/10.1080/09687761003657614

Alhogail, A., & Mirza, A. A. (2011). Implementing a virtual learning environment (VLE) in a higher education institution: A change management approach. *Journal of Theoretical and Applied Information Technology, 31*(1), 42-52. Retrieved from https://www.researchgate.net/publication/289791828_Implementing_a_virtual_learning_environment_VLE_in_a_higher_education_institution_A_change_management_approach

Almendro, D., & Silveira, I. F. (2018). Quality Assurance for Open Educational Resources: The OERTrust Framework. *International Journal of Learning, Teaching and Educational Research, 17*(3), 1-14. https://doi.org/10.26803/ijlter.17.3.1

Alsabawy, A. Y., Cater-Steel, A., & Soar, J. (2013). IT infrastructure services as a requirement for e-learning system success. *Computers and Education, 69*, 431-451. https://doi.org/10.1016/j.compedu.2013.07.035

Alwazae, M., Perjons, E., & Johannesson, P. (2015). Applying a Template for Best Practice Documentation. *Procedia Computer Science, 72*, 252-260. https://doi.org/10.1016/j.procs.2015.12.138

Anstey, L. M., & Watson, G. P. (2018). *Rubric for eLearning Tool Evaluation*. Centre for Teaching and Learning, Western University. Retrieved from https://teaching.uwo.ca/pdf/elearning/Rubric-for-eLearning-Tool-Evaluation.pdf

Aydin, C. H., & Tasci, D. (2005). Measuring Readiness for e-Learning: Reflections from an Emerging Country. *Educational Technology & Society, 8*(4), 244-257.

Barrie, S., Ginns, P., & Prosser, M. (2005). Early impact and outcomes of an institutionally aligned, student focused learning perspective on teaching quality assurance. *Assessment & Evaluation in Higher Education, 30*(6), 641-656. https://doi.org/10.1080/02602930500260761

Bower, M., Dalgarno, B., Kennedy, G., Lee, M., & Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education, 86*, 1-17. https://doi.org/10.1016/j.compedu.2015.03.006

Bunn, M. D. (2001). Timeless and timely issues in distance education planning. *The American Journal of Distance Education, 15*(1), 55-68. https://doi.org/10.1080/08923640109527074

Castro, R. (2019). Blended learning in higher education: Trends and capabilities. *Education and Information Technologies, 24*(4), 2523-2546. https://doi.org/10.1007/s10639-019-09886-3

Centre for Academic Teaching. (2019). *Teaching fellows*. Universiteit Utrecht. Retrieved from https://www.uu.nl/en/education/top-lecturers-and-top-students/teaching-fellows

Chew, E., & Jones, N. (2009). The "E"-Vangelist's Plan of Action - Exemplars of the UK Universities'Strategies for Blended Learning. In *Hybrid Learning and Education* (pp. 378-389). Springer. https://doi.org/10.1007/978-3-642-03697-2_35

Dale, V., Kubincová, E., Kerr, J., & Murray, J. A. (2021). Lessons learned from being BOLD: Staff experiences of an institutional strategic project in Blended and Online Learning Development. *Journal of Perspectives in Applied Academic Practice, 9*(2), 29-38. https://doi.org/10.14297/jpaap.v9i2.484

Davies, P. (2000). The Relevance of Systematic Reviews to Educational Policy and Practice. *Oxford Review of Education, 26*(3-4), 365-378. https://doi.org/10.1080/713688543

DeLone, W. & McLean, E. (2003). The DeLone and McLean Model of Information Systems Success: A

Ten-Year Update. *Journal of Management Information Systems, 19*(4), 9-30. https://doi.org/10.1080/07421222.2003.11045748

Dijkstra, W. P., & Goeman, K. (2021). *European Maturity Model for Blended Education: Implementation guidelines*. Retrieved from https://embed.eadtu.eu/results

Dobbins, M., Knill, C., & Vögtle, E. M. (2011). An analytical framework for the cross-country comparison of higher education governance. *Higher Education, 62*(5), 665-683. https://doi.org/10.1007/s10734-011-9412-4

Dos Santos, I. (2019). *Practical Guidelines on Open Education for Academics: modernising higher education via open educational practices*. Publications Office of the European Union. Retrieved from https://op.europa.eu/s/uvvr

Duvivier, R. J. (2019). How to 'future-proof' the use of space in universities by integrating new digital technologies. *Perspectives, 23*(1), 18-23. https://doi.org/10.1080/13603108.2018.1486894

Dyson, M. C., & Campello, S. B. (2003). Evaluating Virtual Learning Environments: what are we measuring? Electronic *Journal of E-Learning, 1*(1), 11-19. Retrieved from https://www.researchgate.net/publication/228496948_Evaluating_Virtual_Learning_Environments_what_are_we_measuring

ENQA, ESU, EUS, & EURASHE. (2015). *Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)*. EURASHE. Retrieved from https://enqa.eu/index.php/home/esg/

EUA. (2006). *Quality Culture in European Universities: A Bottom-Up Approach*. European University Association. Retrieved from https://eua.eu/resources/publications/656:quality-culture-in-european-universities-a-bottom-up-approach.html

Farnsworth, V., Kleanthous, I., & Wenger-Trayner, E. (2016). Communities of Practice as a Social Theory of Learning: a Conversation with Etienne Wenger. *British Journal of Educational Studies, 64*(2), 139-160. https://doi.org/10.1080/00071005.2015.1133799

Garrison, D., & 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., & Vaughan, N. (2013). Institutional change and leadership associated with blended learning innovation: Two case studies. *The internet and higher education, 18*, 24-28. https://doi.org/10.1016/j.iheduc.2012.09.001

Gedik, N., Kiraz, E., & Ozden, M. Y. (2013). Design of a blended learning environment: Considerations and implementation issues. *Australasian Journal of Educational Technology, 29*(1). https://doi.org/10.14742/ajet.6

Goeman, K., & Dijkstra, W. (2021). Creating Mature Blended Courses: The European Maturity Model Guidelines. In *EDEN Conference Proceedings: Lessons from a Pandemic for the Future of Education* (pp. 80-96). https://doi.org/10.38069/edenconf-2021-ac0008

Goeman, K., Poelmans, S., Van Rompaey, V., Dijkstra, W., & Van Valkenburg, W. (2019). Embedding Blended Learning Environments in Higher Education: Towards a European Maturity Model. In A. Volungeviciene, & A. Szűcs (Eds.), *European Distance and E-Learning Network (EDEN) Conference Proceedings: Connecting through educational technology* (pp. 67-71). https://doi.org/10.38069/edenconf-2019-ac-0009

Goeman, K., & Ubachs, G. (2018). Towards a European Maturity Model for Blended Education (EMBED). In A. Volungeviciene, & A. Szűcs (Eds.), *European Distance and E-Learning Network (EDEN) Conference Proceedings: Exploring the Micro, Meso and Macro* (pp. 321-324). Retrieved from https://proceedings.eden-online.org/

Goeman, K., Dijkstra, W., Poelmans, S., Vemuri, P. & Van Valkenburg, W. (2021). Development of a Maturity Model for Blended Education: A Delphi Study. *International Journal on E-Learning, 20*(3), 229-258. Retrieved from https://www.learntechlib.org/primary/p/217682/

Graham, R. (2018). *The career framework for university teaching: Background and overview.* Royal Academy of Engineering. Retrieved from http://www.teachingframework.com/resources/Career-Framework-University-Teaching-April-2018.pdf

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 C. Dziuban (Ed.), *Blended learning: Research perspectives* (pp. 83-110). Routledge, Taylor & Francis Group.

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

Gregory, M., & Lodge, J. (2015) Academic workload: the silent barrier to the implementation of technology--enhanced learning strategies in higher education. *Distance Education, 36*(2), 210--230. https://doi.org/10.1080/01587919.2015.1055056

Hunley, S., & Schaller, M. (2006). Assessing Learning Spaces. In D. G. Oblinger (Ed.), *Learning Spaces* (Chapter 13). Educause. Retrieved from https://www.educause.edu/research-and-publications/books/learning-spaces/chapter-13-assessing-learning-spaces

Jansen, D., Schuwer, R., Teixeira, A., & Aydin, C. H. (2015). Comparing MOOC Adoption Strategies in Europe: Results from the HOME Project Survey. *International Review of Research in Open and Distance Learning, 16*(6), 116-136. https://doi.org/10.19173/irrodl.v16i6.2154

JISC. (2015). *Support students and staff to work successfully with digital*. Retrieved from https://www.jisc.ac.uk/guides/enhancing-the-digital-student-experience/support-students-and-staff

JISC. (2018). *UK Higher Education Learning Space Toolkit: case studies*. Retrieved from https://www.jisc.ac.uk/full-guide/learning-space-toolkit-case-studies

JISC. (2020a). *Vision and strategy toolkit*. Retrieved from https://www.jisc.ac.uk/guides/vision-and-strategy-toolkit

JISC. (2020b). *Digital learning in higher education*. Retrieved from https://www.jisc.ac.uk/guides/digital-learning-in-higher-education

JISC. (2020c). *Innovation in higher education*. Retrieved from https://www.jisc.ac.uk/guides/innovation-in-higher-education

Keramati, A., Afshari--Mofrad, M., & Kamrani, A. (2011). The role of readiness factors in E--learning outcomes: An empirical study. *Computers & Education, 57*(3), 1919-1929. https://doi.org/10.1016/j.compedu.2011.04.005

Killen, C., Beetham, H., & Knight, S. (2017). Developing organisational approaches to digital capability. Jisc. Retrieved from https://www.jisc.ac.uk/guides/developing-organisational-approaches-to-digital-capability

Koehler, M., Mishra, P., & Cain, W. (2013). What is technological pedagogical content (TPACK)? *Journal of Education, 193*(3), 13-19. https://doi.org/10.1177/002205741319300303

Korr, J., Derwin, E. B., Greene, K., & Sokoloff, W. (2012). Transitioning an adult-serving university to a blended learning model. *The Journal of Continuing Higher Education, 60*(1), 2-11. https://doi.org/10.1080/07377363.2012.649123

Kuromiya, H., Majumdar, R., & Ogata, H. (2020). Fostering Evidence-Based Education with Learning Analytics. *Educational Technology & Society, 23*(4), 14-29.

Lai, J. W. M., & Bower, M. (2019). How is the use of technology in education evaluated? A systematic review. *Computers & Education, 133*, 27-42. https://doi.org/10.1016/j.compedu.2019.01.010

Laurillard, D. (2015). Thinking about blended learning: A paper for the thinkers in residence programme. In G. Van der Perre & J. Van Campenhout (Eds.), *Higher education in a digital era: A thinking exercise in Flanders* (pp. 7-32). KVAB Press. Retrieved from https://www.kvab.be/sites/default/rest/blobs/77/tw_blended-learning_en

Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Educational Technology & Society, 12*(4), 282-293.

Mader, C., Scott, G., & Abdul Razak, D. (2013). Effective change management, governance and policy for sustainability transformation in higher education. *Sustainability Accounting, Management and Policy Journal, 4*(3), 264-284. https://doi.org/10.1108/SAMPJ-09-2013-0037

Marshall, S. (2010). A Quality Framework for Continuous Improvement of E-Learning: The E-Learning Maturity Model. *Journal of Distance Education, 24*(1), 143-166.

https://doi.org/10.1108/dlo.2010.08124aad.001

Mihai, A., Questier, F., & Zhu, C. (2021). The institutionalisation of online and blended learning initiatives in politics and international relations at European universities. *European Political Science, 20*(2), 359-377. https://doi.org/10.1057/s41304-020-00307-5

Mirriahi, N., Dawson, S., & Hoven, D. (2012). Identifying key actors for technology adoption in higher education: A social network approach. In M. Brown, M. Hartnett, & T. Stewart (Eds.), *Future challenges, sustainable futures* (pp. 664-674). Retrieved from https://www.ascilite.org/conferences/Wellington12/2012/images/custom/mi

Oblinger, D. G. (2006). *Learning Spaces*. EDUCAUSE. Retrieved from https://www.educause.edu/research-and-publications/books/learning-spaces

Oh, E., & Park, S. (2009). How are universities involved in blended instruction? *Educational Technology & Society, 12*(3), 327-342.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended Learning Environments: Definitions and Directions. *The Quarterly Review of Distance Education, 4*(3), 227-233.

Owens, T. (2012). Hitting the nail on the head: The importance of specific staff development for effective blended learning. *Innovations in Education and Teaching International, 49*(4), 389-400. https://doi.org/10.1080/14703297.2012.728877

Peshkin, L. (2020). *Lightboard.info*. Retrieved from https://lightboard.info/

Porter, W., Graham, C., Spring, K., & Welch, K. (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

Porter, 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

QQI (2018). *Statutory Quality Assurance Guidelinesfor Providers of Blended Learning Programmes*. Quality and Qualifications Ireland. Retrieved from https://www.qqi.ie/Publications/Publications/Statutory%20QA%20Guidelines%20for%20Blended%20Learning%20Programmes.pdf

Raes, A., Pieters, M., & Bonte, P. (2019). Hyflex Learning within the Master of Teaching Program@KU Leuven. In B. J. Beatty, *Hybrid-Flexible Course Design: Implementing student-directed hybrid classes*. EdTech Books. Retrieved from https://edtechbooks.org/hyflex/hyflex_MTP_KULeuven

Raes, A., Pieters, M., Windey, I., Depaepe, F., & Desmet, P. (2020). *Technology-Enhanced Collaborative Learning: Resultaten en eerste balans*. ITEC, KU Leuven.

Redecker, C., & Punie, Y. (2017). *Digital Competence Framework for Educators (DigCompEdu)*. Publications Office of the European Union. Retrieved from https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/european-framework-digital-competence-educators-digcompedu

Resnick, L. B., Spillane, J. P., Goldman, P., & Rangel, E. S. (2010). Implementing innovation: from visionary models to everyday practice. In H. Dumont, D. Instance, & F. Benavides (Eds.), *The Nature of Learning: Using Research to Inspire* (pp. 285-306). OECD. https://doi.org/10.1787/9789264086487-14-en

Schophuizen, M., & Kalz, M. (2020). Educational innovation projects in Dutch higher education: Bottom-up contextual coping to deal with organizational challenges. *International Journal of Educational Technology in Higher Education, 17*(1), 17-36. https://doi.org/10.1186/s41239-020-00197-z

Steinhardt, I., Schneijderberg, C., Götze, N., Baumann, J., & Krücken, G. (2017). Mapping the quality assurance of teaching and learning in higher education: the emergence of a specialty? *Higher Education, 74*(2), 221-237. https://doi.org/10.1007/s10734-016-0045-5

SURF. (2018). *Decision aid: realising support structures for IT-driven educational innovation*. SURF.Nl. Retrieved from https://www.surf.nl/en/decision-aid-realising-support-structures-for-it-driven-educational-innovation

SURF. (2020). *Quality assurance of open educational resources*. SURF.Nl. Retrieved from

https://www.surf.nl/en/quality-assurance-of-open-educational-resources

Tong, K., & Trinidad, S. (2005). Conditions and constraints of sustainable innovative pedagogical practices using technology. *International Electronic Journal for Leadership in Learning, 9*(3), 1.

TU Delft. (2020). *Education Spaces Viewer.* Retrieved from https://esviewer.tudelft.nl/#

TU Delft Teaching Academy. (2020). *Education Fellows*. TU Delft. Retrieved from https://www.tudelft.nl/tu-delft-teaching-academy/get-inspired/education-fellows/

University College Dublin. (2018). *UCD Quality Framework*. UCD Quality Office. Retrieved from https://www.ucd.ie/quality/ucdqualityframework/

Ustun, A. B., & Tracey, M. W. (2020). An effective way of designing blended learning: A three phase design-based research approach. *Education and Information Technologies, 25*(3), 1529-1552. https://doi.org/10.1007/s10639-019-09999-9

Van der Zanden, P., Bogerd, T., & Van Loon, I. (2018). *Cookbook Education Spaces*. TU Delft. Retrieved from http://homepage.tudelft.nl/9c41c/Cookbook_Education_Spaces_v2_0.pdf

Van Valkenburg, W., Dijkstra, W., de los Arcos, B., & Goeman, K. (2020). *European Maturity Model for Blended Education*. Retrieved from https://embed.eadtu.eu/results

Varlamis, I., & Apostolakis, I. (2010). A Framework for the Quality Assurance of Blended E-Learning Communities. In R. Setchi, & I. Jordanov (Eds.), *Knowledge-Based and Intelligent Information and Engineering Systems* (Vol. 6278, Issue 3, pp. 23-32). Springer. https://doi.org/10.1007/978-3-642-15393-8_4

Van Petegem, W., Bosman, J., De Klerk, M., & Strydom, S. (2021). *Evolving as a Digital Scholar: Teaching and Researching in a Digital World*. Leuven University Press. https://doi.org/10.2307/j.ctv20zbkk0

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2016). Unified theory of acceptance and use of technology: A synthesis and the road ahead. *Journal of the Association for Information Systems, 17*(5), 328-376. https://doi.org/10.17705/1jais.00428

VSNU. (2018). *Professionalisation of university lecturers: The UTQ and beyond*. Retrieved from https://www.vsnu.nl/files/documenten/Professionalisation%20of%20university%20lecturers.pdf

Wenger, E. (2011). *Communities of practice: A brief introduction*. Retrieved from http://hdl.handle.net/1794/11736

Zeichner, K. (2005). A Research Agenda for Teacher Education. In M. Cochran-Smith, & K. Zeichner, *Studying teacher education: The report of the AERA panel on research on teacher education* (pp. 737-759). American educational research association. Retrieved from https://www.researchgate.net/publication/303382056_A_Research_Agenda_for_Teacher_Education

Zhang, W., & Cheng, Y. L. (2012). Quality Assurance in E-Learning: PDPP Evaluation Model and its Application. *International Review of Research in Open and Distance Learning, 13*(3), 66-82. https://doi.org/10.19173/irrodl.v13i3.1181

Zone Facilitating Professional Development for Lecturers. (2020). *Building blocks for effective professional development*. Retrieved from https://versnellingsplan.nl/english/publication/building-blocks-for-effective-professional-development/

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Appendix

Appendix 1

Table 1. Dimensions and indicators at the institutional level, according to the European Maturity Model*

Dimension	Description	Maturity level		
		Ad hoc	**Consolidated**	**Strategic**
Support	The manner in which an institution supports BT&L practices.	Limited support for BT&L, aimed at individual educators and students	Dedicated support for BT&L, available to all educators, students and departments.	Dedicated support for BT&L, part of the standard support services at the HEI. CQI procedures are embedded in order to improve the support

				services.
Strategy	The extent to which BT&L are embedded in the vision, educational model and goals of an HEI.	No uniform BT&L strategy is in place.	A dedicated BT&L strategy is in place. HE administrators recognize and advocate the importance of BT&L.	BT&L is an integral part of the institutional strategy. The strategy is embedded in the whole institution (throughout faculties and departments), well documented, and evaluated and adjusted on a regular basis. HE administrators and departments recognize and advocate the importance of BT&L.
Sharing and openness	The degree to which an institution facilitates the sharing of BT&L practices.	Individual teachers or departments share (best) practices of BT&L.	Communities for sharing (best) practices of BT&L are facilitated. Procedures and/or platforms are in place for sharing materials and/or courses.	Communities for sharing (best) practices of BT&L are facilitated, actively built and maintained. Procedures and/or platforms, as well as QA are in place for sharing materials and/or courses. The HEI regulates sharing, sharing is executed under an open license.
Professional development	The extent to which teaching staff are able to develop their blended teaching skills.	A few different PD initiatives related to blended teaching are offered by the HEI to the teaching staff.	Various different PD initiatives related to blended teaching are offered by the HEI to the teaching staff. PD in blended teaching is incidentally recognized by the HEI.	All teaching staff are trained in blended teaching; it is included in their (basic) qualification. The institution offers an aligned portfolio of PD initiatives related to BT&L to the teaching staff. PD in blended teaching is recognized and valued by the HEI.
Quality assurance	The process where BT&L courses, programmes, strategy, rules and regulations are assessed and revised on a regular basis.	No specific quality assurance of BT&L practices.	Specific quality assurance of BT&L practices is developed and implemented. Some dedicated BT&L research is conducted.	The QA of BT&L practices is encapsulated in the standard QA approach of the HEI. The HEI has a research agenda related to BT&L which aims to assess and improve practices, based on multiple data sources and clear criteria.
Governance	The extent to which a vision is translated to policies, rules, regulations and action plans that facilitate BT&L.	No policies, rules, regulations, action plans and guidelines related to BT&L are in place. No use of models for blended course and program design.	Policies, rules, regulations, action plans and guidelines related to BT&L are developed and implemented in the HEI. A few key actors of the HEI are involved in the governance process. Models for blended course and program design are available and shared in the HEI.	Policies, rules, regulations, action plans and guidelines related to BT&L are embedded in the standard governance of the HEI. These are systematically reviewed and adjusted. Key actors, at different levels in the institution, are involved in all processes. Standardized models for blended course and program design are provided.
Finances	The extent to which financial resources are allocated to develop, support, stimulate and improve BT&L.	No allocation of financial resources specifically for BT&L purposes.	Financial resources are incidentally allocated tto develop, support, stimulate and improve BT&L. The allocation of these resources is evaluated.	Financial resources are structurally allocated to to develop, support, stimulate and improve BT&L. The allocation of these resources is systematically evaluated and adjusted, based on clear criteria and qualitative and quantitative data sources.
Facilities	The extent to which institutions are equipped to facilitate blended learning and teaching.	Limited availability of facilities for BT&L.	A wide variety of facilities for BT&L is available. This includes both digital and physical facilities.	A wide variety of facilities for BT&L is available. This includes both digital and physical facilities. Teaching staff impact the scheduling of the facilities. The development of facilities is aligned with the institutional strategy. CQI are embedded in order to improve the facilities. These focus on the assessment and adjustment of the facilities" quality, quantity and assortment, based on clear criteria and multiple data sources.

Note. BT&L = blended teaching and learning; HEI = higher education institution; QA = quality assurance; CQI = continuous quality improvement; PD = professional development

* As compared to the published version on the EADTU website, minor differences in terms of wording of the model components are present. This is done for reasons of enhanced comprehension.

Copyrights