Technology-enhanced learning in higher education: How to enhance student engagement through blended learning

Dolores R. Serrano¹ | Maria Auxiliadora Dea-Ayuela² | Elena Gonzalez-Burgos¹ | Alfonso Serrano-Gil³ | Aikaterini Lalatsa⁴

¹School of Pharmacy, Complutense University of Madrid, Madrid, Spain
²Department of Pharmacy, Universidad CEU Cardenal Herrera, Valencia, Spain
³Faculty of Law, Universidad Nacional de Educación a Distancia, Madrid, Spain
⁴School of Pharmacy and Biomedical Sciences, University of Portsmouth, Portsmouth, United Kingdom

Correspondence
Dolores R. Serrano, Department of Pharmacy and Pharmaceutical Technology, Complutense University of Madrid, Plaza Ramon y Cajal s/n, E-28040 Madrid, Spain. Email: drserran@ucm.es

Abstract
Blended learning has risen in popularity in the last two decades as it has been shown to be an effective approach for accommodating an increasingly diverse student population in higher education and enriching the learning environment by incorporating online teaching resources. Blending significant elements of the learning environment such as face-to-face, online and self-paced learning leads to better student experiences and outcomes and more efficient teaching and course management practices if combined appropriately. Hence, an appropriate systematic and dynamic approach of blended learning design is crucial for a positive outcome, starting with planning for integrating blended elements into a course and creating blended activities and implementing them. Evaluating their effectiveness and knowing in which environments they work better and improving the blended activities designed from both the student’s and instructor's perspective are critical for the next delivery of the course. This article aims to increase awareness of higher education educators about how traditional face-to-face learning can be transformed into blended courses so as to develop student engagement with both in-class and online approaches, whilst being time effective for the instructor.
Teaching and learning in higher education are changing dramatically and the landscape is constantly evolving. Apart from the ubiquity of digital technologies, many factors are responsible for this revolution, such as an increasingly diverse student population, great demands on a skilled workforce and the need for more flexible learning environments because of lifelong learning. In Europe, the higher education ecosystem is constantly changing and growing, driven by the influx of students from emerging economies such as China and India which counteracts the declining numbers of 18-year-olds in Europe (OECD, 2018).

Even though each EU country is responsible for its education and training system, the EU policy has designed a framework for cooperation in education and training (ET 2020) to overcome common challenges such as skill deficits in the workforce, global competition and technological developments. With the Bologna Process, Europe has been making a significant effort in two major fields: (a) the modernisation and assurance of high quality standards of education and training systems to meet the needs of a changing labour market and (b) the harmonisation of Bachelor, Master and Doctorate degrees across EU countries through the reinforcement of learning mobility in order to develop professional, social and intercultural skills and enhance employability (http://ec.europa.eu/education/policy/higher-education_en). In May 2017, the EC identified four key goals that needed to be implemented in higher education: promoting skills development, building inclusive and connected education systems, supporting effective and efficient systems and ensuring that institutions contribute to innovation. The implementation of digital technologies in higher education institutions is crucial as it determines to a great extent the efficiency and effectiveness of the teaching systems which correlate to innovation. However, the implementation of digital technologies in Europe has been slower than in other countries such as the United States and Japan. One reason is that the total investment in higher education in Europe is lower (1.3% of GDP on average, although there are substantial differences between countries: 2.7% in the US, 4.6% in Canada, 3.8% in Australia or 1.5% in Japan (http://ec.europa.eu/education/policy/higher-education/governance-funding_en). The EC has identified an urgent need to boost digital skills and competences in Europe and has recently published a Communication on Opening Up Education in which a framework for enhancing learning and teaching through new technologies and open digital content at all levels of education was set up (European Commission, 2017a).

Ignoring the potential impact of innovative teaching technologies on the quality of higher education is not an option and this was reflected in the EC report "New modes of learning and teaching in higher education" in 2014 that responded to the current challenges and embraced the use of new technologies in European higher education institutions by making 13 policy recommendations (European Commission, 2017b). Three are especially relevant for technology-enhanced learning in higher education: (a) "The EC should support Member States in developing and implementing comprehensive national frameworks for diversifying provision and integrating new modes of learning and teaching across the higher education system", (b) "The integration of digital technologies and pedagogies should form an integral element of higher education institutions’ strategies for teaching and learning" and (c) "All staff teaching in higher education institutions should receive training in relevant digital technologies and pedagogies as part of initial training and continuous professional development".

Considering these recommendations and our experience in teaching in higher education, in this article we provide examples that are easy to implement on a day-to-day basis to increase the awareness of educators of how traditional face-to-face learning can be transformed into blended courses in order to enhance the quality of teaching and student engagement with both in-class and online approaches. Additionally, we propose five points for action that can easily be taken up by educators in higher education.

2 | TECHNOLOGY-ENHANCED LEARNING IN HIGHER EDUCATION THROUGH BLENDED LEARNING

Blended learning evolved from distance and open education movements. The development of online or e-learning has gained in popularity in the last two decades as an effective approach for accommodating an increasingly
diverse student population and enriching the learning environment with the incorporation of online teaching resources. However, there is an ongoing debate about the definition of blended learning which has led to different understandings and approaches (Alammary, Sheard, & Carbone, 2014). One of the most accurate was given by Krause in 2007, describing it as those teaching and learning environments where there is an effective integration of different modes of delivery, models of teaching and styles of learning as a result of adopting a strategic and systematic approach to the use of technology combined with the best features of face-to-face interaction (Krause, 2007). The effective use of Information and Communication Technologies (ICT) in course design is key to enhance the learning environment for both students and teachers by enabling them to engage in ways that would not have been feasible in face-to-face or distance approaches (Krause, 2007). The blending of three significant elements of the learning environment such as face-to-face, online learning and self-paced learning leads to better student experiences and outcomes and more efficient teaching and course management when combined appropriately.

Face-to-face learning can be blended with both synchronous and asynchronous online approaches (Figure 1). Asynchronous learning is based on flexible self-paced learning where students complete their studies when and where they decide with no time limits (Hrastinski, 2008a). Different teaching elements are included such as journals, videos, and discussion forums such as Wikis and blogs. It has a very positive impact on the overall learning for most courses and especially for self-motivated learners, as they can spend more time refining their contributions which generally increases their quality (Hrastinski, 2008b). However, a major disadvantage of this approach is a weaker engagement as a consequence of feeling disconnected from the group. Hence, synchronous e-learning such as videoconferences and webinars can be a more powerful tool in several circumstances. First of all, it is flexible, allowing for a greater accessibility than face-to-face courses, as students decide where to study; secondly, it is more cost-effective and overcomes physical barriers, as questions can be asked and answered in real time, allowing e-learners to feel like participants and obtain immediate feedback while collaborating with the instructor and other peers (Hastie, Hung, Chen, & Kinshuk, 2010).

**FIGURE 1**  Blended learning environment [Colour figure can be viewed at wileyonlinelibrary.com]
As described by other authors (Garrison & Kanuka, 2004; Osguthorpe & Graham, 2003), the key factor is to find the “harmonious balance” of “thoughtful integration” between face-to-face and online components. Hence, the process of designing blended courses is critical, involving a great deal of planning and forethought. Good practice in blended learning does not imply combining a wide range of technologies for a specific course, but making effective use of a few tools in order to achieve quality in teaching, learning and course management. Three approaches were followed when designing blended learning courses: (a) adding extra activities to an existing course (low-impact blend), (b) replacing traditional activities by blended activities in an existing course (medium-impact blend) and (c) building the blended course from scratch (high-impact blend) (Alammary et al., 2014). A course can involve blended approaches on “time” when a face-to-face lecture is replaced by recorded lectures, blended approaches to “people” when a lecturer is replaced by a virtual classroom, blended approaches to “place” where small in-class group tutorials are replaced by online discussion forums, and blended “resources” that combine or replace traditional textbooks by online readings (Bath & Bourke, 2010).

When developing and implementing a new blended course, instructors face two major challenges: first, the correct blending of “time, people, place and resources” and second, the extra time added to the instructor’s workload to introduce extra in-class and online activities. Like in a standard higher education setting, the instructor’s role can be summarised as delivery of face-to-face classes, designing and marking assessments (formative and summative) and providing written extra material for self-paced studying. We propose blended learning approaches that can be incorporated at different instructor levels, such as the introduction of audience response systems (ARS) as in-class tools to promote student engagement which are easy to implement and can be considered as a high impact approach to “people”, the incorporation of self- and peer-assessment (blended activity on people and place usually with a high impact) over the classical student evaluation systems, flipped classroom methodologies as a medium impact blended approach to time, people and place and the uploading of lecture recordings as extra material designed to enrich self-paced learning (low impact blended approach on time).

3 | IN-CLASS APPROACH: ARS

Several studies (Bird, Osheroff, Pettepher, Cutrer, & Carnahan, 2017; Jones, 2007; Kitchen, 2012; Michael, 2006; Qamar, Rehman, & Khan, 2016; Yoder & Hochevar, 2005) have demonstrated the effectiveness of active learning in small group sessions in enhancing student learning and performance. But promoting active learning in large size classes is far more challenging. Thus, information is delivered in a traditional lecture format with little student interaction, which facilitates focus on memory retention rather than on understanding, logical thinking and solving problem (Gauci, Dantas, Williams, & Kemm, 2009).

Purpose-driven student response technology is proven to enhance key indicators of student success, including retention, motivation and attendance. In our era, mobile student response preparedness is a fact (Nugent, 2015). ARS promote an active learning environment in which students can learn to reconstruct and synthesise the new information and the prior knowledge into new knowledge and practice (Treesa & Jacksona, 2007). This tool is especially powerful for instructors who teach large or medium-size classes because of its success in: (a) monitoring students’ learning and understanding of content in real-time, allowing for the identification of areas that should be revised and adjusting the pace of the course and (b) providing students with immediate feedback to help them to monitor their own understanding (Mellon, 2014). Additionally, ARS can assess student satisfaction throughout and at the end of the course, a metric that is taken into consideration by many prospective higher education students. Several studies (Beaumont, Gousseau, Sommerfeld, Leitao, & Gooi, 2017; Bode et al., 2015; de Oliveira-Santos, Tirapelli, Rodrigues, Domaneschi, & Caldeira Monteiro, 2017; Grzeskowiak, Thomas, To, Reeve, & Phillips, 2015; Mains, Cofrancesco, Milner, Shah, & Goldberg, 2015; Simmons, Cosio, & Lin, 2015) have shown that ARS and conferences and seminars had a positive influence on student participation in class by increasing attention and classmates' participation, interest and learning. However, this does not always translate
in higher examinations scores (de Oliveira-Santos et al., 2017; Grzeskowiak et al., 2015). Hence, it is crucial not to rely exclusively on them to enhance student performance in assessments. A major advantage of ARS is that they are user-friendly learning tools that allow for in-class test/surveys designed to increase student engagement by enabling instructors and students to interact in a matter of minutes. There are different strategies to implement this ICT. A wide variety of questionnaires (such as multiple choice, extended matching questions, true or false, short answers) can easily be designed. During the lecture, the instructor asks questions (e.g., to assess if the content of the lecture has been delivered appropriately or if further revision of key concepts is required) and the students answer by means of a clicker or web-enabled devices such as smartphones or laptops, using a link given by the instructor. In a matter of seconds/minutes, the instructor can display the results in real-time and discuss them with the students. Responses can be anonymous to encourage participation or can be recorded and fed into a continuous assessment marking scheme (Hoekstra & Mollborn, 2012). According to Boscardin and Penuel (2012), student engagement is promoted in diverse facets when using this technology (Figure 2). Initially, they are engaged through participation in the test, followed by deeper thinking about the delivered content and answering the instructor’s question. Thus, the passive learner enters an active learning cycle where rational thinking and problem-solving prevail rather than memory retention (Hoekstra & Mollborn, 2012). Instantaneous feedback is the next key element, as humans are curious by nature (Bode et al., 2015; Hughes, ). Awakening student curiosity increases the search for an answer. Students at this stage are more likely to be highly motivated to understand the answers, thus facilitating the internalisation of knowledge. At the same time, instructors benefit from the results, as they immediately know which areas should be covered again. However, implementing most of the existing technologies can be extremely costly for many higher education institutions, especially when an individual clicker is needed (Brady, 2012).

**FIGURE 2** Audience response systems aiming to increase student engagement [Colour figure can be viewed at wileyonlinelibrary.com]
Several free tools are proposed below as an alternative to marketed proprietary audience response technologies such as i-clicker (MacMillan learning, New York, US) and turning point technologies (Turning Technologies, Arizona, US) (Gousseau, Sommerfeld, & Gooi, 2016; www.turningtechnologies.com/higher-education). A free solution is Google Docs Forms (Google, California, US) where instructors can send students a link to a form they have created in Google Forms (Brady, 2012; George, Dreibelbis, & Aumiller, 2013). There are three requirements: (a) instructors should be aware of new skills, as they will need a Google account to create this form, as well as knowledge of how to create and modify forms; (b) students need a web-enabled device such as a smartphone, tablet or laptop to access the form (with no need to create an account or log into a site) and (c) a good Internet connection in the classroom is needed to pull through all the responses together in a matter of seconds. There are many advantages (Brigham, 2014). It is easy to use and no installation of any software is required. As a free tool, it can be implemented in a large number of schools, colleges and institutions at very low cost, as no direct costs are involved and minimum training is required. Additionally, there is no need for a base station, receiver or annual subscription, unlike in other technologies such as i-clicker technology where every remote control needed to answer the questions has a minimum cost of 45$ per student. In addition, the Google Docs platform allows for complete control over the design and ownership of the survey/questionnaire/test and for much greater integration in other technologies than other common survey tools such as SurveyMonkey (California, US) and PollEverywhere (California, US). Google Docs can be used for both synchronous and asynchronous audience response and polling, whilst being reliable even if other in-class tests are ongoing in nearby classrooms. Responses can be tracked and saved as a spreadsheet, which makes it useful for both anonymous formative or summative assessments. The forms can be uploaded directly to Blackboard, Moodle or other educational software used by the institution, thus facilitating student access to the questionnaires. Figure 3 presents an example of the output of a Google Doc Form in-class multiple choice questionnaire. The results are plotted immediately in the spreadsheet which can be shown directly to the students, thus allowing the instructor to address any issues/concerns encountered with the content delivered.

Other free alternatives to clicker response systems which are similar in concept to Google Doc Forms are Kahoot! (Norwegian University of Science and Technology, Oslo, Norway) or Socrative (MasteryConnect, Cambridge, US). These allow the posting of as many questions as the instructor desires in a variety of formats. One format, “the space race”, allows students to work both individually and in teams, answering questions as rapidly as
possible (www.socrative.com). GoSoapBox (Go Education, Chicago, US) is another free learning tool for gathering instant feedback from students, with unique features such as: (a) the confusion barometer (which allows students to define their status in terms of “I get it” or “I’m confused”), (b) the smart filter (that searches for similar questions in order to avoid duplicates) and (c) the profanity filter (that prevents inappropriate language from being posted in the backchannel) (Byrne, 2011). However, a limitation of free ARS is that a collapse can occur in real time when collecting answers by submitting forms from a large number of students (i.e., over 100) at the same time, particularly if the web connection is not reliable. In this case, the questionnaire can be used before or after the lecture to assess the knowledge gained and be uploaded separately. Results can be backed up in a spreadsheet that can be uploaded to Blackboard/ Moodle or any other equivalent platform in order to track student learning and facilitate formative and summative assessments by automatically saving each student’s score.

4 | MIXED APPROACH: SELF- AND PEER ASSESSMENT

The massification of higher education has impacted on both the quality and quantity of interactions between students and instructors (Ballantyne, Hughes, & Mylonas, 2002) and negatively impacted on the instructors’ ability to provide detailed feedback on student’s work. In order to face this challenge, contributing student pedagogy can be implemented, encouraging students to contribute to their learning and the learning of others and value the contributions of others (Hamer et al., 2008). By using self- and peer assessment tools, many benefits can be obtained for both instructors, as their workload is reduced, and for students, as they can obtain a great deal of individualised feedback (Luxton-Reilly, 2009). Moreover, these tools help students to develop generic skills such as communication, lifelong learning and autonomy and a sense of community and thus forge a culture collaborative learning. The effectiveness of using self- and peer assessment to improve learning outcomes by offering opportunities to practise, assess and provide feedback on students’ attribute development has been demonstrated in many studies (Duers, 2017; Fete, Haight, Clapp, & McCollum, 2017; Ihm, Choi, & Roh, 2017; Khan, Payne, & Chahine, 2017; Luxton-Reilly, 2009; Moore, Westwater-Wood, & Kerry, 2016; Willey & Gardnnera, 2010). However, some authors (Monroe, 2016; Roberts, Jorm, Gentilcore, & Crossley, 2017) have highlighted issues relating to self- and peer assessment in terms of the accuracy of the evaluation.

Students benefit from the analytical experience of evaluating submissions against defined criteria providing feedback on the assignments submitted by other peers. In order to make this technology successful, it is crucial that the instructor plans the activity in advance and defines the learning outcome that will be addressed and the criteria that students should take into account during the evaluation process, that is, Is it required that the submission meet the word count?, How many marks are allocated to every question?, When is it considered that the question is fully answered?, etc. The provision of model responses can facilitate the evaluation process and the comprehension of the subject. The rationale behind this strategy is that students should be able to master key concepts that foster higher-ordered thinking skills when comparing their own and their peers’ work against criteria and standards set by the instructor. To provide an account of examples is highly recommended. The assessment is more authentic and provides an open environment when multiple answers are correct. A model answer that includes a marking scheme is also useful. A face-to-face tutorial can then be arranged with students who have faced problems during the process. Many platforms were designed in order to allow for the efficient implementation of self- and peer assessment activities even in large classes in a wide range of disciplines. Examples are: (a) SPARKplus (developed by the University of Technology Sydney, Australia) which is especially useful with large classes and enables the feedback loop to be closed (Willey & Gardnnera, 2010); (b) PeerGrader (Peergrade ApS, København, Copenhagen) which allows students to submit an arbitrary number of webpages and multimedia resources for review and facilitates anonymous communication between reviewers and author before the grades are allocated (Gehringer, 2000) or (c) Web-SPA (developed by Ho, Chang, Sung, & Chiou, 2003) which allows instructors to configure parameters such as setting a group or individual assignment and defining the method of
scoring by a rubric such as discrete scale, percentage or no scoring. Web-SPA uses a fixed workflow to progressively engage students in the activity and randomly presents each student with examples of the best and the worst cases selected by other group of students (Sung, Chang, Chiou, & Hou, 2005).

The flipped classroom (also known as inverted classroom) is another educational strategy that combines self- and peer assessment by introducing online activities before a face-to-face class in the form of reading materials and other artefacts (Figure 4). This teaching model originated in American Woodland Park High School and is now widely implemented in higher education. It involves flipping over the traditional classroom teaching structure (Anderson et al., 2001; Cheng-lin, 2015; Van Vliet, Winnips, & Brouwer, 2015) where both autonomous and interactive group learning are combined. The first stage is initiated outside the class (autonomous learning). Students must collect information and recall theoretical concepts at home through computer-based individual instruction (i.e., video lectures, reading, quizzes, tutorials, practice exercises). The second stage takes place inside the class (Interactive group learning). Students discuss, analyse and evaluate the theoretical content that was learned and assimilated at home through different activities that can include problem-solving, answering (clicker) questions or quizzes, peer instructions and debates.

Many studies (Ihm et al., 2017; McNally et al., 2016; Selvabarathi & Govindarajan, 2016; Shi-Chun, Ze-Tian, & Wang, 2014) have shown that a flipped classroom methodology provides many advantages such as: improvement of critical thinking, interactions among peers and instructor, peer learning and tasks value, personalised learning adapted to individual work rhythms, deeper learning of the subject, encouraging collaboration skills, enhancement of students’ protagonism of their own learning and promoting centred-learning and no centred-teaching. It can be invaluable for the teaching of mathematics and statistics (a key graduate skill), as well as chemistry, biology and physics principles that could need to be revisited for successful learning of first year students who are increasingly entering higher education with a diverse range of qualifications.

Some authors (McNally et al., 2016; Selvabarathi & Govindarajan, 2016; S2014) also described disadvantages and challenges associated with the practicality of this tool. For example, computer and Internet access are essential in order to implement this methodology. Also, resistance can be encountered, as students need to be motivated to participate in the activity and, in this respect, the educator could need the support of all faculty members, including the personal tutors. However, engagement with flipped classroom activities can be monitored.

1) Outside class: Autonomous learning

- Computer-based individual instruction:
  - Video lectures
  - Reading
  - Quizzes
  - Tutorials
  - Practice exercises

2) Inside class: Interactive group learning

- Classroom activities:
  - Problem solving
  - Answering questions
  - Peer instructions
  - Debates

**FIGURE 4** Flipped classroom model [Colour figure can be viewed at wileyonlinelibrary.com]
via learning platforms such as Moodle. Preparing flipped classroom artefacts can be time-consuming for the instructor, as more preparation is required to provide high quality extra material during its first stage.

5 | ENRICHING SELF-PACED LEARNING VIA ONLINE EDUCATIONAL RESOURCES: LECTURE RECORDINGS

The recording of lectures is becoming common practice in higher education institutions, but it is not intended to replace in-class teaching lectures except for fully online courses. There are several reasons behind its increasing popularity: (a) recorded lectures are a cost-effective provision of information; (b) the instructor’s workload can be reduced as the lecture recordings can be re-used for future reference and following semesters or courses and (c) learning is facilitated, especially when the content is difficult or highly technical for students who are unable to attend class and international students who are taught in languages other than their mother tongue and can benefit from listening to the recordings at their own pace (Hadjianastasis & Nightingale, 2016; Krause, 2007; Oz, 2005).

An obvious concern is the fact that video lectures may encourage students to not attend live lectures and only access the recordings (Maynor, Barrickman, Stamatakis, & Elliott, 2013). Surprisingly, some authors (Yoon, Oatesa, & Sneddona, 2014) have shown that a significant number of students prefers live class to recorded lectures, as the latter do not allow for interaction with the teacher and other fellow students who are perceived as a complementary resource. Viewing a recorded lecture also takes as much or more time as a live lecture. The use of recorded lectures requires time management practices by students and caution on the part of the academic staff involved, ensuring high quality recordings. Some authors (Bacro, Gebregziabher, & Fitzharris, 2010; Johnston, Massa, & Burne, 2013) found no correlation between the final grades and the use of lecture recordings, whilst others (Johnston et al., 2013) demonstrated a correlation between poorer overall academic student performance and access to recorded lectures.

The lecture recordings can be either created by the instructor or obtained from open educational resources (OER) databases. On the one hand, there are several online tools to generate live streaming and recording, such as open broadcaster software (Github, California, US), which is a free and open source software or Camtasia (Techsmith, Michigan, US) (www.techsmith.com/camtasia.html) and allows for a more advanced customisation and editing of the recording content but requires a subscription. One of the advantages of these technologies is that they are user-friendly and do not require high computer skills to create the recordings. However, the instructor’s workload can be intense, especially at the beginning. On the other hand, recorded lectures can be obtained directly from open educational databases such as Multimedia and Educational Resource for Learning and Online Teaching (Merlot II) (www.merlot.org/merlot/index.htm) or Open Educational Resources (OER Commons). OER have become a new buzzword in the globalisation of education. Their aim is to support open access to learning and teaching resources in the era of the glocalisation of higher education (Willemsa & Bossub, 2012). The term “glocalisation” was created to refer to the interplay between local, regional and global interactions, showing the overlapping among spheres of society, technology and the World Wide Web (Wellman, 2002). The main advantage is that the material is ready for use. However, it is critical that instructors identify suitable resources for a specific activity of high quality which are tailored to the intended learning outcomes, necessitating that they scrutinise the content from beginning to end.

6 | REFLECTIONS AND RECOMMENDATIONS FOR THE FUTURE

Higher education is constantly changing with current and new technologies that are constantly added to the arsenal of educators (Bath & Bourke, 2010). With the Bologna Process, European countries are making a significant effort to modernise higher education institutions, supporting effective and efficient systems in order
to promote excellence and the employability of future graduates (http://ec.europa.eu/education/policy/higher-
education_en). The implementation of digital technologies plays a key role in the teaching systems as correlates with innovation and hence, traditional courses should be revised in order to ensure student engagement and better learning experiences.

ARS are one of the most time effective ICT tools and are easy to implement in a blended course. Apart from improving student engagement in class, they can serve as a track record of student learning, facilitating formative and summative assessments. They are powerful in assessing student satisfaction and providing a dynamic tool for responding to student needs. Our recommendation regarding the use of this strategy is to start by adding integrated questionnaires at the end of the class. Once the educator feels more comfortable with the use of this technique, questionnaires can be displayed in a very effective manner at the beginning and in the middle of the class without endangering precious face-to-face contact time that is limited. Additionally, in our experience, this tool has been very useful to track student attendance in an indirect manner and significantly enhance student engagement.

Self- and peer assessments embrace the idea of teaching and learning and shift the power balance from the educator to the learner. They can be applied to laboratory classes when combined with clear marking criteria for providing quick formative personalised feedback while remaining excellent tools for courses with a large number of students, such as open online courses to reduce time constraints on the instructor for providing personalised feedback. To overcome concerns about the reliability of scores, it is crucial that the activity is planned in advance and students are provided with well-defined criteria or self-assessment schemes. A good alternative is to combine self- and peer assessment in the same learning activity so that the instructor has only to address cases where the score between these assessments differs significantly (e.g., more than 10%).

The implementation of flipped classroom methodologies is more successful in scientific and healthcare courses prior to laboratory practicals or clinical workshops than in traditional face-to-face classes where theoretical concepts are delivered. Flipped classroom methodology can be extremely useful for first-year students, especially as students enter higher education with varied qualifications. For example, mathematical skills, which are a pre-requisite for a variety of courses, can be enhanced and harmonised by using good quality online material, videos, quizzes and workbooks with which students can learn, revise and bring their knowledge and skills up to speed, allowing classroom time to be spent in deepening their learning through problem-based activities. Planning a number of resources to make each lesson engaging and interesting (e.g., videos, Camtasia videos, workbooks) and aligning them with online quizzes after every lesson can help students to revise or grasp new concepts.

Finally, recorded lectures are considered as a low-impact blended approach on time. However, their use is encouraged as, although contradictory in terms of examination performance, they are highly demanded by students and can be extremely useful for large-size classes, especially when a large number of international students might not necessarily possess the language skills needed to fully cope with traditional lectures.

Before starting to modify any teaching course, a deep reflection based on previous experiences is required. Implementation of the Shewhart cycle (PLAN-DO-CHECK-ACT) is recommended, as it does not focus only on the initial intervention, but also on the evaluation of the performed actions and future improvements. It illustrates how blended learning can be introduced in classical teaching systems and help to better define different actions (Best & Neuhauser, 2006; Shewhart, 1931) (Figure 5). It involves four stages: (a) “Planning” in order to identify what can be improved and what changes are necessary; (b) “applying or doing” to implement the design change; (c) “Checking or evaluating” in order to assess and measure the outcome and (d) “Improving or acting” when the results are not as hoped for (Best & Neuhauser, 2006). In our experience, an extra “designing” step should be added, especially when developing new blended courses from scratch or improving an existing course (high-impact blend). As a cycle, this process is never ending and should be used to guide improvement in a continuous manner during the instructors’ teaching life.

Designing for blended learning requires a systematic and dynamic approach and involves planning to integrate blended learning elements in the course (i.e., which content is difficult to deliver by using a traditional approach?,
can blended activities make the process of learning easier?, which blended activities are more appropriate?) followed by creating and implementing the blended activities (i.e., using some of the learning tools commented previously). Evaluating their effectiveness in order to appreciate in which context they would work better (e.g., flipped classroom methodologies usually work usually better in smaller groups) can improve significantly blended activities and serve both the student and the instructor's perspective. Academic student performance and student feedback are key elements to bear in mind when evaluating the effectiveness of new blended course.

We propose a five-point action plan:

1. Consultation with staff based on student feedback and their experiences and the involvement of student representatives prior to the development of a school/institute blended teaching strategy.
2. Co-ordinate which blended approaches are more appropriate and feasible and develop a blended learning platform.
3. Support and facilitate blended learning needs in terms of finances and staff time whilst consideration can be given to appointing a blended learning co-ordinator.
4. Ensure policy is clear in copyright, contact hours and use of OER.
5. Educate staff in blended learning, offer demonstrations on how it can be applied and how these digital technologies can be used in a time-efficient and cost-effective manner whilst ensuring that their uptake is justified/explained to both staff and students.

REFERENCES


