

# An Evaluation of Quality Metrics for Distance and Blended Teaching



Alexis Mason and Arnaz P. Binsardi

**Abstract** This study discusses evaluating the service quality in higher education institutions (HEIs) or the teaching quality of hybrid learning. Following COVID-19, most HEIs have shifted from face-to-face learning to blended and online learning in a synchronous or asynchronous form. The disadvantage of online learning is the absence of face-to-face and social interaction, which is why blended learning has become more popular. However, there are methodological and theoretical issues. Methodologically, to evaluate teaching delivery, either qualitative or quantitative research can be employed. Univariate analysis can be utilised to investigate the relationship among metrics. Alternatively, a multivariate analysis such as Structural Equation Modelling could be used when there is a complex interaction between metrics. Other methodological issues relate broadly to sampling, such as which metrics should be evaluated, whose opinions should be shared between students and lecturers and when to evaluate the survey using pre-learning or post-learning metrics in terms of module quality, module relevance, module intellectual, module infrastructure, module success rate, module engagement, module support, module feedback and overall satisfaction. Theoretically, additional metrics such as aesthetic technology and co-creation dynamics should be utilised in evaluating blended learning because institutions and clients simultaneously produce education. Moreover, based on the constructive alignment theory, several metrics can be used to evaluate teaching performance, such as learning-objectives metrics, learning-activities metrics and feedback metrics. In addition, new metrics have also been developed based on the behaviourists, constructivists and social constructionists, including content metrics, instruction-quality metrics, teaching-climate metrics, online-management metrics, professionalism metrics and classroom-management metrics.

**Keywords** Distance and blended teaching · E-learning measurement metrics · COVID-19

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## 1 Introduction

Recent research (Basilaia et al., 2020; Dhawan, 2020; Mishra et al., 2020) indicates that the COVID-19 crisis has led higher education institutions (HEIs) to shift their learning and teaching methods from traditional face-to-face classroom models towards blended and online models. Before the pandemic occurred, most HEIs had gradually started shifting their learning and teaching towards blended and online models. However, the pandemic has led HEIs to speed up this process of offering learning and teaching that is blended and online.

With the increasing trend of online learning models, HEIs are now facing the challenge of evaluating the qualitative success of their blended and online models using metrics. Although HEIs regularly evaluated their traditional learning models before the pandemic occurred, the question remains as to whether the same metrics can be used to evaluate the quality of blended and online learning models. In addition, there are potential issues such as determining the evaluative metrics distinction between traditional models and blended or online learning models. Although the terms ‘blended learning’ and ‘distance learning’ are used conventionally in the literature (Adam & Nel, 2009; Bates, 1995), ‘blended teaching’ and ‘distance teaching’ will instead be used throughout this research, because teaching is officially directed by HEIs through learning outcomes, rubrics, syllabi, lesson activities and other means, while learning is not official: it is considered an informal and independent process undertaken by learners to study any knowledge.

The aim of this research is to provide theoretical and methodological discourse on the evaluation of, and quality metrics for, distance and blended teaching. The first section (Introduction) discusses the significance of the research and the rationales for conducting it. This is followed by a second section (Theoretical Framework) covering the theories of measuring teaching quality. The third section (Methodological Framework) focuses on the methods of evaluating the metrics using qualitative or quantitative analysis. The fourth and final section (Summary and Conclusion) closes the paper and offers direction for future research.

Before further discussion, definitions of conventional, blended, and online teaching will be offered in order to achieve a coherent perspective for the readership.

- Conventional teaching can be defined as classroom teaching or teaching as it was before the internet. The internet conveys the world of learning through synchronous and asynchronous teaching (Murphy et al., 2011; Sabine et al., 2021). Synchronous teaching is characterised by the fact that teachers and students meet and interact together at the same time. Teachers and students communicate and discuss in real-time. This exchange is comparable to traditional classroom instruction, in which teachers stand up in front of the class to lecture or give a lesson. Their presentation is followed by direct interactions, tutorial discussions and question-and-answer exchanges between teachers and students. While asynchronous teaching materialises when teachers prepare course materials in advance, which students can access at any time; however, teachers are not there to help students in real-time. This type of teaching, which uses recordings, is common in

today's online context. Another common form of online teaching is the webinar (Christian & Andreas, 2019), which is usually considered to be synchronous, as all participants and presenters must log on in real time at the same time. However, students are frequently confused because some online webinar teaching is asynchronous, in which the online teaching is archived to be watched by participants at a later date; however, the teachers and presenters are not there. Some webinars are pre-recorded, and students repeat them several times. Accordingly, webinars and other online teaching can be classified as either synchronous or asynchronous.

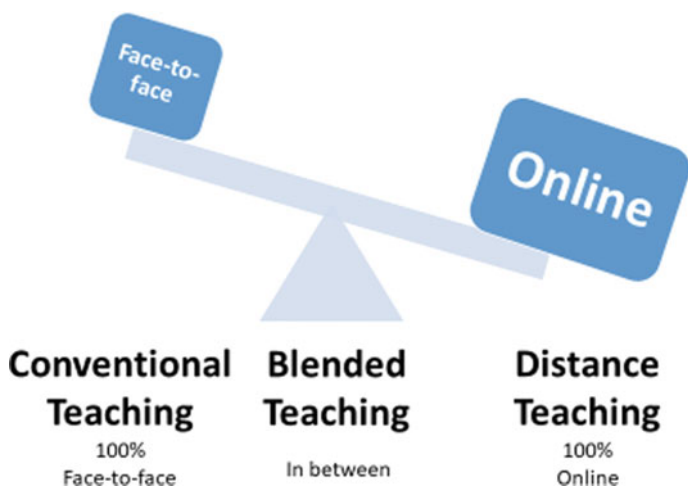
- In conventional teaching (Bates, 1995; Hung & Chou, 2015), students are given several types of physical exposure, e.g. direct interaction with other students and direct, instant comments or discussions from lecturers in real time. This exposure is part of education and is considered a service according to the service theory (Ng and Forbes, 2009). However, evaluating teaching or education as service is somewhat complex (Hornstein and Law, 2017; Stroebe, 2020). Additionally, education is also jointly and simultaneously produced by both teachers and students, which is known as a value co-creation concept in the light of the theory of service-dominant logic (Díaz-Méndez & Gummesson, 2012; Lusch & Vargo, 2014). Because both teachers and students jointly create education, it is problematic to conduct a mere single evaluation or non-value-co-creation evaluation such as a student satisfaction survey that evaluates staff teaching performance without examining students' effort or collaborative attempts. For example, evaluating the module's passing or a drop-out rate as an indicator of teacher performance can be misleading since those rates are considered in a value co-creation context between teachers and students. Unfortunately, this concept is not well understood in the literature because many teaching evaluations still do not incorporate a value co-creation concept.
- In addition, classroom teaching provides a conducive platform for learning cooperative subjects such as organisational behaviour, corporate social responsibility and others, where the modules require collaboration by students by means of significant interaction, group activities, discussions, collective presentation and teamwork. Despite the positive impact classroom-based teaching has on learning, the literature (Geske, 1992) also highlights some of its drawbacks. It can be demanding of time, finances and other resources; students must sacrifice their full-time work and 'real time' as well as travel to attend conventional teaching sessions. This is in contrast to distance teaching, where learners may study at their own pace, in their own time, and pay lower tuition fees.
- Distance teaching is defined as fully online teaching that does not require a student's physical presence. Instead, it uses interactive teaching tools and online software to engage students as required. As a result of the COVID-19 pandemic, distance teaching has recently become widely used across universities (Dhawan, 2020); people recognise that learning can happen online, with reduced tuition fees. In addition, students are given the opportunity to learn flexibly, at their own pace. Due to technological advances, students can gain access to study materials, online tests, online quizzes etc. at any time. The main drawbacks of distance teaching are a lack of direct contact with lecturers and an absence of social face-to-face interaction (Bates, 1995; Hustad & Arntzen, 2013). Students are expected to be more

independent. However, today's distance teaching can allow for social interaction online, e.g. students can interact with their own groups through completing online group activities on platforms such as Zoom, Microsoft Teams, Google Hangouts.

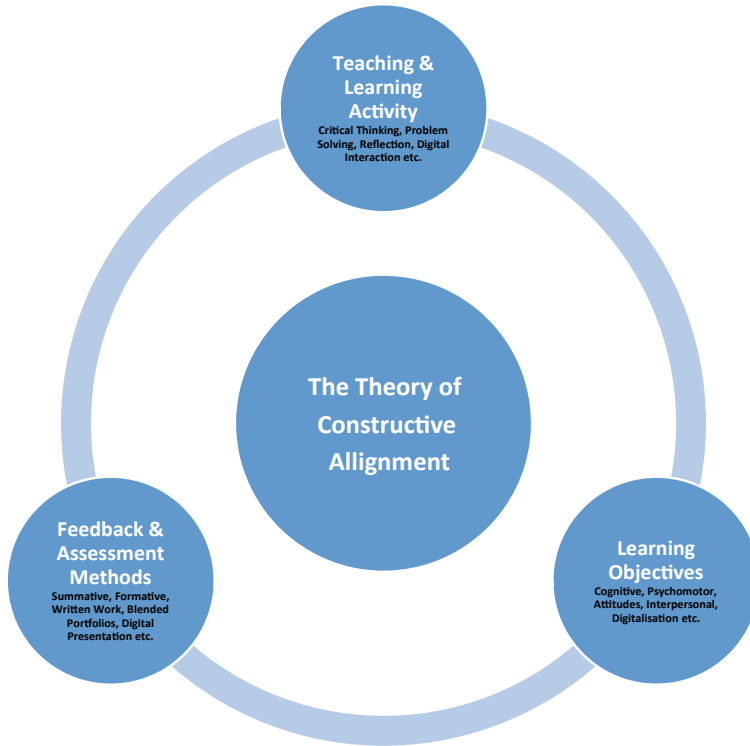
- Blended teaching combines conventional and distance teaching—students have the opportunity to attend both online and conventional classes. For example, as well as studying online (distance teaching), students can also attend classroom sessions at a university (conventional teaching). This type of blended teaching is popular with today's learning and teachings. However, there is variation in the application of blended teaching across UK universities, as indicated in Fig. 1. For example, some universities use conventional teaching for 90% of their lessons and employ online teaching for the other 10%, while others conduct 80% of their teaching in the classroom and the other 20% online; thus, the pendulum can swing in either direction—towards more conventional teaching or more online teaching (Fig. 1). With the current COVID-19 pandemic and social distancing requirements, universities are tending to shift their teaching more towards electronic (Basilaia et al., 2020; Dhawan, 2020), online methods—with up to 60–70%, or even more, of their content being taught online, the role of conventional teaching is lessened.

There are several measures or surveys (Appendix), or metrics that can be used to evaluate blended teaching. Most of the metrics were designed based on the theory of learning, which was developed from behaviourist theory, constructivist theory, social constructivist theory and notably the theory of constructive alignment (among others, Biggs & Tang, 2007; Ellis & Tod, 2018; Jarvis & Watts, 2003; Means et al., 2009; Ozkan & Koseler, 2009; Pritchard, 2009) as shown illustratively in Fig. 2.

The theory of constructive alignment reveals that a module's learning outcome, assessment, and learning activities should be aligned in order to optimise students'



**Fig. 1** Pendulum swinging from conventional to blended and distance teaching



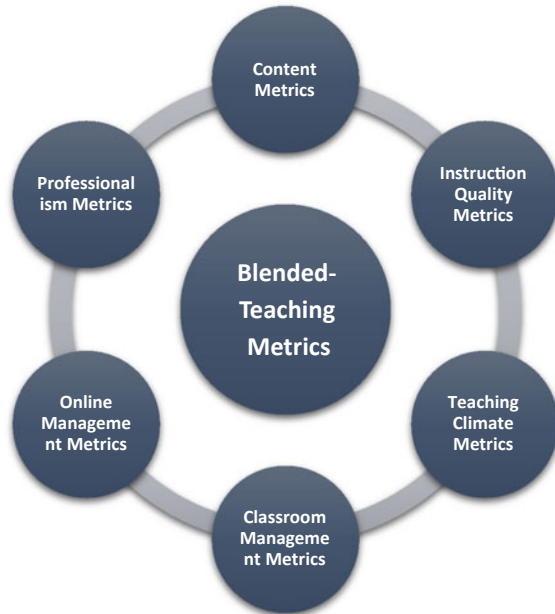
**Fig. 2** The theory of constructive alignment. *Source* Based on Biggs and Tang (2007)

learning progress. This serves as the foundation for the metrics. For example, an evaluation survey can be developed, giving students the opportunity to indicate how they feel their course content measures up to the following metrics:

- Whether the module learning outcomes are relevant to the objectives and content of the course.
- Whether it is possible to achieve the module’s learning outcomes within the time allowed, and the content is relevant for the level of study (undergraduate, master or doctoral levels—levels 5, 6, 7 or 8).
- Whether learning activities are relevant to the module’s learning outcomes.

Aside from the theory of constructive alignment, evaluation criteria and quality metrics for distance and blended teaching have been extensively developed in literature (Means et al., 2009; Ozkan & Koseler, 2009) based on behaviourist theory (learning by association), constructivist theory (learning by consequences), and social constructivist theory (learning by collaboration). The metrics were developed to allow evaluation of whether some of the module components inhibit or promote students’ learning and to discover what could inhibit learning. Ultimately, they were developed with the aim of establishing the best ways to help students to achieve a module’s

**Fig. 3** Blended teaching metrics toward face-to-face teaching



learning outcomes. Correspondingly, following the above rationales, the literature reveals that measuring the effectiveness of blended teaching incorporates several components as indicated by Fig. 3.

- *Content metrics* encompass the knowledge and structure of a particular module. When a lecturer possesses a strong expertise in a particular subject or module, the content of the module can be transmitted more effectively to students. The literature reveals strong evidence of the impact of a module's contents on students' learning.
- *Instruction quality metrics* include a lecturer's skills in providing Socratic instruction in class as well as robust, quality assessment in order to nurture the range of skills that need to be mastered by students. It also includes a lecturer's ability to transfer skills and knowledge to students. Evidence of the impact of instructional quality on students' learning has also been documented robustly in the literature.
- *Teaching climate metrics* have a moderate impact on students' learning. The teaching climate includes professional relationships between lecturers and students and critical questioning from lecturers so that students develop a sense of proficiency because of their effort.
- *Classroom management metrics* have a relatively moderate impact on students' learning. Classroom management includes the use of lesson time, co-ordinating resources, space and managing students' behaviour.
- *Online management metrics* are similar to classroom management metrics but apply to distance teaching, since blended teaching combines both conventional

and online components. It relates to how group activities, and communication and interaction between students and their peers and lecturers, are directed digitally. For example, the way that students are separated into groups for discussion using Zoom and how teamwork presentations using MS Teams (or other alternatives such as Cisco Webex Meetings, GoToMeeting, Google Hangouts, Adobe Connect) are facilitated.

- *Professionalism metrics* relate to how the professionalism of lecturers has also been linked to students' learning progress. Lecturers engaging in professional networking, supporting colleagues, and joining professional bodies or learned societies plays a significant role in achieving effective teaching because lecturers are able to keep abreast of the current demands and practices in their field and maintain an up-to-date syllabus in line with industry.

Following the COVID-19 pandemic, more HEIs have shifted their teaching delivery towards online distance teaching. There are two main types of online distance teaching: synchronous online classes and asynchronous online classes (Sabine et al., 2021). Synchronous online classes are conducted in real time, in which students and instructors attend lectures and tutorial exercises concurrently together from different geographical locations at the same time. One benefit of synchronous online classes is that students complete tutorial exercises in front of the lecturer, where they can ask directly questions, and the lecturer provides answers in real time. Conversely, asynchronous online classes are pre-recorded in a more relaxed environment in which students are able to access and watch a lecture and complete tutorial exercises during different hours and from different locations. In these asynchronous online classes, students also need to complete tutorial exercises in a prescribed time, but they have no direct access to the lecturer. They are unable to pose direct questions to the lecturer because the lecture was pre-recorded. Although this is a limitation of asynchronous online classes, more HEIs are delivering this flexible learning delivery, which is considered convenient for both students and lecturers, particularly when timing becomes an issue, such as when lecturers are based in the UK but students live in China. This synchronous online learning becomes problematic and impractical because of time differentials.

Consequently, there has been a shift towards including more online and technological dimensions to quality metrics—evaluating more online infrastructure such as the quality of software-supporting tools, content navigation, technology adoption, and learning managements systems (LMS) such as Blackboard, Moodle, Canvas and others. Several technological metrics can be utilised to assess the performance and efficiency of online learning delivery. The most popular assessment metric is the hexagonal assessment model (HELAM) to measure e-learning success within HEIs based on a variety of six e-learning dimensions: (a) system quality, (b) service quality, (c) content quality, (d) learner perspective, (e) instructor attitudes and (f) supportive issues. The model can be examined empirically via interviews (qualitative analysis) or survey questionnaires (quantitative analysis).

## 2 Theoretical Literature

Measuring the quality of blended teaching is problematic, because blended teaching can be defined as the combination of online (distance) with traditional (classroom) teaching—the combination can be 10% online and 90% classroom, or 70% distance and 30% conventional teaching—while distance teaching itself is defined as 100% online teaching. The theoretical literature on measuring blended teaching starts with simply evaluating the amount of classroom teaching (say, 90%) and online teaching (10%). Most of the literature regarding this combination is occupied with measuring face-to-face classroom teaching, such as classroom management performance, quality of PowerPoint presentations and lecturers' face-to-face ability and partial measurement of online presence.

The literature (Means et al., 2009; Ozkan & Koseler, 2009) indicates several metrics for gauging the quality of online and blended learning programmes by using several feedback measurements. These can be obtained from students and sponsoring organisations by asking both pre and post learning questions. Pre-learning measurements can be obtained from students directly before they graduate from their programmes. Post-learning feedback can be obtained after students complete their course and determine the programme's usefulness for the student's career and work.

- *Module quality metrics*: whether students perceive the module carries quality in terms of the module structure, content and the staff's competence, when compared to similar modules or programmes within the industry. For example, students can make comparisons with competing universities such as the Open University or other regional universities, which offer similar programmes.
- *Module relevance metrics*: whether the students perceive the module is relevant and useful for their career or future employment.
- *Module intellectual knowledge metrics*: whether the students perceive they gain knowledge by attending the module.
- *Module infrastructure metrics*: whether the students perceive that the module infrastructure and presentation is acceptable, such as online video, animated explanations, additional reading materials, case studies, quizzes and others.
- *Module success rate metrics*: whether the students pass the course comfortably as well as the completion rate metrics for the module such as 70, 80 or 90%. 95% indicates excellent completion rates because only 5% of the students failed the module.
- *Module engagement metrics*: whether the students perceive the module has engaged them and their classmates or whether they have engaged with other online activities.
- *Module support metrics*: whether the students perceive they have received enough teaching hours to undertake tutorial exercises. This is common for numerical modules such as management accounting, in which students may need additional help to review their basic mathematics.



- *Module assignment feedback metrics*: whether the students perceive that the tutor provides them with feedback on assignments on time and with rigorous and constructive feedback that can be applied to future assignments. In addition, whether it can inform the student's professional development.
- *Post e-learning metrics*: whether the students perceive, following graduation, that the module and the programme has been useful and relevant at work by increasing their performance and reducing skill gaps. For example, if there is little or no reduction in any skill deficit, then online and blended learning has less value, although there is a difficulty in accessing these metrics, as once students complete the programme and enter the jobs market, they may not be contactable by the provider. This subsequent feedback could, however, be obtained from the company who sponsors and employs students. The company may also be able to comment on the usefulness of online and blended learning.
- *Overall satisfaction metrics*: whether the students regard the module, staff and the provider (the university) positively and whether they have been good value for money.

### 3 Methodological Literature

There are several methodological issues that need to be tackled by future researchers to investigate empirically the quality of blended and distance teaching metrics at their institutions.

- *The first issue* has to do with methodology. For example, the Hexagonal models have been widely used in the literature (Ozkan & Koseler, 2009) to evaluate the quality of blended and distance teaching across universities using quantitative methods under the theoretical umbrella of 'positivism'. Several quantitative methods have been used, from univariate statistics such as simple mean, standard deviation and correlation to regression and other non-parametric techniques, as indicated by several studies (Chen & Hoshower, 2003; Low-Choy et al., 2017; Means et al., 2009). Most quantitative studies employ item questionnaires to measure variables. For example, say the first questionnaire can be used to measure a content quality (QUAL) variable, while the second questionnaire can be employed to evaluate a technological presentation (TECH) variable and the third questionnaire examines the module performance (PERF) variable vis-à-vis other modules in comparison. However, there exist some mediating and moderating variables within the overall survey questions. A mediating variable facilitates the relationship between the independent and the dependent variable, while a moderating variable is a variable that strengthens or weakens the relationship between the variables. In this case, mediating and moderating variables exist among the first, second and third questionnaires; consequently, it is these in which structural equation bias occurs, since most studies use univariate statistics and single equation regression models to measure the quality of teaching when, in fact, a structural or simultaneous model should be used to account for complex

interactions and interdependence among variables or questionnaires between the variables of QUAL, TECH and PERF.

- *The second issue* relates to sampling (Pombo & Moreira, 2012). Here, ‘sampling’ is not defined narrowly as merely selecting random or non-random respondents out of the whole population, but also refers to other dimensions, such as space and time, as part of answering the questions below. These sampling issues should be solved in detail in order to achieve more accurate findings, since the findings will be used to formulate strategic pedagogic policies to support student learning progress and achieve institutional competitive advantages in learning and teaching.
- (1) *What should be evaluated in the survey?* Should the module’s content, online infrastructure, animated presentation or supporting components be prioritised above other competing criteria? These metrics should be linked with the module’s learning outcomes following the above theory of constructive alignment.
  - (2) *Who should evaluate the survey?* Survey questionnaires or interview questions may be distributed to students taking the module. However, this may create ‘potential biases and inaccuracies’, since the students themselves are novice learners. They have just started learning the modules; accordingly, they are not knowledgeable enough to comment about the content, structure or complexity of the module. The survey should be given to experts, lecturers or professors who have greater expertise and have taught a similar module for years. Alternatively, the survey can be given to the sponsor (the companies, who sponsor and finance the students so that they will be able to comment on the practicality and employability of the module’s content). Alternatively, among several stakeholders, who is the most eligible to evaluate the survey?
  - (3) *How and when to evaluate the survey?* This question relates to the time dimension of the sampling. Should the evaluation survey be implemented in the middle of the module, at the end of the module or some period after the module completes, so that the researcher will be able to evaluate the employability aspects and functionality of the module in real life?
  - (4) *What is the evaluation survey for?* If the research intends to use the survey for improving the university’s technological infrastructure, the module evaluation should focus on the technology acceptance model (TAM) or, more recently, the theory of technology compatibility model (Taherdoost, 2018). Alternatively, if the survey was to evaluate the university’s competitive advantage when facing a highly competitive environment, the module’s evaluation survey should focus on the module’s functionality and employability vis-à-vis its learning outcomes.

- *The third issue* relates to the use of qualitative analysis. Qualitative techniques all present a different set of challenges for evaluation compared to quantitative. A variety of participants is required to provide samples for evaluating the quality of blended and distance teaching because of the complexity of the issue. Interviews and focus group discussions have also been used in the literature to evaluate the quality metrics of blended and distance teaching. In addition, a qualitative study should obtain a variety of samples by combining purposive and maximum variation sampling (MVS) to achieve sampling diversity across the stakeholders. This can be implemented by evaluating the lecturer (who delivers the module), the module itself and the technology used deliver the module. Moreover, a variety of stakeholders should also be recruited, including existing students, former learners, lecturers who are teaching the module, other lecturers or professors (who do not teach the module and are acting as peer reviewers or independent experts), the sponsors (the relevant companies who fund the students for studying online) and other potential stakeholders.

## 4 Summary and Conclusion

Since the COVID-19 pandemic, there have been gradual developments in blended teaching methodologies, from 95% classroom and 5% online towards 100% distance teaching and 0% classroom. This development has shifted from conventional face-to-face teaching measurement metrics to e-learning measurement metrics. Initially, metric measurements of quality teaching were based on the conventional framework of classroom management and social interaction among lecturers and students during the 1980s (underpinned by the behaviourist, constructivist and social constructivist theories); it has moved towards a more technological adoption framework during the 2010s (underpinned by the technology adoption model, the theory of planned behaviour and others), such as the Unified Theory of Acceptance and Use of Technology (UTAUT) and the extended UTAUT (Straub, 2017; Venkatesh & Bala, 2008). Apart from broadening the traditional face-to-face frameworks towards more technological frameworks such as the hexagonal assessment model, methodological dimensions have also developed to challenge how to evaluate blended and online teaching more accurately because of the interdependency among pedagogic questions or technological variables. For example, there are several methodological and technological issues that also need to be tackled by future researchers to investigate empirically the quality of blended and distance teaching metrics at their institutions. Other issues relate to more complex dimension such as:

- (a) How should the practitioners and pedagogists redesign the evaluation of teaching performance by encompassing a value co-creation concept to avoid teaching devaluation?
- (b) In light of the value co-creation concept, what should be evaluated in the survey and who should evaluate the survey?

- (c) How and when to evaluate the survey relating to more dimensional aspects of technological and value co-creation challenges?

These above aspects need to be addressed by future researchers to obtain more accurate and robust findings when measuring the quality of blended and distance teaching such as bandwidth coverage metrics (such as optimal data transmitted over the internet in a given amount of time) and other aesthetic video metrics (such as visual, view count, play rate, innovation, conversion rate and others).

## Appendix

There are several metrics that can be used, including survey questionnaires with a variety of scaling techniques such as the Likert scale or semantic differential scale as indicated by the statements below to measure quality metrics for distance and blended teaching, in which a survey questionnaire can be distributed to students using either a semantic differential scale or the Likert scale. The scales appear as follows:

- Semantic differential scale
- No, the worst 1 2 3 4 5 Yes, the best
- Likert scale
- Strongly disagree; Slightly disagree; Neutral; Slightly agree; Strongly agree

I always prepared weekly for the module and online discussion.

- (1) I was encouraged to interact with classmates.
- (2) My assignments were marked fairly by the lecturer.
- (3) The lecturer returned my assignments on time.
- (4) The lecturer provided helpful assignment feedback.
- (5) The assignments were reflective of the module content.
- (6) The module followed the syllabus and was well-organised.
- (7) The workload for the module was reasonable.
- (8) The online learning environment was conducive.
- (9) The lecturer presented video materials clearly.
- (10) The lecturer stimulated my interest in the subject.
- (11) The lecturer was available and responsive to online queries.
- (12) The assigned readings were valuable.
- (13) The module enhanced my knowledge.
- (14) The module developed my professional and analytical skills
- (15) I would recommend the module to others.
- (16) I would recommend the lecturer to others.
- (17) The lecturer met my expectations (a quality lecturer).
- (18) The module met my expectations (a quality module).
- (19) The module stimulated my interest in the subject.

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