

The literature review of the evaluation of blended learning

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ABSTRACT

Blended learning is a hybrid teaching method which combines the advantages of both online learning and traditional face-to-face learning, which also gives a balance between classroom and online learning environment. The evaluation of blended learning effectiveness is becoming an increasingly important research theme. However, few studies has been done for its systematical evaluation. In order to provide a wider and more standard evaluation method, we performed a systematic review. This paper divided the evaluation dimensions into four parts adapted from the SCOPe evaluation framework, hoping to give references for the further researches on the evaluation of blended learning.

KEYWORDS

Blended learning; literature review; classroom evaluation; teacher evaluation

1 INTRODUCTION

As the combination of traditional face-to-face learning and flexible online learning, blended learning has its unique superiority in both flexible time, high effectiveness and ubiquitous space. This style of learning is normally defined as the integration of traditional classroom methods with online activities (termed “e-learning”) [1-3]. According to the Centre for Educational Research and Innovation, blended learning courses are becoming increasingly significant, with ICTs being developed to complement, not replace, traditional forms of learning [4].

Actually, blended learning is not merely a random hybrid of traditional and online learning. It suits the situation that the number

of the students are high, the resources it provides can give students more chances and opportunities to learn better compared with online or face-to-face learning, and in order to improve the effectiveness of course [5].

Some researches have been done about the evaluation of blended learning, which is very crucial for us to implement and further improve it. So far, there has been almost no serious examination reporting the students' experiences [6] or the outcomes obtained with this type of learning [7-9]. As we know, evaluation is more than significant link among all the processes of the teaching. And we need different evaluation dimensions according to the respectively research purposes. With the desire to provide comprehensive evaluation dimensions, we investigate previous studies and classifies the evaluation dimensions as four parts adapted from the SCOPe evaluation framework by Wegmann and Thompson [10].

2 FOUR EVALUATION DIMENSIONS

2.1 Evaluation dimension 1: platform using in blended learning

Online platform is a very important section in learning. It can upload learning materials, and record students' data etc. And it plays a significant role in online learning. Zhang and Wang [11] designs a blended learning mode based on Moodle platform, which validated the effectiveness of the combination of traditional classroom and advanced educational platform. Modular object-oriented Dynamic Learning Environment is a modular package for web-based courses or websites. It

is a global development project to support the education framework of social constructivism. Moodle is a free, open source software (under the GNU public license), meaning that Moodle is copyrighted, but you have extra freedom. You are free to copy, use, or modify Moodle, provided you agree to provide code

to others without modifying or removing the original copyright and license, and to apply similar copyright to derivative works. However, Moodle seems more like a learning management system, which mainly operated by teachers, leading to a lack of the motivation of students.

Table 1. Comparison of platforms used in the blended learning

Platform	Advantages	Limitations	Application
MOOC (eg.Coursera and edX)	1) One of the characteristics is bringing disruptive innovation [12] into the educational system. 2) It happens whenever teachers adopt new technologies and innovative practices [13]. 3) Available to anyone with internet access. MOOC are considered a way to allow access to teaching and to democratize learning throughout life [14]. 4) Students do not need to attend physical institutions to have classes nor to pay any tuition [15]. 5) Creating opportunities for knowledge socialization [16].	1) Not all educational institutions can afford or are willing to make such investments, as open education are not often part of official programs at universities [17].	Eg.Airton Zancana et al. use the term MOOC platforms for understanding that they are entities - online education websites [18] that provide a storage system, allowing the management of the entire life cycle of a course and making MOOCs available to a group of participants.
Web-Based Learning Platform	1) A highly valuable source of information . 2) Can be used as an effective teaching tool, owing to its ability to disseminate educational information in accordance with the scope and objectives of certain curriculums . 3) Present teaching contents through interactive exercises and multimedia materials.	Lacks of specific evaluation tools to effectively evaluate these web-based learning environments, it has been difficult for users(i.e.teachers/student -s/ domain experts) to select the most suitable web-based learning applications among the many samples.	Eg. Funda Dağ [19] determine the language equivalence and the validity and reliability of the Turkish version of the Web-Based Learning Platform Evaluation Scale, which provide a more useful and reliable method to evaluate web-based learning.
Cloud computing platforms	1) Reduces the need for each user to have expensive individually held computing resources that become idle when not needed or which is impractical to store at the users' geographical location. 2) The environment available online (e.g.Amazon EC2, Microsoft Azure, Google App Engine, Go Grid) allows users to distribute computing tasks across many nodes.	Highly complex	It is demonstrated how to compute the expected revenue loss over a finite time horizon in the presence of all these model characteristics through the use of matrix analytic methods and illustrated how to use this knowledge to make frequent short term provisioning decisions – transient provisioning[20].

LMS systems (eg.Moodle,BI ackboard and Sakay)	1) Control the participants and the distribution of course content. 2) Handle thousands of students simul- taneously accessing the environment [21].	1) Copyright and cost policies, exclusivity and ownership of course participants' data [22]. 2) They present scala- bility problems because they were not designed to support access by thousands of students at the same time [23]. 3) Papachristos et al. [21] reported that another serious problem was the lack of availability of courses in foreign languages, which did not give any opportunity to attract international students.	1) Zhang and Wang [11] designed a blended learning mode based on Moodle platform, which validated the effectiveness of the combination of traditional classroom and advanced educational platform. 2) Wilen-Daugenti [24] interchanges the terms CMS and LMS. 3) Nikolaidou et al [25] describe the usage of Open eClass in Harokopio Uni- versity and conducted an evaluation study of the LMS with the particip- ation of students, instruct- ors and infrastructure- technology specialists to evaluate the ecosystem of blended learning.
Autonomic Computing	1) self-properties: self-configuration self-optimization self-healing self-protection 2) self-management [26]	High demands for its usage.	Huergo and Granda Candás [27] design a self- managed multimedia distribution platform for developing synchronous e- learning activities, provid- ing an efficient data delivery service and minimizing the required human intervention.

From the table above, we can see that every material has its own merits as well as disadvantages. There is no such perfect platform. We have to choose the suitable platform according to our evaluation purpose and other requests.

2.2 Evaluation dimension 2: classroom evaluation

As a typical formative evaluation, classroom evaluation is closely related to school teaching and student learning. Studies have shown that it is important to promote the student's learning through the class evaluation, rather than the external test, which is to be achieved, and to be able to improve learning by using an effective class evaluation. And it turns out that there is still a lot of room for improvement in classroom evaluation [28]. The research methods based on classroom observation include classroom teaching mode

analysis and classroom teaching interactive quality analysis.

2.2.1 Analysis methods of interactive quality of classroom teaching

Based on the Social Interaction Model, Ned Flanders [29], the famous American scholar, proposes the Flanders Interaction Analysis System (FIAS), which is the earliest published and mature interactive analysis system. Specific to the characteristics of language teaching, on the basis of Flanders Interaction Analysis System (FIAS), Moskowitz proposed a FLINT (Foreign Language Interaction, an adaptation of FIAS). In China, there are also some researchers getting interested in this field. From the implementation concept of the new curriculum reform and the application of Information Technology, Gu and Wang [30] further improved FIAS and formed an Information Technology-based Interaction

Analysis System (ITIAS) based on Information Technology. This system pays more attention to students' behaviors in classroom teaching so as to truly understand students' learning behavior in class.

There are the advantages and limitations about FIAS as the following table 2.

Table 2. The advantages and limitations about FIAS

Advantages	Limitations	Improvements made by Gu
FIAS makes a quantitative analysis of the teacher-student speech interaction in classroom teaching.	We can't truly understand the learning behavior of middle school students by paying more attention to the behavior performance of teachers in classroom teaching (seven categories) and ignoring the behavior performance of students in classroom teaching (two categories).	Add participation.
A comprehensive understanding and analysis of classroom teaching can be made by using quantitative data to analyze and reflect teachers' teaching and the description of teaching quality obtained by combining classroom observation.	Information technology being an indispensable element in classroom teaching, FIAS cannot reflect the interaction of it.	Questioning and critical thinking
It preserves a certain amount of information regarding the sequence of behavior [31].	FIAS also has some deficiencies in the concrete operation. Because sampling codes are required every three seconds at observation sites, and the operation is difficult.	Interaction with technology

2.2.2 Classroom quality evaluation

"Education evaluation" was first proposed by Tyler of Ohio state university in 1929, who argued that "education evaluation is essentially a process of determining the degree of curriculum and syllabus to achieve education goals" [32]. Classroom teaching quality evaluation is an important part of education evaluation, and it plays increasingly

significant role in the teaching link. The research of classroom teaching quality evaluation includes two aspects. The one is about the evaluation of students' studies while the other one is the evaluation of teachers' teaching activities. These two aspects are highly independent and interrelated. The current researches on classroom teaching quality evaluation mainly focus on the following aspects:

Table 3. Classroom quality evaluation dimensions

Aspects	Main focus
Evaluation methods	1) It emphasizes the application of modern information technology and modern statistical technology on the basis of original qualitative research. 2) It emphasizes the application of quantitative methods in classroom teaching quality evaluation. 3) It expects to realize the scientific and objective evaluation of classroom teaching quality.
Evaluation content	According to the teachers' classroom teaching, the scientific evaluation index is constructed, and the unified evaluation index is applied to the evaluation of classroom teaching quality.
Subject of evaluation	Focuses on the research on student evaluation of teaching, and discusses the significance of student evaluation of teaching to realize the effectiveness of classroom teaching evaluation.
Comprehensive evaluation	The monographs of education evaluation are systematically based on the whole education evaluation, including the research on the classroom teaching quality evaluation. These works have important reference value for the research on the classroom teaching quality evaluation The other is to combine the evaluation idea, evaluation principle, evaluation method and

From the aspects of researches above, Yang and Nie [33] defined classroom teaching quality evaluation as a multi-evaluation subject with evaluation qualification. According to objective and accurate evaluation indexes, teachers' classroom teaching activities are evaluated by using scientific and rational evaluation methods, so as to achieve personal career development of teachers and improve classroom teaching quality.

2.2.3 Course satisfaction

The University Student Course Experience Questionnaire (SCEQ) and the DEEWR/GCA Course Experience Questionnaire (CEQ), are designed to collect quantitative and qualitative data about students' perceptions of the quality of teaching and learning in their degree courses [34]. And SCEQ is adapted from CEQ by adding the factor of students. During the test, each student should give response to the suitable item in the statement of S/CEQ Factor, which using 5 point Likert Scale to link to their extent to which they agree or disagree with the statement of the items. And in some parts of the questionnaire, students are requested to provide their comments on the experience and theory improvement during the course. This questionnaire combines quantitative and qualitative evaluation method thus collecting both quantitative and qualitative data to help assess students' learning satisfaction.

There are some applications of SCEQ. Students' perceptions surveys of university course experiences and learning environment have been part of quality evaluation in higher education in the western world, especially Australia and UK for the purpose of accountability, learning improvements or both.

In Africa, particularly in Nigeria, it has not been so [35].

For example, since 1993, in countries like Australia, the Graduate Career Council of Australia has included the Course Experience Questionnaire (CEQ) [36, 37] as part of its annual Graduate Destination Survey for the improvement of the quality of teaching in the Australian higher education sector. Even UK has also developed a similar national survey. Apart from these, the results of the CEQ are used widely by a range of stake holders, including the Australian Commonwealth Government, researchers in higher education, prospective students and tertiary institutions via the Good Universities bulletin.

2.3 Evaluation dimension 3: teacher evaluation

2.3.1 Overview of teacher evaluation

For the past few years, teacher evaluation has been attached great importance. The most widely used methods of teacher assessment is standardized paper-and-pencil examinations and on-the-job ratings by supervisors. Because the defects of paper-and-pencil tests, including a lack of accurate measurement properties, low predictive validity for student learning and halo effects, Shannon came up with an alternative to the paper-and-pencil approach. Besides of that, there have also been several recent reviews of teacher evaluation process in which the authors identified from six to twelve general approaches to teacher evaluation [38-42]. There are three aspects they sought, including teacher competence, teacher performance (teacher effectiveness). Medley offers useful definitions of four terms often treated as synonyms:

Table 4. The definition of four synonyms used in teacher evaluation

Term	Definition
Teacher competency	It refers to any single knowledge, skill, or professional value position, the possession of

	which is believed to be relevant to the successful practice of teaching. Competencies refer to specific things that teachers know.
Teacher competence	It refers to the repertoire of competencies a teacher possesses. Competence is a matter of the degree to which a teacher has mastered a set of individual competencies.
Teacher performance	It refers to what the teacher does on the job rather than to what she or he can do (that is, how competent she or he is).
Teacher effectiveness	It refers to the effect that the teacher's performance has on pupils. Depends not only on competence and performance, but also on the responses pupils make.

2.3.2 Methods of teacher evaluation

(1) Teacher interviews

One standardized interview method developed and used recently is the Teacher Perceiver Interview. However, there are limited research to verify the effectiveness.

(2) Competency tests

By far the most widely used competency test has been the National Teacher Examination (NTE). Harris estimated that 75,000 teacher candidates in 24 states and 311 school districts take the exam each year. In some states and school districts, passing the NTE is a condition of employment [43].

There are also a number of states and locally developing teacher examinations. Most prominent in the literature is the Georgia Teacher Area Criterion Referenced Test, which assesses a prospective teacher's knowledge of a specific curriculum area. Passing this exam is a precondition of certification throughout the state [38, 40, 44] [43]. Similar tests have been developed in Florida, South Carolina, Dallas, Houston, Texas, Montgomery County, and Maryland.

(3) Indirect measures

King [45] argues that indirect measures, especially professional commitment as expressed in extra classroom activities, ought to be a supplementary source of evaluation data. Schalock [46] identifies two promising lines of research on teacher characteristics. But the two lines haven't been put into practice of teacher evaluation.

(4) Classroom observation

Classroom observation reveals “a view of the climate, rapport, interaction, and functioning of the classroom available from no other source” [47]. This evaluation method has the advantages of seeing teachers in action and within the context of their schools. However, even proponents of classroom observation recognize its limitations. Observer bias, insufficient sampling of performance, and poor measurement instruments can threaten the reliability and validity of results [39, 40].

(5) Student ratings

Student ratings are another form of “classroom observation”—they measure observed performance from the student's rather than the administrator's point of view. This method is inexpensive with a high degree of reliability, usually ranging from .8 to .9 and above, with some studies finding a modest degree of correlation between student ratings of teachers and students achievement. On the other hand, questions about the validity and utility of student ratings limit their acceptance as primary policy instruments for teacher evaluation [39, 48].

(6) Peer review

The review process is a broader spectrum of performance, encompassing not only performance in the classroom and other teaching behavior as exhibited by assignment and grading practices. Because the method is more open to divergent criteria for assessing performance and is not subject to direct administrative control, it is not generally recommended for use as the basis of personnel decisions [39, 49].

(7) Students achievement

Students achievement can be measured in many ways: comparing student test scores to a national norm; comparing test score gains with those of a comparable class; net gains over time, and so forth [39].

Studies of the reliability of student test scores as measures of teaching effectiveness consistently indicate that reliability is quite low, that is, the same teacher produces markedly different results in different situations, calling into question the use of such teacher effectiveness scores as an indicator of teacher competence.

(8) Faculty self-evaluation

Self-evaluation is becoming an increasingly important link during evaluation process. And the combination of self-evaluation and individual goal-setting may promote self-reflection and motivation toward change and growth. A teacher can use data coming from any technique-student or peer ratings, self-assessment measures of students achievement, and so forth, to make judgments about his or her own teaching. Thus doing some adjustments to improve the classroom performance.

2.3.3 Models of teacher evaluation

There are the five common used models of teacher evaluation.

Table 5. Five models of teacher evaluation

Model	Details	Author	Commons
Mutual Benefit Evaluation	<p>Step 1: The school board and administration</p> <p>Step 2: A diagnostic evaluation is performed to assess each teacher's present status the standards.</p> <p>Step 3: With the cooperation of the teacher, the evaluator sets job targets (three to five are recommended) for the teacher's performance improvement.</p> <p>Step 4: After a specified time, the teacher is reevaluated and new job targets are set</p>	Manatt	<p>(a) goal-setting</p> <p>(b) teacher involvement in the evaluation process</p> <p>(c) centralized teaching standards and criteria</p> <p>(d) straddle the competency-based and outcomes-based evaluation philosophies</p>
Management by Objectives Evaluation	<p>Step 1: The evaluator and teacher jointly establish individual objectives, an action plan, and measurable progress indicators</p> <p>Step 2: A teachers' responsibilities and learning goals are set by the responsible school authority.</p> <p>Step 3: The teacher's action plan is monitored through diagnostic rather than summative observations.</p> <p>Step 4: The observation results are assessed by the evaluators who then meet with the teacher to discuss progress and to set additional objectives.</p>	Redfern	
The Georgia evaluation system	<p>1) The Georgia system requires each teacher to possess professional knowledge and training and to demonstrate mastery of 14 teaching competencies.</p> <p>2) Each prospective teacher must pass a criterion-referenced test as a precondition to receiving a 3-year nonrenewable certificate. To receive recertification, sometime within 3 years a teacher must prepare a portfolio of lesson plans, test</p>	Used in Salem, Oregon	

	papers, and other teaching documents for a team of trained evaluators. 3) In addition, he or she must pass a classroom evaluation based on the Teacher Performance evaluation Instrument (TPAI).		
Evaluation program used in Bedford	This model assures that criteria for evaluating an experienced teacher will be different from those used to make the original employment decision or for evaluating new teachers. This evolving model is unstructured and highly dependent on teacher self-evaluation and joint efforts between teacher and evaluator. Similarly, the New Hampton, Iowa, evaluation program is based on a belief that "no single model [of instruction] will result in effective learning..." and that "an evaluation system must respect the uniqueness of each individual staff member" [40].	Used in Bedford	

2.4 Evaluation dimension 4: students' evaluation

2.4.1 Self evaluation

Self-assessments of knowledge are learners' estimates of how much they know or have learned about a particular domain. Self-evaluations offer the potential to reduce the burden of developing tests to determine whether the desired knowledge has been gained as a result of participation in a course or training intervention [50]. Sitzmann [51] defines self-evaluation as a process of the evaluations learners making about their current knowledge levels or improvements in their knowledge levels in a particular domain.

There are some practical evaluation examples. Carrell and Wilmington [52] asked students rate the extent their competence on six dimensions of interpersonal communication in a communication course, an evaluation of knowledge level. In contrast, Le Rouzie, Ouchi, and Zhou [53] asked employees to take organizational training courses to rate the extent to which they acquired information that was new to them during training, an evaluation of knowledge gain. Thus, the main research focuses of self-evaluation are whether and how learners were asked to rate

their knowledge level in the domain or how much knowledge they gained.

Compared with other methods of evaluation, self-evaluation is the most directive way to evaluate the behavior and the information they have required. Self-reported method is one of the methods of self-evaluation, which is interpreted by the individuals themselves. One strength of data from this category may be that self-report inventories can be efficient to administer and score.

But there are also some limitations. In 1750, Benjamin Franklin proposed that we have three things extremely hard: steel, a diamond, and to know oneself. What's more, Darwin [54] noted, "Ignorance more frequently begets confidence than knowledge." The conclusion mentioned above is consistent with research findings by Kruger and Dunning [55] that some people routinely overestimate their capabilities. Similarly, accrediting bodies, such as the Association to Advance Collegiate Schools of Business (AACSB) International, require schools to provide evidence of student learning as part of the accreditation process and recommend directly assessing learning rather than relying on student self-evaluations [56].

2.4.2 Peer evaluation

Topping [57] defines peer evaluation as an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status. The varying nomenclature adopted by different authors in the literature can prove confusing and needs careful scrutiny.

Lu and Law [58] focuses on the effect of peer rating and peer feedback on the learning results of the evaluator and the assessed. Peer rating refers to the use of indicators in peer appraisal to judge the rating of peer works. Peer review feedback refers to the appraiser's comments and feedback on his or her work. The conclusion is that the quality of the questions or Suggestions written by the evaluator can predict the quality of the completed work. For the evaluators, getting positive emotional feedback can affect the quality of their work.

In view of the activity design method, Hovardas [59] and Korfiatis put towards that the procedures of combination of peer and expert, combination of qualitative and quantitative, and combination of peer and expert are composed of learners and experts. At the same time, the evaluator needs to provide written feedback to the team on each criterion. The interviewees can ask peers or experts to give specific explanations for their opinions through online chatting tools.

However, Zundert [60] believes that although there are many studies on peer evaluation at present, the effects of which factors affect peer evaluation activities still need to be further analyzed. So, he applies peer evaluation strategy to hybrid teaching in colleges and universities, and designs online peer evaluation learning activities, focusing on three aspects: first, the influence of peer evaluation activities on learners' understanding of knowledge and the quality of works. Secondly, pay more attention to whether there are differences in the influence of peer mutual evaluation on learners of

different learning styles, that is, learners with certain characteristics are more likely to gain from peer mutual evaluation. Finally, learners' attitude towards peer evaluation and improvement suggestions should be put forward.

Compared with self-evaluation, peer evaluation is reported more reliable. Stefani [61] found peer evaluation more reliable. Saavedra and Kwun [62] found outstanding students were the most discriminating peer assessors, but their self-evaluations were not particularly reliable [63].

3 RESULTS

Blended learning is a mixture of online and face-to-face learning. In the literature, blended learning is also known as 'hybrid learning' or the 'flipped classroom'. Although there has been some debate about an exact definition [64], Boelens, Van Laer, DeWever, and Elen [65] define blended learning as "learning that happens in an instructional context which is characterized by a deliberate combination of online and classroom-based interventions to instigate and support learning" (p.5). During the whole process of the blended learning, the evaluation link is becoming increasingly important because it provides us direction and help us adjust the whole processes. One of the purposes of the evaluation is to improve our learning and find out the questions and to reflect and adjust ourselves. In general, the evaluation of mixed learning includes the online data and the summative or formative evaluation, which is based on the evaluation of learning effect. The previous related papers concentrate more on measuring course outcome, learner satisfaction and students engagement. In order to provide a more systematic and comprehensive method to evaluate the blended learning, we reviewed quite a lot papers and we divided the evaluation dimensions into four parts adapted from the SCOPe evaluation framework by Susan J. Wegmannn and Kelvin Thompson [10]. And we list the corresponding research according

to the classification. Compared with the previous research, we add student and teacher evaluation. This change can better enable students to recognize the deficiencies in the learning process and improve the learning methods. Teachers can clearly know the shortcomings in the process of imparting knowledge. By evaluating the classroom, teachers can better promote the course redesign. The evaluation of classroom, teacher, student and platform can better promote the teaching effect of mixed learning and the improvement.

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