Rethinking Online Teaching Evaluation in Post-Pandemic Era

Ke Cheng[1,*], Ming Pang[2], and Yingwei Wang[3]

[1] Center of Language Education, Beijing Union University, Beijing, China
[2] Research Institute of the System of People's Congresses, Beijing Union University, Beijing, China
[3] Tourism College, Beijing Union University, Beijing, China
Email: gytchengke@buu.edu.cn (K.C.); pangming@buu.edu.cn (M.P.); sunshinewyw@163.com (Y.W.)
*Corresponding author

Abstract—**Online education in the post-epidemic era is bound to reshape Chinese education, while the integration of online and offline education will inevitably pose a summoning for refreshing the conventional teaching evaluation system. The saying paper proposed that online teaching evaluation should take learners' evaluation as the core as well as the "Four Evaluations" as keystone to build a refreshed online teaching evaluation system, and to make it meet the needs of the new era. Moreover, the saying paper conclusively argued that the idealized online teaching evaluation should realize scientific evaluation by different educational stakeholders, and provide references for designing, developing, and implementing the effectiveness of online teaching and learning.**

Keywords—**post-pandemic era, online teaching, teaching evaluation**

I. INTRODUCTION

Since 2019, over one billion students—more than 98% of the world's student population—have been affected by school closures because of the COVID-19 pandemic [1]. Online education, triggered by the epidemic, has completely overturned the face-to-face teaching model in the most prevailing teaching practice. Presently, how to utilize the urgent needs for integrating offline-online education and how to carry out forward-looking planning turned out to be a crucial topic facing all educational institutions. It is generally believed that face-to-face teaching and online teaching will coexist and deeply integrate in the long run, which has given rise to new forms of educational paradigms—"Blended Teaching" [2]. Educational evaluation is fundamentally related to the direction of education development, which directly affects the allocation of public educational resources, school-running activities, teaching behaviors of teachers and the learning behavior of learners and affects the educational concepts of the whole society and educational choices of families [3]. In October 2020, the State Council of China issued a report entitled "Overall Plan for Deepening the Reform of Educational Evaluation in

the New Era", and advocated that: with respect to the characteristics and laws of different education entities, different school grades, and different types of education, we adhere to scientific and effective evaluation by improving "Outcome Evaluation", strengthening "Process Evaluation", exploring "Value-added Evaluation", and improving "Comprehensive Evaluation", aimed at improving the scientificity, professionalism, and objectivity of educational evaluation [4]. Since the epidemic, the urgent transition to online learning and teaching has posed challenges to both school students and teachers [5]. Consequently, probing into why and how to rebuild a refreshed online teaching evaluation system and make it meet the needs of the post-epidemic era and realize scientific evaluation with different educational participants has become a key issue facing various teaching institutions when carrying out online teaching.

II. LITERATURE REVIEW

TABLE I. LEVELS OF EVALUATION IN HIGHER EDUCATION

Level	Purpose	Description
Sector-wide	Accountability Management Comparison Auditing	Beyond programmes. International, national and/or regional.
Government-initiated programme	Impact Effect Value for money	Each evaluation is situated in the context of the institution in which it is conducted. Same objectives, priorities and rules apply across all
University-wide	Quality assurance Quality standards Enhancement	Whole-of-institution.
Course, subject, unit or module	Value Impact Enhancement	About delivery of a course or unit Judgements made by students, staff, supervisors and/or employers.
Self-evaluations and peer review	Personal learning and development	Judgements about self, made by staff or students. Based on evidence*

*Distinguishing aspect of evaluation cf. reflection, according to authors.

Gullickson [6] argued that the evaluation is understood as "the generation of a credible and systematic determination of merit, worth, and/or significance of an

object through the application of defensible criteria and standards to demonstrably relevant empirical facts". Cook [7] referred to the notion of evaluation as "use of criteria and standards to form judgments, which are used for decision-making, development and/or accountability purpose". Saunders [8, 9] proposed that the evaluation has been described as "occurring across four domains of social practice – systemic, programmatic, institutional, and self". Table I shows a research framework by Boyle and Cook as an expansion partially from Saunders' research, combined with the framework of Smith's 4Q model with a focus on the evaluation of teaching [8–11].

Relevant studies have revealed that the methods and tools of teaching quality evaluation have gradually nurtured the characteristics of online teaching since 2019. Nevertheless, doubt about the value of the conventional online teaching evaluation mode remains increasingly due to the incompetency of teachers' online teaching skills, the imperfect supervision system of the online teaching process, the weakening of teacher-student interaction activities, no visual interactions, and other relevant disadvantageous factors [12–15]. In respect of an idealized and up-to-date notion that online teaching evaluation mode could play its due role in the process of teaching quality monitoring, relevant research in this field has attracted more and more attention at home and abroad respectively.

For example, Guan and Li [16], by reviewing more than 200 online educational products prevailing nationwide, analyzed and summarized the developing trend of online education in China, they also proposed that experience could be learned in the process of developing online educational products. Xu *et al*. [17] analyzed the current situation and existing problems of online education under the background of Big Data and "Internet+" Era, besides, they discussed and proposed relevant online teaching improvement measures on how to enhance the actual effect of online teaching and on how to regulate and balance education management mechanism. Wu [18], by thoroughly tracing the evolution path of education technology in Chinese universities and colleges in the past 40 years, classified the dilemma of promoting educational technology in China; Viewing from the perspective of international comparison, the research parsed the online teaching practices in three foreign universities; On top of that, based on the online teaching quality reports originated from 57 universities in China and the statistical reports of curriculum platforms from Fujian and Shandong provinces, this research analyzed and conclusively discussed the advantages and challenges of online teaching in China's universities and colleges under the epidemic prevalence. Wang and Zhuo [19] clarified the challenges brought by online teaching quality monitoring, and analyzed the problems existing in the conventional online teaching quality evaluation system. Accordingly, (1) the research proposed to formulate a set of online teaching quality monitoring and evaluating system borrowing the advantages of Internet Big Data; (2) and the research concluded that, in respect of the characteristics and diversification of online

teaching modes, it is necessary to establish evaluation standards that may take into account the commonality and individuality of classification and diversification with aims of complying with teaching requirements and teaching objectives with various courses.

Yeh *et al*. [20] in a study applied KAP (Knowledge, Attitude, and Practices) questionnaires to evaluate traditional and online teaching modes with professional experimental programs, and the study concluded that online teaching and traditional teaching should undoubtedly be blended in a complete teaching model which would result in better performance in the process of practical teaching. Carol and Eileen [21] argued that formative assessment of teaching by peers could be used to evaluate teachers' online teaching performance; Besides, the researchers descriptively proposed a new peer evaluation form of formative assessment in monitoring online teaching process, and they conclusively interpreted its function to be relevant, and applicable in lifting online teaching effectiveness.

Kim *et al*. [22] clarified that, in online learning environments, it is not enough to rely only on learners' behavioral analysis to infer the effectiveness of learning status, and not enough to determine the degree of learners' effort due to a lack of corresponding indicators. The researchers argued that teaching evaluation should take into account observing learners' experience in perception, regulation, and emotional support of the learning process, and expand the connotation of learning input into the learning process. As also mentioned by Lee *et al*. [23], online learning investment not only requires completing homework, answering questions, reading materials and other relevant activities in learning behaviors, but also requires efforts to actively utilize the knowledge, and emotionally possess a sense of self-identity in the process of learning, and actively participate in various learning activities.

Martin *et al*. [24], based on interviews, set research focused on the roles and competencies of online instructors and argued that online instructors, with common tasks in areas of course design or teaching, assumed five different roles: Facilitator, Course Designer, Content Manager, Subject Matter Expert, and Mentor as well. This research highlighted and contributed to the understanding of the roles and competencies of online instructors from across the United States.

Liu and Yu [25] developed an online learning system for the purpose of supporting active learning and formative evaluation in classrooms with undergraduate engineering students, and the research results indicated that the formative evaluation system preserved "distinct feature of deferring display of participants' responses" to cultivate independent thinking and build formative evaluation.

Presently and domestically, the practice of teaching evaluation is mainly confined within the prevailing practice of the conventional mode—"Using student data as the primary source" [10, 26, 27]. It is argued that this mode bears disadvantages such as incomplete formative evaluation in terms of measuring the effectiveness of

teaching and learning, and unitary source from "survey fatigue among students impacting response rates and data validity" [28]. To sum up, this part may help address identified issues in conventional teaching evaluation mode which may no longer meet the needs of to-date online teaching settings, and may as well help make a call that refreshed online teaching evaluation framework, based on integration of teaching evaluation and learning evaluation, needs a push to a turn or a shift towards the high-ended and comprehensive measurement for effectiveness of online education.

III. PRINCIPLES AND FRAMEWORK

A. Principles for Building Online Teaching Evaluation System

In essence, evaluation of teaching is ultimately seen as a value measurement for learners to improve their theoretical literacy and professionalism based on complying with the laws of educating and pursuing the goal of talent-training orientation. Accordingly, systematic, objective, and diversified evaluation principles are doomed to exert positive significance in enhancing the effectiveness of teaching and learning respectively.

1) Performing an evaluation from various participants involved

Conventionally, the unitary measurement from single evaluating attendee (mainly from learners towards instructors) poses an incomplete picture of the effective teaching evaluation when in face-to-face teaching settings, the same is true in online or blended teaching settings. Due to the different nature of the platforms, hardware, and courses as well, different participants thus are needed when processing the evaluation, accordingly, the "panel" may include teachers, students, peers, supervising experts, teaching leaders, and other relevant stakeholders, etc.

2) Performing an evaluation with measurement elements diversified

Different from the traditional teaching modes which mainly evaluate the explanation of knowledge points and classroom organization, the evaluation content of online teaching may not only reflect offline personalized self-studying, pre-class teaching preparation, online teaching organization, etc., but also cover the use of various information teaching methods, the preparation of online teaching resources, online classroom information interactivity and other evaluation content. Therefore, the evaluation of online teaching quality should reflect diversification on the evaluation content.

3) Performing an evaluation with learning outcomes oriented

Learning outcomes are the maximum competencies that learners can eventually achieve after experiencing a certain stage of the learning process. To serve the ultimate goal of learning, teachers can clarify the learning objectives before teaching, and cater for the diversified and personalized learners' needs, and can further improve the original teaching design and make implementation of teaching concerning the feedback of learner outcomes after teaching. Compared with the traditional mode of "Teacher-centered evaluation", the mode of "Learning-outcome oriented evaluation" may highlight measuring students' learning effectiveness, from which the latter may result in dramatic differences in the value orientation, evaluation criteria, and evaluation indicators as well.

4) Performing an evaluation with scientific indicators designed

It is necessary to apply different evaluation modes, along with analysis methods, for different teaching procedures complying with the actual teaching situations in the classroom. And, specifically, the evaluation methods may be classified as: scale evaluation, questionnaire evaluation, performance evaluation, observation evaluation, evaluation based on online learning monitoring data, etc. Accordingly, in the process of designing evaluation indicators, the principle of combining qualitative indicators and quantitative indicators should be advisably observed, in respect of gaining an objective evaluation of online teaching effectiveness.

B. Drafting Explanatory Framework for the Online Teaching Evaluation

As stated in the previous part, the conventional online teaching evaluation modes, often singly based on students' rating towards teachers' work, are prone to ignoring the measurement of students' learning effectiveness. Presently and domestically, evaluation of teaching from students' opinions has become the uppermost part in the prevailing practice of face-to-face teaching settings, or online teaching settings, or both, which eventually contribute to subjective and biased results of unitary evaluation. With the birth and growth of online education, some scholars have begun to consider turning to new online teaching evaluation methods. Yin [29] set this kind of example and proposed an online teaching evaluation model based on certain online teaching platforms, in which one part is designed to set based on the various records automatically generated from online teaching platform during the whole learning process, i.e., the formation of the platform evaluation from the learners' records; and the other part was processed by the evaluation of teachers' work in terms of the teaching effectiveness; and additionally, the later-on teaching content and teaching progress may be deliberately and occasionally adjusted from teachers' evaluation results. As for another inspirational case, Lai [30] analyzed the characteristics of online teaching quality evaluation in the classrooms of TCSOL (Teaching Chinese to Speakers of Other Languages), and designed an evaluation standard system fixed with a set of evaluation indicators by which the researcher advisably advocated to enhance the online teaching quality evaluation method for international Chinese education.

Apart from the indicator set of online teaching quality evaluation, Lai's work also collectively proposed a participant list of evaluation which consisted of the teaching management office, teaching supervision experts, students, teachers of Chinese language (who performed

the self-evaluation) and, specifically, the Ministry of International Chinese Education as well [30].
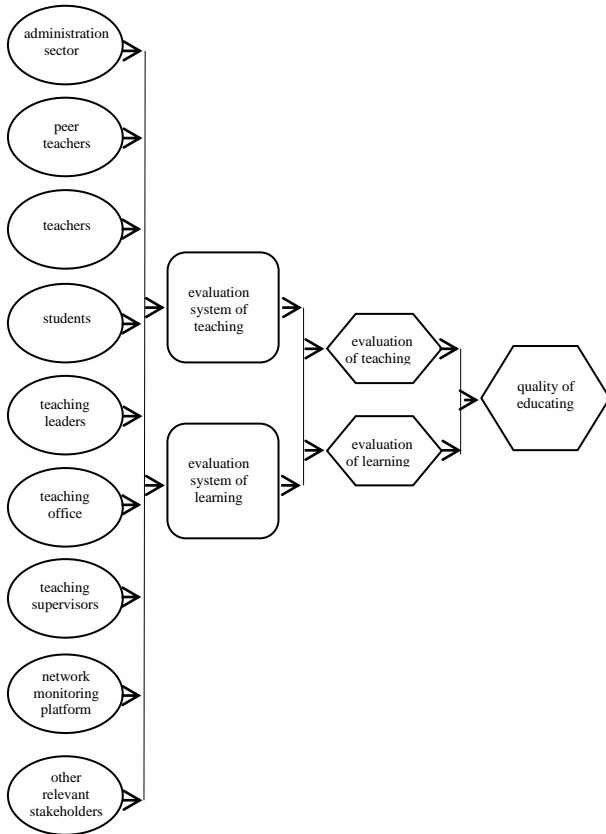

Fig. 1. Explanatory framework: Evaluation of the online teaching.

As shown in Fig. 1, the participants in the online teaching evaluation consist of students, peers, teachers, supervisors, and other relevant stakeholders who perform the information provider to the evaluation system of instruction in this framework; Besides, students also perform as the information providers to the evaluation system of learning. Both provide feedback to teachers, and teachers deliver feedback of the teaching effect to students.
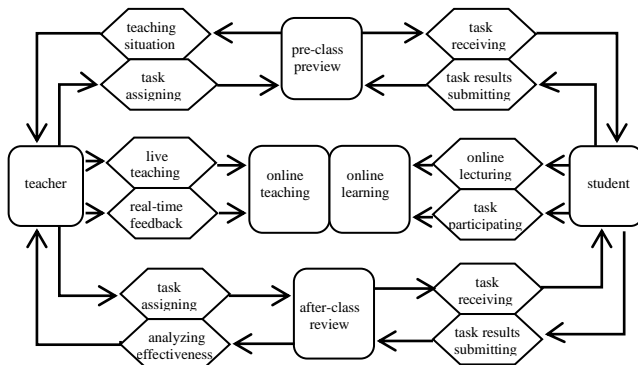

Fig. 2. Explanatory framework: Evaluation system of teaching & evaluation system of learning.

Online teaching quality evaluation system is an important foundation and guarantee for online teaching quality; Accordingly inspired by the above research, the saying study fumbled to design an online teaching evaluation framework, in which two modules were separately created and defined as evaluation system of teaching and evaluation system of learning, as shown in Fig. 2 which presents a revised expansion from the research work by Lai [30], and partially combined with the research by Zhao and Peng [31].

The evaluation system of teaching is all about the teachers' job --- the evaluation of teaching originated from subjective opinions or gradings by students, peers, supervisors, and teachers themselves, which weighs more on subjective judgments from the various evaluators; Completely different from face-to-face teaching, online teaching implements teaching activities through online platforms which are usually equipped with network monitoring software programs with the function of monitoring and generating records, or rather, the statistics of teaching and learning activities. The evaluation system of learning is on a large scale facilitated by the online monitoring function by collecting statistics on various operations from the students' end—The operating activities done by students, such as records of students' operating activities "before, in and after class", or records of "class sign-in and sign-out", classroom speeches or reports, or testing results, etc. In accordance with the objective data (from monitoring records) and with the set of evaluation indicators, the relevant analysis is due to be carried out, and the teaching quality data is automatically generated by the platform, the whole process eventually provides objective data support for the objective evaluation of teaching and learning effectiveness.

IV. DISCUSSION AND IMPLICATION

Much of the research has presently been set focused on inventing and developing learning algorithms or training new learning models to develop new educational tools and systems [32, 33]. The same is true when it comes to the online educational evaluation. The saying research provides a framework for facilitating educators to better understand up-to-date ideas in terms of online education evaluation, and, in addition, better understand the practice to help justify the utility of this framework of online teaching evaluation.

A. Strengthen Process Evaluation; Improve the Dynamics and Diagnosis of Evaluation

Process evaluation is a targeted and dynamic judgment of the performance and effectiveness of the assessee in the process of education; Process evaluation is a supplement and revision added to the evaluation based on outcome; Process evaluation gets rid of the disadvantageous side of outcome evaluation, and performs dynamic tracks over the development routines of the assessee's work from an objective perspective, and transforms the identification evaluation of the results into the improvement evaluation of the process; Process evaluation is conducive to improving the dynamics and diagnosis of evaluation, and is a full-cycled, multi-leveled feedback of information flow.

Nowadays, our focus on research on learning is gradually shifting from external performance to internal mechanisms and psychological changes. Consequently, it is difficult for unitary data to accurately reveal the nature of learning; On the contrary, it is necessary to collect learning data in a multi-modeled and non-inductive manner. Compared with manual collection of data such as observation methods in the traditional learning environment, the online learning platform can retrieve data from the whole process of teaching and learning, such as learners' learning behavior, teachers' teaching files, teacher-student interaction activities, exam answering tracks, and website browsing records, etc., which can help discover and explain the learning process in terms of its characteristics and changes. Furthermore, the accompanying and dynamic evaluation in online education can timely pass relevant information feedback to teachers and learners. This move, on one hand, can help teachers adjust educational content and methods, improve the relevance and feasibility of educational decisions, and on the other hand, help learners adjust to learning paths and learning strategies in a timely manner. To sum up, all these have greatly enriched and expanded the result-oriented evaluation, and improved the scientificity and practicality of the evaluation.

B. Enhance the Evaluation of Results; Accomplish Diversified Evaluation Standards

Outcome evaluation is, based on the preset educational goals, defined as a measurement of the extent to which the assessee has achieved the goal after the completion of a learning plan or program. Acceptability remains widely sound in that emphasizing results in the final evaluation is conducive to guiding the preset goal and direction of teaching, and, from this perspective, the result-oriented evaluation has its rationality and necessity. However, the development of individuals is a complex process of individualization, thus the one-way evaluation of results is prone to fall into the trap of "biased evaluation". Therefore, it is necessary to establish diversified evaluation criteria, as well as objectively and comprehensively evaluate the development of different learners. Moreover, due to the difference between online education and traditional education in terms of environment, motivation, meta-cognition, process, and outcome, the characteristics of online learning should be taken into account when performing the learning evaluation, rather than directly transferring the traditional evaluation mode into online teaching settings. In addition, since learning may occur on different platforms, diversified learning outcomes need to be permanently, securely, and sustainably recorded through reliable monitoring software programs.

C. Explore Value-Added Evaluation; Lift the Guiding and Stimulating Role of Evaluation

Value-added evaluation assesses learners' performance at different nodes, especially weighing the value of the transformation or progress occurred over the learning process, and realizes the aim of promoting teaching and learning effectiveness through evaluation. Different from side-by-side comparison, value-added evaluation focuses on the progress made by the assessees, or focuses on the self-made changes or progress made by the assessees; Additionally, the value-added evaluation also improves the positive function of evaluation as a stimulating and guiding medium for bettering the learning effectiveness.

The value-added evaluation focuses on the transformation of step-by-step progress made by the assessees, which is conducive to reducing the negative influence of external factors on the evaluation results and giving the assessees more feasibility for individualized development. At present, some parts of China have begun to make positive attempts in this research field. For example, Liaoning Province has launched a value-added evaluation service system, and taken the value-added evaluation as a breakthrough in monitoring and evaluating basic education quality; Tianjin has incorporated value-added evaluation into the municipal evaluation system of teaching quality, which has basically formed a value-added evaluation system for basic education with regional characteristics. However, the current value-added evaluation partially focuses on external factors such as learning performance; Thus doubt remains strongly when it comes to reflecting the actual and comprehensive effectiveness of teaching and learning process, which turns out to pose an urgent need to invest in further research on developing value-added tools and systems to measure the development with all aspects, and by which we can improve the monitor-ability and operate-ability in the practice of the value-added evaluation.

At the same time, we need to use emerging technologies to empower the practice of value-added evaluation. For example, the technology of network monitoring has powerful storage and computing capabilities, which can continuously track and record the learning activities at different points in the online learning process.

D. Fulfil Comprehensive Evaluation; Improve the Comprehensiveness with Scientific Evaluation

Comprehensive evaluation refers to a process of building evaluation index system for the assessees, and utilizing certain methods or models to fulfil an overall measurement; besides, the core of comprehensive evaluation is to make a systematic, comprehensive evaluation towards the assessee, with an aim to simultaneously improve the comprehensiveness and scientificity of the evaluation.

First, the evaluation content should be integrated to improve the comprehensiveness of the evaluation. Attention should be paid to the evaluation of all elements about the assessee, and changes be made from unidirectional evaluation to multi-dimensional evaluation. In the "Internet+" era, the talent and literacy, compared with the importance of knowledge acquisition, are gaining more and more importance in terms of the individual development. The importance of independent learning ability, information literacy, questioning ability,

integration and reflection ability, innovation ability and problem-solving ability has been unprecedentedly highlighted, accordingly a full-scaled and three-dimensional learner model can be established composed of the above ability elements and can help understand individual learners comprehensively and objectively.

Second, the evaluation participants should be diversified and the scientific nature of evaluation should be incorporated into the practice of educational evaluation. Apart from the basis of teacher evaluation, we should guide government, schools, parents, and other relevant stakeholders to participate in the education evaluation practice fairly and qualitatively. Besides, the human-machine enhanced model can also be used to establish a multi-dimensional model in the practice of the educational evaluation system.

V. CONCLUSION

In addressing of the utility and a more holistic view of the online teaching evaluation, Smith [11] argued that "quality assurance in teaching and learning requires not just the collection of data but also a system that ensures interpretation of, and response to, those data". In addressing this topic, it is argued that scientific, educational evaluation realizes the core foundation of scientific intervention into the comprehensive understanding of teaching and learning. Appropriate, objective, scientific and real-time evaluation of teaching and learning can help educators implement targeted educating activities. The massive amount of data and scientific models in online education gradually realize the integration of true educational evaluation into the process of teaching and learning. At present, the construction of a high-quality education system has become the guideline of education policy and key requirement of nationwide education development in the new era.

In the digital era, the evaluation system of online education needs to be clearly and accurately positioned around the evaluation goals, elements, standards and indicators, and advanced theories. Under the guidance of advanced theory, based on educational big data, educational evaluation modeling can be carried out to truly realize the construction of evaluation technology system.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

MP and YW conducted the research of literature review; KC wrote the paper; all authors had approved the final version.

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