Research on the Evaluation Index Framework of Student Participation in Blended Teaching Model

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Abstract—This paper analyzes the reasons why blended teaching model is more suitable for students in independent colleges than other online teaching models. And then in light of the research results of customer participation in service marketing and the characteristics of online teaching activities, an evaluation index framework of student participation is constructed from the dimensions of locations, interactive objects, and behavioral levels. For each subclass, the description indicators are adjustable and extensile, which can be self-defined by the teachers according to their specific situations. On the given student participation indicators, we explore whether the blended teaching model can bring about the more scores and satisfaction than the traditional style significantly, which will beneficial to understand the preferred channels of educational information, material pushing, mastery degree feedback and so on through the behavioral data of student participation.

Keywords—student participation; blended teaching; evaluation index framework; interactive objects

I. INTRODUCTION

Compared to the traditional face-to-face classroom teaching, network teaching has the characteristics of distance and autonomy [1]. It enriches the teaching means, contents, and communication channels. However, it puts forward higher requirements for students' self-study ability and self-control ability. A reality check shows that among students in independent colleges, blended teaching is more popular than other online teaching models such as the MOOC (abbr. massive open online courses), the micro-course and the flipped classroom, but why? Besides, since the increase in student participation can theoretically promote communication and interaction in educational activities, does network teaching effectively promote student participation and produce high-quality learning outcomes?

In light of the research results of customer participation in service marketing and the characteristics of online teaching activities, this paper aims to discuss the dimensions, structure and then the subclass indicators of the evaluation index framework of student participation from the perspective of "behavior-consequence" links.

On the given student participation indicators, we explore whether the blended teaching model can bring about the more scores and satisfaction than the traditional style significantly, which will beneficial to understand the audience's information channel preference of knowledge dissemination, educational material pushing, mastery degree feedback and so on through the behavioral data of student participation.

II. THE RELATED LITERATURE

A. Blended Teaching Model in the Network Education

The teaching model usually refers to a series of teaching methods and activities guided by certain theories to accomplish the prescribed teaching objectives and contents [2]. Existing research has not formed a consistent definition of the concept of the teaching model.

The network teaching model pays more attention to the influence of network technology on the teaching objectives, contents, methods and processes than the traditional face-to-face model. Its subcategories include the MOOC, the micro-course online videos, the flipped class and the blended class, etc.

In all the subcategories except blended class, the part of the knowledge impartment will be almost done by students themselves outside the regular class hours [3]. On one hand, the focus of teachers' work has been shifted to the class organization and guidance of learning activities to enhance the in-depth discussion of knowledge points, the professional problem solving, especially the new idea stimulation, etc. On the other hand, due to the long period of cramming education in middle school, the sudden pressure of independent study has left quite many independent college students confused and helpless.

The blended class integrates the advantages of the traditional classroom and the other forms of online teaching with fewer requirements of self-control and self-study abilities, which are generally lacking among independent college students. So, it can integrate more resources from online and offline and becomes more and more welcome.

Although the existing research has made a useful discussion on the specific technical means of the network teaching model and the application value of the big data on student engagement, teachers still have no clear idea to evaluate how the network technology promotes student participation and ultimately improves the effects in their teaching practices.

Using big data on student engagement, the educational activities can be transferred from "non-quantifiable" to "quantifiable", from "experiential" to "scientific", from

"popular" to "individualized", from "invisible" to "visualized" [4], we need to develop an evaluation Index Framework of Student Participation in blended teaching. So, the blended teaching model is the focus of this paper.

B. The Degree of Student Participation

There are so much researches about customer participation in the field of service marketing and enterprise value creation. Participation is a behavior-related concept, which refers to the customers contributing their efforts, resources, information and time to enterprises in the process of service or production [5].

On the one hand, customer participation can be explained from the angle of customer psychology and motivation. The unique demand for the product, experience, and creative incentive has a significant positive impact on customer participation intention. The relative theories include motivation theory, emotional theory, individual creativity, and group creativity theory, etc. The usual research methods cover experiments, social network analysis, and investigation, etc. Questionnaires or psychological instruments, such as near-infrared, are often used in data collection.

On the other hand, customer participation can be explained from the angle of the participating consequences also, such as customer satisfaction, service quality, product innovation and so on. The more effective customer participation, the smaller the gap between customer perception and expected service quality, so the higher the service quality [6].

The relationship between customer participation and satisfaction cannot sustain positive due to the moderating effect of customer knowledge under any circumstances. In high-complexity product innovation, whether customers are information providers or co-developers, there is higher satisfaction of the high-knowledge customers than that of low-knowledge customers at the same level of participation [7]. In the meantime, when low-knowledge customers are co-developers, the deeper they participate, the less satisfied they feel about the participation process.

Low customer involvement can hardly shake the inertia of the organization [8]. Only when customer involvement reaches a certain critical point, can customer involvement boost the enterprise to reengineer its organization process. So, the ability of dynamic response to customer participation has a moderating effect on customer participation in product or service innovation.

The student participation can be described from the public aspects of a student's curriculum results presentations, timely feedback on the homework assignments, peer comments, and discussions, etc. The increase in student participation promotes communication and interaction, which can produce high-quality learning outcomes.

Based on the existing teaching research on student participation, if the educational process is regarded as the process of service marketing, we find the following problems:

Firstly, the research results of customer participation in the marketing field are not fully used for references in student participation research.

Secondly, student participation is different from customer participation because the former belongs to the field of education but the latter belongs to the field of consumption.

Thirdly, the research on student participation based on the background of network education technology is not enough, such as lacking theoretical support, the evaluation Index framework, and appropriate evaluation indicators.

III. EVALUATION INDEX FRAMEWORK AND INDEX DESCRIPTION OF STUDENT PARTICIPATION

A. Evaluation Index Framework of Student Participation

The level of customer participation varies with service environments and individual differences. Similarly [9], the degree of the students participation in their course will be influenced by their individual characteristics and their preferences for the information backgrounds, channels and contents under the different subclasses of web-based teaching models, such as the MOOC, the micro-course online video, the blended class with some auxiliary APPs, etc. which will ultimately affect the teaching-learning effects.

The degree of customer participation can be divided into three different behavioral levels: attendance, information provide and collaborate from the perspective of customer participating behaviors [10]. It can also be divided into three categories as low, medium and high according to the different service experiences [11].

Network teaching breaks through the space barrier and makes students' behavior in and out of the classroom observable. In teaching activities, the three parties of educational resources, students and teachers interact with each other. So, this study constructs the evaluation index framework of student participation from the dimensions of the location (in or out of class), the interactive objects (students and resources, students and students, students and teachers) and the participation levels of behaviors cited from the customer participation in the service marketing field. The structure of the dimensions and some typical observable behavioral indicators of each sub-category are listed in the following table I.

TABLE I.   EVALUATION INDEX FRAMEWORK OF STUDENT PARTICIPATION

Locations	In (out of) Class (face to face or online)		
Interactive Objects	S-R	S-S	S-T
Levels Attend	Log in	In team	Attendance
Levels Information Provide	Upload	Comment	Answer
Levels Collaborate	Paper	Discuss	Assignment

B. Description of Student Participation Index

For all the students, the participation in and out of class is face-to-face or online, we briefly describe the subcategories of indicators in the table above as follows:

In (out) Class / Attend/ S-R: log in the "Rain Classroom" or network education platform, QQ (a kind of popular instant messaging software) group or WeChat (another kind of popular instant messaging software) group.

In (out) Class / Attend/ S-S: in the self-organized team, QQ group or WeChat group for particular learning tasks actively.

In (out) Class / Attend/ S-T: Attend the class or team online.

In (out) Class / Information Provide / S-R: upload their papers or other files to the background database.

In (out) Class / Information Provide / S-S: give their opinions or comments face to face or online.

In (out) Class / Information Provide / S-T: answer questions or debate with their teachers face to face or online.

In (out) Class / Collaborate/ S-R: process their data such as paper.

In (out) Class /Collaborate/ S-S: the process of discussing with their classmates.

In (out) Class / Collaborate/ S-T: complete the tasks assigned by the teacher.

Teachers of different courses can expand the above indicators according to their actual situations, thus keeping the description of indicators open.

IV. DATA SOURCE AND METHODOLOGY

A. Sample Selection and Data Collection

We chose 120 sophomores majoring in accounting specialty with the comparable entrance examination results enrolled in 2017, who were divided equally into two natural classes, one as an experimental class and the other as a reference class.

We gathered the degree of participation for every student in our intermediate financial accounting course for a whole semester. The frequency or content data of the "log in", "upload", "comment" and "assignment" etc. had mainly been recorded through the online education platform provided by the school and the APP "Rain Classroom". The degree of satisfaction with the courses was measured by Likert scale, with one point indicating very dissatisfied and five points indicating very satisfied. So, we retained 120 unique behavioral reports, course satisfaction rating scales and the final exam grades respectively in the fall semester of September 2018.

B. Experimental Methods

The selected classes had 60 subjects respectively and were taught by the same lecturer. The experimental class adopted blended teaching via the online education platform and the APP "Rain Classroom" to enhance participation of the students in (out of) their classes, while the reference class adopted the traditional face to face model and took the online education platform by personal computers as an auxiliary measure to download or upload educational resources without the APP "Rain Classroom".

At the end of the semester in January 2019, we analyzed whether the blended teaching was beneficial to improve the students' test scores and satisfaction with their course teaching.

C. Empirical Results

Because the research goal is to verify whether the evaluation index framework of student participation can take effect or not, we compare the final test scores and the Classroom satisfaction between the experimental and reference class.

TABLE II.   SUMMARY STATISTICS FOR THE FINAL TEST SCORES

Variable	Obs	Mean	Std. Dev.	Min	Max
Mark_ref	60	65.4	23.79303	12	98
Mark_exp	60	74.63333	21.78708	13	98

TABLE III.   T-TEST TO COMPARE THE FINAL TEST SCORES

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Mark_ref	60	65.4	3.071668	23.79303	59.25361	71.54639
Mark_exp	60	74.63333	2.8127	21.78708	69.00513	80.26153
diff	60	9.233333	3.907574	30.26794	1.414296	17.05237

Mean (diff) = mean (Mark_exp - Mark_ref) $t = 2.3629$

Ho: mean (diff) = 0   degrees of freedom =59

Ha: mean (diff) < 0   Ha: mean (diff) != 0   Ha: mean (diff) > 0

Pr (T < t) =0.9893   Pr (|T| > |t|) =0.0214   Pr (T > t) =0.0107

TABLE IV.   SUMMARY STATISTICS FOR THE FINAL TEST SCORES

Variable	Obs	Mean	Std. Dev.	Min	Max
Satis_ref	60	3.333333	1.284413	1	5
Satis_exp	60	3.766667	1.140423	1	5

TABLE V.   T-TEST TO COMPARE THE FINAL TEST SCORES

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Satis_ref	60	3.333333	.165817	1.284413	3.001534	3.665132
Satis_exp	60	3.766667	.147228	1.140423	3.472064	4.061269
diff	60	.4333333	.2077138	1.608944	.017699	.8489676

Mean (diff) = mean(Satisfaction_exp - Satisfaction_ref)   t = 2.0862

Ho: mean (diff) = 0   degrees of freedom = 59

Ha: mean (diff) < 0   Ha: mean (diff) != 0   Ha: mean (diff) > 0

Pr (T < t) = 0.9794   Pr (|T| > |t|) = 0.0413   Pr (T > t) = 0.0206

We define the final test scores of the intermediate financial accounting course in experimental (reference) class as Mark_exp (Mark_ref), while the satisfaction to their class quality in experimental (reference) class as Satis_exp (Satis_ref). Table II provides summary statistics for the final test scores and table III provides the t-test results of the final scores. Analogically, table IV provides summary statistics for the final test scores and table III provides the t-test results of the final scores.

An independent t-test was performed to identify if there were significant differences between different teaching modalities for college students in regard to their course intermediate financial accounting scores in different learning subjects.

The t-test result in Table III indicates that the blended teaching model can enhance the scores of the subjects than the traditional face to face model in their intermediate financial accounting course, while the t-test result in Table V indicates that the former can also improve the subjects' course satisfaction than the latter, both are significant.

V.   EXTENDED QUALITATIVE SURVEY

Compared with the improvement of course scores, the improvement of satisfaction in the two teaching models was somehow different. One was that the average score did not exceed 4 points, which was lower than the satisfaction standard. Second, although the improvement of course satisfaction was significant, the range was only about 0.4 points. To explain this phenomenon, we conducted qualitative interviews with the experimental subjects and got some main reasons as the following:

- The inertia of cramming education. It is difficult to overcome the teacher-led cramming in primary and secondary school. When the leading power of study and exploration is given to students, they feel at a loss.

- It cannot bear the pressure of independent study. Due to the lack of good self-study habits and self-control ability, the students preferred blended teaching because there was less pressure on them to learn independently than other network teaching models, such as the flipped classrooms.

- Lack of systematic planning between courses. When multiple courses adopt different forms of online teaching models, students were tired to feed the demands of the curriculum and did not have enough time for self-study.

- Unamiable network platform or APPs. An unstable network, Stiff interface, and imperfect software functions dampened the students' enthusiasm for communication through online channels for its low communication efficiency.

VI.   CONCLUSION

In a variety of online teaching models, blended teaching may promote students' participation in the curriculum because it can integrate the most education resources, such as in or out classroom, online or face to face, etc. So, blended teaching is especially suitable for students with low abilities of self-control and self-study from the independent colleges, which are colleges funded by social capital in China.

This paper constructs an evaluation index framework of student participation from the dimensions of locations, interactive objects, and behavioral levels. For each subclass, the description indicators are adjustable and extensile, which can be self-defined by the teachers according to their specific situations.

Based on some common description indicators, we apply experimental method and t-test to prove quantitatively the hypothesis that the more participation in the blended teaching model can bring about more scores and satisfaction than the traditional style significantly.

This study also has obvious limitations: Even if the evaluation index framework is valid, the validity of the measurement index for each subclass can be divided into

apparent validity and actual validity. It seems hard to verify the actual validity of each subclass index based on apparent validity. So, further research may call for many collaborations to establish the index database, and then screen the indicators with actual validities.

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