Research on Evaluation System of SPOC Learning Interaction Effect

Huangxue[a], Jiao Baocong [b]
Department of Educational Technology, Capital Normal University, Beijing, China
[a] 13001073500@163.com, [b] jiaobc3093@126.com

Keywords: SPOC, Evaluation System, Learning Interaction Effect, Fuzzy Comprehensive Evaluation, Evaluation Index.

Abstract. At present, the blend learning evaluation involves less in SPOC. In this study, from the practical point of view, based on the "game theory" SPOC course learner learning effect data as the data base, this study combined with a variety of research methods to construct the SPOC learning evaluation system, and then use quantitative methods to evaluate the system and to provide an effective way to study the interactive evaluation system of SPOC.

Introduction

SPOC is MOOC future development of educational mechanisms and mixed learning teaching form, eliminating the MOOC part of the shortcomings. Therefore, the study of SPOC learning effect evaluation has practical significance, the current research at home and abroad focus on the following aspects: firstly, relying on the platform of the automatic evaluation system measurement of learners. For example, based on the theory of learning target classification, the study of the influence of stent learning theory on the establishment of peer rating system (ARISE) on peer ratings confidence. [1] Secondly, from the monitoring and adjustment of the learning process, intervene in the individual learning process and then enhance the reliability of individual learning effect, the final evaluation of the formation of evaluation and summary evaluation and other multi-dimensional combination, such as GAMEO cheating test algorithm research; Third, from the SPOC learning effect evaluation system to provide constructive guidance to the evaluation system. [2] Above has made many achievements, on the qualitative point of view after the evaluation system with quantitative and other hybrid methods for its test is still a hot research. Therefore, from the practical point of view, the first school year *game theory* SPOC course learner learning effect data as the data base, this study combined with a variety of research methods to construct SPOC learning effect evaluation system, and then use quantitative methods to evaluate the system Consistency check.

Related theoretical basis

The interaction in this area mainly includes the interaction between learners and learners, the interaction between learners and content, and the interaction between learners and teachers. Moreover, according to the network teaching interactive level tower, the network teaching interaction is divided into: operation interaction, information exchange, conceptual interaction. SPOC learning method is attached to the mixed learning category. The online learning part is also applicable to the theory of distance network education.

Research methods

Fuzzy Comprehensive Evaluation (FCE) is a comprehensive evaluation method based on fuzzy mathematics. Based on the membership degree theory of fuzzy mathematics, this method transforms qualitative evaluation into quantitative evaluation, and adopts fuzzy mathematics method to be subject to various factors [3]. Fuzzy comprehensive analysis of the strategy to deal with the problem is roughly: to clarify the research problem, the first analysis of the main factors within the evaluation of the relationship between the link and the overall relationship between the establishment of fuzzy

comprehensive evaluation index system; and then determine the weight of each factor and membership degree vector [4].

Establishment of Evaluation System of SPOC Learning Interaction Effect

According to the general method of fuzzy evaluation analysis, it is divided into two steps: 1, SPOC learning interactive fuzzy comprehensive evaluation index system. 2, the weight set by the evaluation factor. Specific details are as follows.

SPOC learning interaction evaluation dimension analysis.

Online learning interaction. According to the theoretical basis of online education interaction, the interactive learning of SPOC learning effect evaluation system is divided into two aspects: learner and teaching resource interaction and network interpersonal interaction, among which learner and teaching resource interaction is divided into learner as shown in Table 1.

Table 1 Online learning interaction indicators

indicators 1	indicators 2	indicators 3	indicator description
Online learning interaction A1	Online learning content A11	Course content A111	Learners learn the main content
		Resource Sharing A112	Platform for sharing
		Forum A113	Thematic forums, free forums, etc.
		Operations and testing A114	Each chapter or chapter of the test content
	Network learning platform A12	Platform infrastructure support A121	Support learner learning function
		Learning behavior data A122	Learning process and other multi-dimensional data
		Auxiliary memory learning tool A123	Review
		Discuss communication tools A124	Support learner video, web conferencing, etc.

Offline learning interaction. Analyze the characteristics of SPOC learning, and analyze the behavior of classroom teachers and students' interaction and learning community, as shown in Table 2.

Table 2 Online learning interaction indicators

indicators 1	indicators 2	indicators 3	indicator description
Offline learning interaction A2	Teacher and student interaction A21	Teacher language A211	Teacher classroom discourse
		Student language A212	Student classroom discourse
		Class silence A213	Classroom is blank
		Classroom use of technology A214	Technical equipment used by teachers or learners
	Learning community behavior A22	Group type and learning goal A221	The team sets the learning goals
		Group members A222	By the different characteristics of learners
		Group study duration A223	Group members learn time
		Collaborative learning needs A224	The group learns the required content

Emotional attitude and sense of experience. Learners in the learning process of the course of cognitive and learning motivation and other subjective factors also affect the learning interaction effect. This aspect mainly includes the learners' attitudes towards the course and the experiential experience of the learners in the learning process, as shown in Table 3.

Table 3 Online learning interaction indicators

indicators 1	indicators 2	indicators 3	indicator description
Emotional attitude and sense of experience A3	learning attitude A31	Learning motivation A311	The starting point for learners to learn
		Metacognitive ability A312	Self-monitoring and other learners own ability
		Continuous learning A313	The learner's individual insists on learning the length of time
		Disembodied sense of immersion A314	Multi-sensory into study

Case

The research object of this study is to select *the University of China MOOC* platform to open the *game theory* SPOC courses Capital Normal University college students. According to the fuzzy evaluation method, the quality of learning interaction of the course is evaluated [5].

Comment set V = {v1, v2, v3, v4, v5} = {excellent, good, general, qualified, poor}.

Evaluation factor set A = {online learning interaction, offline learning interaction, emotional attitude and sense of experience}.

Table 4 Online learning interaction indicators

Indicators 1	**indicators 2**	**indicators 3**	**Comment set**				
			excellent	**good**	**general**	**qualified**	**poor**
A1 (0.4)	A11 (0.6)	A111(0.4)	28	8	8	6	0
		A112(0.1)	26	7	8	7	2
		A113(0.2)	30	5	10	5	0
		A114(0.2)	14	20	10	5	1
	A12 (0.4)	A121(0.2)	24	6	10	8	2
		A122(0.3)	18	20	7	5	0
		A123(0.2)	19	14	12	5	0
		A124(40.1)	26	14	10	10	0
A2 (0.3)	A21 (0.6)	A211(0.45)	24	11	13	1	1
		A212(0.35)	15	18	12	5	0
		A213(0.1)	23	15	10	2	0
		A214(0.1)	20	16	11	3	0
	A22 (0.4)	A221(0.2)	28	8	8	6	0
		A222(0.15)	12	18	12	5	1
		A223(0.15)	23	11	9	7	0
		A224(0.2)	21	16	5	8	0
		A225(0.1)	8	12	19	11	0
		A226(0.2)	26	4	10	6	4
A3 (0.3)	A31	A311(0.3)	10	20	13	5	2
		A312(0.2)	30	5	10	5	0
		A313(0.3)	28	10	10	2	0
		A314(0.2)	15	16	11	8	0

According to the principle of "game theory" SPOC and the principle of fuzzy evaluation analysis, the secondary and third indexes are determined respectively, as follows:

Level 1 indicators A = {A1, A2, A3};

The secondary index A1 = {A11, A12}, A2 = {A21, A22}, A3 = {A31};

A12 = {A211, A212, A213, A214}, A22 = {A221, A222, A223, A224, A121, A122, A122, A124} A225, A226}, A31 = {A311, A312, A313, A314}.

The weights of each level are as follows:

The primary index weights

A = [0.4,0.3,0.3];

The second index weight

A1 = [0.6 0.4]; A2 = [0.6 0.4]; A3 = [1];

AA2 = [0.2 0.2 0.3 0.2]; AA3 = [0.45 0.35 0.1 0.1];

AA4 = [0.2 0.15 0.15 0.2 0.1 0.2];

AA5 = [0.3 0.2 0.3 0.2] AA2 = [0.2 0.2 0.3 0.2]

The fuzzy matrix from the secondary evaluation index set to the comment set V is denoted as R1, R2, R3. R1 = [BB1 BB2], R2 = [BB3 BB4], R3 = [BB5].

BB1 = (0.5040 0.1920 0.1760 0.1160 0.0120).BB2 = (0.3820 0.2840 0.1940 0.1320 0.0080).

BB3 = (0.4070 0.2870 0.2430 0.0540 0.0090).BB4 = (0.4270 0.2230 0.1930 0.1380 0.0190).

BB5 = (0.4080 0.2640 0.2220 0.0940 0.0120).

Finally, the membership matrix R and the membership degree B of the first-level evaluation index are established.

R = [B1 B2 B3], B = R * A.

B1 = (0.4552 0.2288 0.1832 0.1224 0.0104). B2 = (0.4150 0.2614 0.2230 0.0876 0.0130).

B3 = (0.4080 0.2640 0.2220 0.0940 0.0120).

According to the percentile test method, the specific is excellent [90 ~ 100], good [80 ~ 89], general [70 ~ 79], qualified [60 ~ 69], qualified [50 ~ 60], And take the interval between the median, the collection of G = (95,85,75,65,30). Then calculate the "game theory" SPOC learning interactive effect comprehensive evaluation value:

Z = GT * B = (95 85 75 65 30) T * (0.4290 0.2491 0.2068 0.1034 0.0117) = 84.5119

Discussion on Measurement Results and Optimization Strategy

Data collection and diversification of evaluation methods. In this study, the effective sample is 50 and the number of effective individuals is too small. The evaluation method is fuzzy comprehensive evaluation method. The comprehensive evaluation method transforms the qualitative evaluation into quantitative evaluation according to the membership degree theory of fuzzy mathematics, that is, To make a general assessment of the object or object. In the further study, AHP was used to validate the evaluation system of SPOC learning interaction.

References

[1] Northcutt, Curtis G., A. D. Ho, and I. L. Chuang. "Detecting and Preventing "Multiple-Account" Cheating in Massive Open Online Courses." Computers & Education 100(2016):71-80.

[2] Roblyer, M. D. "How Interactive are YOUR Distance Courses? A Rubric for Assessing Interaction in Distance Learning." Online Journal of Distance Learning Administration. Retrieved 11 February 2010 from: http://www.westga.edu/#distance/roblyer32.html 3.2(2000).

[3] LlQing, LlU Na. "Towards a MOOC Quality Assurance Framework." Open Education Research 5(2015):66-73.

[4] LIU He-hai, LI Qi-bin, ZHANG Shu-yu The Application of Fuzzy Evaluation Method in Teaching Quality Evaluation. E-education Research (2016):84-90.

[5] LI Wu-zhou, and WANG Ji-de. Research on MOOC Adaptability Based on Fuzzy Integrated Evaluation Method——Taking Modern Educational Technology" as an Example. E-education Research 12(2016):60-66.