

Instructional Design of Individualized Online Courses Based on the Characteristics of Learners

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Abstract—Characteristics of learners would directly influence the learning performance in web context. Setting instructional design of online course should be based on the individual characteristics of learners, change the limitation of traditional instructional design, and meet the learning needs of learners. The characteristic index which influenced the instructional design was extracted in this study based on the analysis of the existing worldwide research outcomes about online learners' characteristics. Designing suggestion was indicated from three aspects, which were instructional design, instructional materials and educating interaction design. Moreover, the design pattern of individualized online course education was also presented.

Keywords—*learner characteristic; online course; instructional design*

I. INTRODUCTION

Web-based learning increasingly becomes the crucial method for social learning. As the combining outcome of web and tertiary education, the mass-online course begin to spring up in some major countries around the world, such as America, Britain, France, etc. In 2015, the file of 'Opinions of the Ministry of Education on Strengthening the Application and Management of Online Open Courses in Colleges and Universities' was issued by the Ministry of Education. And in June of 2016, the file of 'Guiding Opinions on Deepening the Reform of Educational Educating in Colleges and Universities of Central Government' was also issued. They declared their requirement on subordinate colleges and universities to promote the construction of online opening courses vigorously. And they also ensured the special financial and policy support. In September of 2016, the issued file of 'Opinions of Promoting the Work on Credit-Recognize-and-Conversion of Tertiary Education' proposed that organized opening courses online learning for students would be incorporated into credit management. However, compared with the traditional educating manner, the educating objects and educating context of online course has changed significantly. In web-learning context, the cognitive model of learners is different from traditional classroom educating; meanwhile, extremely different is existed on object-oriented and leaning behavior of courses due to the sociality, openness and autonomy of online courses. The personality characteristics of learners will lead to the difference of learning outcome. Teachers, transforming from the educating organizers of traditional education to the supporters of getting with various learning requirements,

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should consider the individual characters of every learner abundantly. They should remodel on the aspects of the formulation of learning proposal, the evaluation of learning score, educating management, interaction between students and teachers, as well as the self-evaluation of students, etc.

II. INDIVIDUALIZED ONLINE COURSE EDUCATION

In traditional course educating, individualized education is mainly to formulate different instructional objectives according to the knowledge level and leaning ability of students. It divides the leaning content into several learning units of different difficulty, presents learning methods, helps students make choose, and promotes their learning confidence and their learning performance [1]. Nevertheless, in online course educating, the control rights holder of education converts from a teacher to a learner. Every learner can actively choose study resources, control their learning process, present their own idea more freely on web, and they can choose different learning companion autonomously to discuss and negotiates issues. However, the role of teacher transform from an organizer to a supporter. They master and analyze the needs and behaviors of learners, and allocate suitable educating resources in order to offer the in time assistance. The research on the learning effectiveness of online courses, course resources designing, web learning context establishing, should be based on the characteristics of the learners' online learning process. Dooh. Lim (2002) indicated the importance of analyzing the learning characteristics of learners from the perspective of the learner's age, ability, psychology and learning motivation in different dimensions. The researcher also analyzed the types of characteristic and motivation which influenced the online learning and learning outcome of undergraduates, as well as established education strategies and web learning context which was capable to improve the online learning satisfaction of learners. Nada Dabbagh (2007) considered confirming the online learning characteristics and studying requirements were the guarantee for the successful implementation of web leaning project and web courses. Studying learners' online learning characteristics could help managers, teachers and curriculum designers better understand who might be involved in the site, what kind of factors or motivations will help learners acquire successful learning experiences, and what kind of potential obstacles for learners existed in the process of online learning.

Recent years, with the development of technologies such as Internet big data, the analysis system and real-time collection

of online learning data has become increasingly mature, while the research findings on instructional design based on learners' characteristics are still not rich enough. Searching on the CNKI platform with keywords 'online learning instructional design' and 'web courses instructional design', 1412 published paper were retrieved. However, with the keyword 'individualized web instructional design' searching, only 2 papers can be retrieved. Moreover, the literatures about the pattern of instructional design of individualized online course are even less. It was believed, in this study, that the individualized online education was that, the learner formed the online course establishing goal though their requirement and the course attributes, as well as formed the learning strategy on the education collaboration platform, meanwhile, the educator lowered the cognitive load, built educational situation, established the interaction with the learner and among learners, as well as promote the fusion of horizons based on the identification of learner study style. The implement on individualized education of online course must be based on the characteristics of learners, and considering the relationship between individual character and collective characteristics adequately. Subdividing the mass-online education into private classes of various educating strategy, so then, to improve the learning satisfaction of learners.

III. LEARNER CHARACTERISTICS INFLUENCING ONLINE COURSE INSTRUCTIONAL DESIGN

Instructional design was a process, according to the level and requirements of educating objects, on the basis of settling down the reasonable starting and ending point of education, to reorganize and transform the content, to arrange instructional elements systematically and ordinary, then to form the instructional plan. The basic elements that should be considered during the online course instructional design were instructional objective, preparation, content, structure, and learning method as well as learning evaluation. The establishment of educational systems should be carried out focusing around target direction, process organization, and quality monitoring.

Web learning environment was a more opening learning site than traditional studying environment and media studying environment. The differences of individual, educational, and social cooperators respectively would influence the studying decision of learners. Some researchers believed that the characteristic of online learning was combined knowledge structure and studying style of learners, including four elements of knowledge structure, information processing mode, social characteristic, emotion and intention (Hong Tu, et al. 2004) [2]. Some other researchers indicated online learning characteristic elements including learner's existing knowledge level, intelligent level, studying style, cognitive style, studying motivation and self-efficacy, etc. (Ge Zhang, et al., 2012) [3]. It was argued in this study that the individual characteristics of learning motivation, cognitive style and studying style had more significant impact on learning performance.

Bas Giesbers et al. (2013) proved intrinsic motivation, through empirical analysis, was the critical factor for influencing studying performance. Intrinsic motivation were divided into epistemic motivation, mission completing

motivation, experiencing motivation, among all, epistemic motivation and mission completing motivation had most significant impact on studying performance [4]. Cognitive characteristic was indicated as a kind of cognitive style in cognitive activity of individual. Learners with different cognitive style would produce different cognitive load when reading materials, moreover, the rationality of cognitive load would have effect on the learning performance. According to the cognitive load theory, human cognitive resource was limited. The activity of any studying and problem solving would consume cognitive resource, which might cause the load on cognizing. Minimizing the cognitive load that hindered study, optimizing the cognitive load that promoted study, making learners reasonably use limited cognitive resource, and achieving optimal studying performance were the essential purpose of designing instructional materials reasonably. Sweller (1988, 1994) argued that there were three elements, the previously knowledge experience of individual, and the intrinsic essential traits of learning materials, especially the interaction among information elements, as well as the organizing and presenting mode of materials, which influenced cognitive load [5]. The importance of studying style for education was already proved by many scholars. As Reiff (1992) indicated, studying style will affect the learning process of learners, the educating process of educators, and the interaction between learners and educators. Studying style of learners should be considered in the instructional designing and study intervening. The research of web learning style was becoming a highly concerned topic recently. Based on the theory of traditional studying style, all the behavior related to the learning or the web context carried out in the web learning context was analyzed by using big data technology. Basically, in certain time and situation, the behavior operator did some operations on some objects acquiring some results for data collecting and analyzing. There were various theories on the elements that were influence studying style. James Keefe indicated that elements of studying style including cognitive factors, emotional factors and physiological factors [6]. Rita Dunn argued that the elements influencing study style contained environment variable, social variable, emotion variable, physiological variable and psychology variable [7]. From the layer of using learning resource, studying style could be divided into four studying styles, written text style, audio-visual image style, voice understanding style and affective experience style. From the perspective of learning interactive behavior, the studying style could be divided into active participation, wait-and-see attitude, dropped off and even escape attitude.

IV. DESIGN OF MULTI-HIERARCHICAL ONLINE COURSE INSTRUCTIONAL OBJECTIVES FOR SATISFYING DIFFERENT LEARNING MOTIVATIONS

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starting point and the basis of effective educating activities. Instructional objectives of offline courses were planned based on the contributing points and degree of courses for training objectives in curriculum system. The small differences among educating objects and the full accord of training objectives resulted in the unique and stable courses instructional objective. However, in online course educating, there were various sociological attributes and studying motivations of educating object. Therefore, when setting the instructional objective, different requirements must be fully considered. The instructional objective of online courses could be set with different hierarchical multi-target to meet the needs of learners to make choice according to their requirements, to help learners settle down the learning objectives, acquire suited learning materials, and distribute learning time. The basic difference of the instructional objectives between the online course and offline course was that, the former was set by learners; the latter was set by educators. Thus the system of instructional design was different because of the different starting point. According to the degree of the learners' demanding on courses, the learning objectives could be classified into four levels: exploring learning type, engaging learning type, effective learning type and interests learning type. They determined different level of learners' expectation on courses instructional outcome. Learners judged satisfactions based on settled objective.

TABLE I. DESIGN OF MULTI-HIERARCHICAL ONLINE COURSES INSTRUCTIONAL OBJECTIVES

No.	Type	Learning Objectives
1	<i>Exploring type</i>	Fully mastering the knowledge points of the course, understanding the intrinsic connection of knowledge points, and using the Internet context to autonomously discover and discuss problems, so as to obtain lifelong learning ability, innovation ability and research ability.
2	<i>Engaging type</i>	Fully mastering the knowledge points of the course, understanding the intrinsic connection of knowledge points, and active involving in educating interaction, so as to obtain lifelong learning ability.
3	<i>Effective type</i>	Mastering the connection among knowledge points of courses, involving in educating interaction, so as to improve learning ability.
4	<i>Interests type</i>	Carrying out the knowledge points learning independently, involving in discuss, and using educating resources to expend knowledge.

V. DESIGN OF ONLINE COURSE INSTRUCTIONAL MATERIALS FOCUSING ON LEARNERS' COGNITIVE CHARACTERISTICS

Learning online courses relied on the learning resources offered by web. Learners need to process information based on the instructional materials to acquire knowledge. In most online course educating currently, educators often take the quantity of instructional materials, presenting mode, the validity of information etc. into account. However, individual previous knowledge experience was less considered. In fact, the complexity of instructional materials and the previous knowledge experience of learners are the principal factor influencing the learners' intrinsic cognitive load, while the

previous knowledge experience is a variable. If learners had abundant professional knowledge in the field related to the learning materials, it would relieve the load of working memory, produce lower intrinsic cognitive load, get more space loading related cognitive load of promoting studying outcome.

Advanced organizers' instructional strategy by D. P. Ausubel could be used to solve this problem. Ausubel stressed the important effect of individual cognitive structure on studying, while advance organizers were the principal method for improving cognitive structure and promoting new knowledge [8]. When designing online course instructional materials, the advantage of web technology could be used to create educating situation, and to present advanced organizers. Presenting advanced organizers in web educating could be done with the aid of the web advantage, creating instructional situation with multisensory channel stimulation and integrating the concept and attribute of advance organizers into the instructional situation, as well as creating series of instance based on questions, which made learners to review the related knowledge and experience through exploratory manner. Thereby, not only the reconstruction of the original knowledge was realized, but also the foundation for constructing the new knowledge to be learned was established.

VI. DESIGN OF INDIVIDUALIZED EDUCATING INTERACTION BASED ON LEARNING STYLE IDENTIFICATION

Learning style of learners was the individual's self-adaption expression to environment. The purpose of analyzing learning style was not to change the learning style of learners, but using learning strategy to promote learning style to service the learners better. Learners holding different learning style had different requirements of educating interaction: active style learners were good at using studying resource to assist learning, preferred to communicate with others. On the contrary, reflective style learners would like to solve problems independently. They tended to observe others speech in forum, to think about problems alone, rather than to participate in others' discussion actively. Dependent style learners relied on the detailed instruction produced by educators. They would like to read more educators' post, concerned less on the content of others' discussion or the content irrelevant with mission completing. Independent style learners were confident in their learning ability, preferred to learn what they thought was important. Compared to the dependent style learners, they did not rely on the instructions by educators, concerning more on themselves and on the content they were interested in. Savvy style learners expected to be better than other classmates and liked to do self-testing to test their learning effect. They hoped to acquire educators' attention and appreciation, paid more attention to educators' post, while relatively less concerned about the posts released by other classmates. Learners then could be divided into two types according to their requirements when designing educating interaction: the first type was the mutual assistance among learners, and the second type was the mutual assistance of educators and learn. The first type liked to communicate with each other, or to observe communication. They had less dependent on educators. Educators could attend to the interaction just as assistants and didn't need to highlight

their central position in communication. The educating interaction of the second type required educators plays a leading role to guide learners communicating, as well as give solution actively.

VII. CONCLUSION

Individualized online course educating was the developing trend of web education. Based on the internet big data technology, according to the learning characteristics of learners, the analysis on the relationship among learning motivation, individual knowledge level, learning style, and the design of instructional objectives, educating materials as well as educating interaction could reduce the blindness of mass online course education, achieved learner-centered, and implied individualized instructional strategy indeed.

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