Analysis on the Influencing Factors of MOOC Adoption Behaviour of Faculty: Cross-Case Study based on a Chinese University

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Abstract: From the perspective of technology adoption theory, this study focused on how their educational orientation of MOOC affects their MOOC adoption willingness through in-depth interviews with five college teachers in a Chinese university. The results show that different college teachers have significant differences in the educational function understanding and attribute positioning of MOOC, which mainly reflected in the differences of education and communication attribute positioning of MOOC. In addition, the matching degree of their positioning of MOOC and their own education concept determine the willingness and behaviour of college teacher to adopt MOOC. Furthermore, four typical MOOC orientations were summarized based on the differences of attribute judgment, and the research cases was divided into three typical types of practice according to the matching degree of concepts and the behaviour orientation adopted in practice.

1 INTRODUCTION

In 2012, MOOC (Massive Open Online Courses) triggered the global higher education revolution with a new way of knowledge dissemination and learning mode, and many world-renowned universities successively joined the ranks of MOOC construction. According to incomplete statistics of CLASS CENTRAL (2018), MOOC platforms such as Coursera and edX have launched more than 9,000 courses. In China, MOOC courses offered by Chinese universities, MOOC in Chinese and other domestic platforms have reached as many as 5,000(Zhang, 2018). In addition, the latest "Education Informatization 2.0 Action Plan" issued by the ministry of education of China in 2018 clearly points out that the service quality of MOOC should be improved. It is foreseeable that under the dual role of global MOOC learning demand stimulation and active policy guidance, MOOC will continue to develop rapidly in the future.

However, blindly pursuing course construction may easily lead people to fall into the craze for technology and neglect or deviate from the essential purpose of technology application in education teaching. Are all teachers and courses suitable for the format of MOOC? What are the acceptance and adoption intentions of MOOC for front-line college teachers who are the main organizers and practitioners of teaching? To clarify these issues is conducive to our rational view of new technologies, to make technology better serve education and teaching, and to make the opening of MOOC a path to promote the professional development of college teachers.

The review of previous research on MOOC shows that researchers pay more attention to MOOC learners and less attention to teachers(Veletsiano and Shepherdson, 2016). Most of these researches on teachers focus on the analysis of the teaching strategies adopted by teachers and their specific performance in courses, while few focus on the research on teachers' attitude towards MOOC. Compared with research on teaching strategies, attitude-based research lays more emphasis on exploring teachers' experience world and is more conducive to understanding the nature of the problems behind their participation in MOOC.

Based on the above purposes, this study focuses on the understanding of faculty on technology and practical considerations of technology application in teaching in the context of education informatization reform. On the one hand, by understanding the real thoughts of faculty on MOOC teaching, it is helpful for faculty to find the correct positioning in the wave

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of reform and avoid blindly following. On the other hand, this study attempts to clarify the feasibility of the application of MOOC and other new teaching forms in university teaching and other issues, so as to provide some empirical basis for policy makers and administrators to better promote MOOC in universities and colleges.

2 THEORETICAL PERSPECTIVE

The smooth development of new forms of teaching such as MOOC depends to a certain extent on the effective use of new technologies by teachers, and this problem can be attributed to the research scope of technology acceptance at the individual level. This study attempts to combine the basic theories of social psychology and organizational behaviour to explain how individual beliefs and attitudes determine individual usage intentions and behaviours from the perspective of the recipient.

"Adoption intention" is one of many behavioural intentions, and "behavioural intention" is the core concept of Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) (Figure 1). TRA theory clarifies the production mechanism of rational behaviour of "beliefs-attitude-behavioural intention", that is, on the premise of "people's behaviour is rational", this model discusses the prediction and interpretation of attitude to behaviour. It can be seen from the model that behavioural intention determines the generation of individual behaviours, and meanwhile, behavioural intention is affected by the "attitude toward behaviour" and "subjective norms" held by individuals.

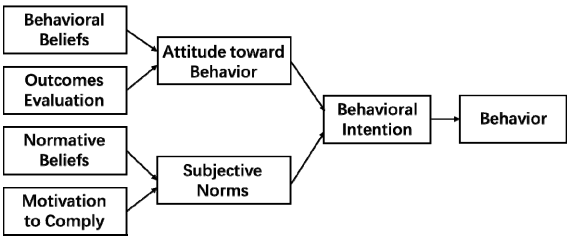

Figure 1: Theory of Reasoned Action (TRA).

Davis (1989) extended TRA to Technology Acceptance Model (TAM) (Figure 2) in order to explain the mechanism of technology adoption behaviour better. According to the TAM model, "external variables" can indirectly influence individuals' behavioural intention and use behaviour by influencing "perceived usefulness" and "perceived ease of use".

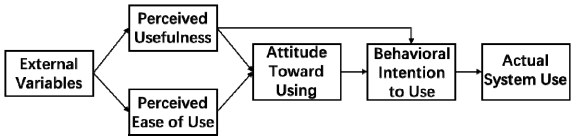

Figure 2: Technology Acceptance Model (TAM).

Previous researches on the influencing factors of technology adoption have provided a rich theoretical perspective for this study, provided a higher level of theoretical reference dimension for analysing the reasons why a new technology was adopted or rejected by individuals, and provided an internal explanation logic for clarifying the following series of research findings. Through sorting out and analysing the above theories, it can be seen that attitude is an important variable or even a core variable that affects behaviour and has a direct impact on behaviour and decision-making. In addition, external variables can indirectly influence individual behaviour by influencing attitude. Based on this, this study conducted in-depth discussion and analysis from the perspectives of external factors, internal factors and external factors influencing internal factors, and thus indirectly influencing teachers' attitude and behavioural intention to carry out MOOC teaching from the perspective of relevant theoretical research on technology adoption.

3 RESEARCH METHOD

This study adopted the cross-case study method of qualitative research to study the subjective understanding and behavioural intention of college teachers on MOOC teaching from multiple cases. The study selected the first-line teachers who are currently teaching at A-University as the research object. The MOOC construction of A-University has been more than four years. At present, A-University has opened more than 100 MOOC courses, and actively organized training of MOOC construction for teachers. This study does not claim the particularity of teachers in A-university, but believes that A-University as an active practice field for education informatization reform, and research on the front-line teachers in the reform can extract enough diversified and complex situations to help build correlation and depth between concepts.

In this study, by stratified purpose sampling was adopted, the research objects were layered according to certain criteria, then purposeful sampling was carried out at different levels, and the overall heterogeneity of the subjects was explored by

understanding the specific situations of different levels in the research phenomenon. The study divided the subjects into two layers: the first is the teachers who have been involved in the practice of MOOC, that is, those who have used MOOC resources in their teaching, and even have personally participated in the practice of MOOC curriculum construction; the other layer is teachers who have not yet participated in any MOOC practice. In addition, as far as possible to spread the characteristics of the case, this study also took into account gender, discipline, job title and other variables. A total of 5 cases were selected in this study, the case characteristics are shown in Table 1.

In terms of data collection, researchers conducted semi-structured interviews with five teachers in turn from April to June 2018. Each interview lasted between 50 and 60 minutes. The interview was conducted with the influence of MOOC on traditional teaching as the introduction, and questions and dialogues were conducted according to the relevant topics randomly appeared in the interview. 1-2 return interviews were made to individual cases with profound experience and deep thinking. The recordings were made on the basis of the consent of the research objects and transcribed at the end of the interview.

This study used three-level coding to analyse the transcript: the primary coding was open coding, which mainly listed and sorted out the important information in each interview segment. The secondary coding was axial coding, which abstracted specific information into categories and situations based on primary coding. The third-level coding was the core coding, which was to find the interconnection between the codes on the basis of the secondary coding, to form a certain relational network, and to explore the formation of the structural framework (Babble, 2009).

4 FINDINGS

4.1 Different MOOC Orientation under the Judgment of "Function -- Attribute"

Through interview analysis, it was found that there were significant differences between different teachers in the understanding and attribute orientation of MOOC educational function, which was embodied in the difference between the educational attribute of MOOC and the orientation of communication attribute.

For MOOC, its initial goal is to provide high-quality university courses to all in a free and open form, so it has educational attributes and a function of education. In addition, as a kind of online course, MOOC can also be seen as a mean of communication. American communications scholar Neil believes that the course itself is an information communication system.

On this basis, this study constructed a binary quadrant as shown in Fig. 3 to illustrate the different orientations of MOOC by different college teachers. The X-axis represents the education function of MOOC, which refers to the effectiveness that teachers think MOOC can play in the actual teaching and learning process. The higher the level, the more recognition teachers have for the education value of MOOC. The y-axis represents "education-communication consistency", which reflects the proximity of teachers to the orientation of MOOC educational attributes and communication attributes. A high level of consistency means that teachers are more inclined to understand and position MOOC from the perspective of integration of education and communication, and a low level of consistency means that teachers tend to position MOOC from a single perspective of education or communication. Four different MOOC orientations were proposed from this binary quadrant, the MOOC was orientated

Table 1: The characteristics of research cases.

Interview order	Case code	Gender	Subject	Title	MOOC experience
1	Teacher D	Male	Social Science	Professor	No
2	Teacher S	Male	Social Science	Associate Professor	Yes
3	Teacher M	Female	Social Science	Associate Professor	No
4	Teacher W	Male	Science	Professor	No
5	Teacher X	Male	Engineering	Professor	Yes

as a resource carrier, a means of communication, a teaching tool and an educational communication technology, respectively.

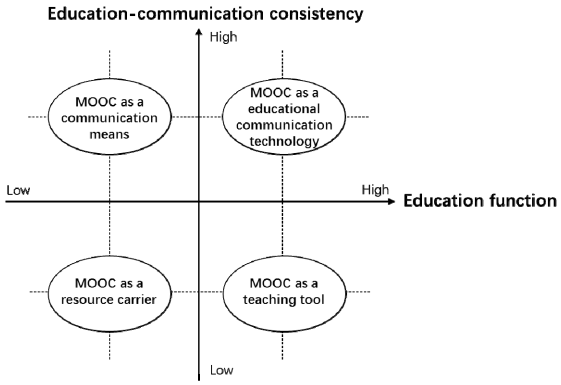

Figure 3: MOOC orientation framework.

4.1.1 MOOC as a Resource Carrier (Low on Both 'X' and 'Y' Axes)

The first orientation regarded MOOC as a kind of resource carrier, which believed the essence of MOOC was a kind of digital teaching resource. Compared with face-to-face teaching, MOOC teaching lacked or weakened some elements and links that should be in teaching. Therefore, online teaching could not be equal to effective teaching and learning. As teacher M said, "How well you lecture is not directly related to how much students directly understand and accept. So in a sense, I think MOOC is more about resource presentation than valuable education patterns."

In this orientation, MOOC was regarded as a kind of teaching resource, but unable to undertake the complete educational function, so it was low in the dimension of education function. In the dimension of education-communication consistency, MOOC was more orientated as a communication level rather than the educational level of the phenomenon, so the same performance is low.

4.1.2 MOOC as a Communication Means (Low on 'X' Axis and High on 'Y' Axis)

The second orientation regarded MOOC as a means of communication. From the perspective of educational communication, the openness of MOOC communication through the internet had realized the long-distance communication and sharing of quality educational resources. However, MOOC teaching alone could not provide students with a complete learning experience. As Teacher D stressed: "I believe that on the basis of MOOC teaching, we must add the following links to compensate for the lack of interaction in the online learning process, in order to form a complete learning process to ensure the learning effect."

Under this kind of orientation, MOOC was more regarded as a means of communication of knowledge, it showed a high degree of consistency in the education-communication dimension, but in the educational function dimension, the educational function dimension performance was low because of its teaching effect was difficult to guarantee.

4.1.3 MOOC as a Teaching Tool (High on 'X' Axis and Low on 'Y' Axis)

The third orientation regarded MOOC as a teaching tool, which believed that the value of MOOC should be embodied in the contribution of serving teaching and learning. As Teacher W said: " All technical means should serve the teaching itself, and only when the effect is good can the tool be proved to be good." Teacher W also stressed that the tools themselves did not directly play a role in the teaching effect, the focus was still on the organization of teaching activities and the reasonable guidance of teachers, in order to achieve the desired teaching results.

Under this orientation, MOOC was regarded as a teaching tool, which could serve education and teaching in practice, so it was high in the dimension of teaching function, but this kind of orientation only started from a single educational point of view, neglected the communication attribute of MOOC, so the education-communication consistency dimension was low.

4.1.4 MOOC as an Educational Communication Technology (High on Both 'X' and 'Y' Axes)

The fourth orientation regarded MOOC as an educational communication technology, which believed MOOC could not only realize the enlighten function in the communication process, but also had the education attribute and the communication attribute of social media, so as to realize the unlimited sharing and communication between communicators and audiences.

Under this orientation, MOOC was regarded as a new educational technology with dual attributes of education and communication. The emergence and development of MOOC catered to the development needs of the lifelong learning era, so it had a high educational function and value. At the same time,

MOOC had achieved a high degree of integration of education and communication in practice, so it was high in the two dimensions of educational function and education-communication consistency.

4.2 Different Types of Practice under the Guidance of Concepts

Concept refers to the teacher's understanding and view of a certain imagination, as well as a set of theories and concepts formed in the internal value system. According to the interview analysis, the matching degree between teacher's own educational concepts and the orientation of MOOC determined the intention and behaviour of teachers to adopt MOOC in practice. The concepts and MOOC adoption behaviours of different cases were summarized in Table 2. According to the matching degree of concepts and the behavioural orientation adopted in practice, the five cases were divided into three types of practice.

4.2.1 High Matching Degree: Active Participant

When the education concept matches the orientation of MOOC, teachers tended to accept MOOC with a positive attitude, and participated in and support the construction and development of MOOC in practice, thus forming the identity of active participant.

A typical example among them was Teacher X. In the education concept of Teacher X, the university, as the talent cultivation centre of modern society, should actively practice social responsibility and realize higher value pursuit from three aspects of teaching, scientific research and social service. The characteristics of MOOC's "massive", "open" and "online" fitted the teacher's educational concepts and pursuits. As Teacher X said: "The development of MOOC enable high-quality teaching resources to achieve barrier-free sharing, which is conducive to the atmosphere of lifelong learning and promote the formation of a learning society."

In the view of Teacher X, the development of MOOC may leverage the original mode and rules of the whole higher education system to realize the deconstruction and reconstruction of the production chain of higher education. This series of changes caused by MOOC generally pointed to make education fairer and society more progressive, which was a positive education reform. Because his education concept matches the orientation of MOOC, Teacher X became an active participant of MOOC with multiple identities. He had not only registered several courses on different MOOC platforms, but also opened two MOOC courses in person.

Teacher S was also an active participant of MOOC. In his education concept, scientific research, teaching and communication should combine and promote each other, and MOOC provided a historical opportunity to realize this education concept. Teacher S has already opened a MOOC course, which described his own practical experience: “Our MOOC are designed to let more

Table 2: Logical analysis of the MOOC adoption behaviour of research cases.

Case code	Educational concept	MOOC Orientation	Matching degree	MOOC adoption behaviour
Teacher X	Making quality education resources benefit the general public was the responsibility and pursuit of the university	MOOC would make education fairer and society more progressive	High	Two MOOCs had been opened and applied in practical teaching
Teacher S	Scientific research, teaching and communication should combine and promote each other in practice	MOOC was the link and communication means between scientific research and teaching	High	One MOOC had been opened
Teacher M	Teaching should be updated in real time with the development of subjects and the change of concepts	MOOC was a means of mass communication of knowledge	Low	No plans to open MOOC
Teacher D	Teaching was the process of interaction between teachers and students, learning from each other, and creating together	MOOC was a resource carrier which can realize long-distance transmission	Partial matching	Recognize education value of MOOC, but have no intention to open MOOC for the time being
Teacher W	Individualized teaching was important and indispensable	MOOC was a technical tool for service teaching	Partial matching	No plan to open MOOC for the time being.

people know about our academic achievements, and through more cooperation, to bear more fruits, which in turn can support us in doing more basic research." In the view of Teacher S, MOOC was a link and communication means that can connect scientific research and teaching. Its important function was to spread the academic achievements more widely, to enhance the influence of research and teaching and create more resources and convenient conditions for the further development of research and teaching, which was consistent with the education concept of him.

For the active participant of MOOC, they tended to view the rationality and development potential of MOOC from a more macro and integrated perspective. In their opinion, as an education communication technology, MOOC was the product of the deep integration of education and technology in the internet era, which met the development needs of education in the era of lifelong learning and was an important means and approach to realize their education concept.

4.2.2 Low Matching Degree: Calm Bystander

When the education concept of teachers and their orientation of MOOC cannot match or even contradict each other, teachers tended to look on or even reject MOOC, thus forming the calm bystander identity.

Teacher M was a typical representative of this type. In Teacher M's education concept, the curriculum resources needed for teaching should be updated in real time with the development of times and subjects, rather than being static. However, the current technical limitations made it impossible to match the orientation of MOOC with their education concept. "The course of mine is still in development, so I need to update it every year and add some latest research results. At least I know that the current (MOOC) technology cannot do this, so I have no plan to open a MOOC." Teacher M said.

At present, the main knowledge transfer form commonly adopted by MOOC is teaching video. Due to the complexity and professionalism of technical operation, the labour and material costs of modifying and updating MOOC video are relatively high, which to some extent hinders the timely modification and updating of MOOC video. Especially for the subject under development, there are still significant limitations on the applicability of the prior art to such courses. As a result, Teacher M could not perceive the convenience and effectiveness of MOOC technology applied in teaching, and the orientation of MOOC could not conform to her educational concept, thus hindering the willingness to adopt MOOC in practice.

4.2.3 Partial Matching: Cautious Investigator

When teachers did not deny the value and significance of MOOC, but the orientation of MOOC could not completely conform to their education concept, teachers tended to take a slightly cautious attitude towards participating in the practice of MOOC, thus forming the identity of cautious investigator.

Teacher D was a typical cautious investigator. He affirmed that MOOC rely on the Internet to realize the long-distance transmission of education resources. “The benefits of MOOC are ' far ', and for some remote areas where teacher conditions are not ideal, the benefits of MOOC are reflected.” Teacher D mentioned in the interview. When it came to his willingness to use MOOC, Teacher D first explained his own educational concept from the aspects of teaching and curriculum. In his opinion, he believed that the most important and essential part of teaching was based on the timely interaction and feedback, through the exchange of different ideas and collisions would often burst out new inspiration, resulting in the unexpected harvest beyond the class itself. As Teacher D mentioned in the interview, "I believe that teaching isn’t just a study of certain knowledge, but a process in which teachers and students learn and create together. In face-to-face communication with students, through eye contact, timely raising new doubts, and organizing students to carry out discussions, can create new inspirations and progress, which can’t be achieved by network communication. ”Since all learning behaviours in MOOC teaching are carried out in the network environment, the time and space differences in the network environment prevent timely interaction and feedback in the teaching process, and the lack of evaluation and feedback also reduce the learning effect and learning depth, which are incompatible with Teacher D's educational concept. Therefore, in view of the above considerations, Teacher D had no intention to adopt MOOC for the time being.

Similar to Teacher D, Teacher W did not deny the value of MOOC. He expounded his views from the perspective of discipline characteristics and the feasibility of MOOC in teaching practice. As a science and engineering teacher, Teacher W always believed that teaching should be a kind of

personalized and creative activity in his educational concept, and teachers should comprehensively determine the teaching content and teaching method of a class based on the characteristics of learners, characteristics of knowledge points, teaching progress and other factors. However, since the audience of MOOC are the general public rather than a specific group, it is difficult for MOOC teachers to implement personalized teaching. Just as Teacher W said, "when lecturing through mass media, the speeches are definitely standard and formal, so that there will be no personalized things in the lecturing. Students will only understand without deep feelings."

In the absence of a measure of rationality and effectiveness, the "standard" teaching method seems to be the best choice for insurance and error-free. However, standardization has resulted in the lack of individualization in MOOC teaching and the loss of the original vividness of many teaching methods. From the perspective of instrumental rationality, as a teaching tool, MOOC cannot meet their own teaching requirements. Therefore, the attitude of Teacher W hold participating in the practice of MOOC was also cautious.

For the calm bystander and cautious investigator of MOOC, they were more likely to consider their willingness to adopt MOOC from the perspective of the feasibility and effectiveness of technology application in teaching. Due to the limitations of external factors such as technology, which could not meet the educational concept and actual teaching needs, these type of teachers' willingness to adopt MOOC were hindered.

5 CONCLUSION AND DISCUSSION

According to the Online Education Communication System (Guo, 2014), in the context of online education, the "teaching dialogue" of continuous interaction between teachers and students is a necessary category of online course design. Driving the four elements to continuously move and develop, forming an effective network teaching process, the core of the dynamic system is online teaching activities. Only when all elements (learners, teachers, resources and environment) form a system under the organization of teaching activities can realize their education function and purpose. However, from the current MOOC practice, due to the large proportion of teachers and students, it is difficult for teachers to achieve direct and real interaction with each learner, and they do not have enough energy to pay attention to and promote whether each learner can obtain positive learning results (Xu, 2015).

On the other hand, different from mass communication, education communication emphasizes "teaching students according to their aptitude", which is a kind of "subdivision communication" aimed at specific audiences and individual differences (Guo et al., 2013). Whether it is the choice of teaching resources, the explanation of teachers, and the feedback of teachers to students, it is necessary to consider the cognitive level and personality characteristics of specific learners. However, at present, MOOC have not been able to solve the hierarchical and classified subdivision requirements in education communication. Most MOOC are still teacher-centred traditional knowledge transmission modes. Therefore, it is not difficult to understand that many teachers in the interview have a deviation from the educational function understanding and attribute orientation of MOOC, which is actually caused by the trend of "emphasizing resources and neglecting teaching" in the existing MOOC teaching practice.

The educational idea arises from the educational practice, and has the guidance and the orientation function to the education practice. Through the case study of MOOC technology adoption behaviour and influencing factors, this study found that the matching degree between teachers' technical concepts and education concepts ultimately determines teachers' willingness to adopt a certain technology. Only when the two concepts achieve a certain degree can teachers adopt positive adoption of new technologies. In addition, the perceived usefulness and ease of use of teachers will affect the formation of teachers' technical ideas, which indirectly affect teachers' willingness and behaviour to adopt technology. In this study, when considering the adoption of MOOC technology, teachers will first consider the applicability, feasibility and effectiveness of MOOC in practical teaching by considering the characteristics of their own disciplines and courses. At the same time, the operability of the existing MOOC technology and the perception of the availability of external technical support will affect the teacher's technical orientation of MOOC, which indirectly affects the teacher's adoption of MOOC. This finding fits into the core of the theories related to rational behaviour and technology acceptance, that is, any external variable can indirectly affect individual behaviour by influencing internal psychological variables.

The research value of this study is mainly embodied in two aspects. Firstly, for front-line college teachers, their concepts of education and the education orientation of MOOC can be self-tested to determine whether they are suitable for MOOC teaching or opening MOOC in person. Secondly, for college administrators, the willingness and behaviour of teachers to adopt new technologies can be indirectly affected by providing effective technical support and facilitating conditions to increase teachers' perception of technology usability.

During the process of this study, the following questions can be further explored. These questions include: How do the front-line teachers produce the educational orientation of MOOC? How does the college atmosphere and environment affect the formation of teachers' teaching concept and technical concept? For those teachers with MOOC practical experience, how their MOOC teaching practice implemented? Does the practical experience of MOOC influence their attitude and positioning towards MOOC? The above problems can be further analysed and discussed in subsequent studies to help researchers have a deeper understanding of MOOC teaching problems.

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