

Study on teaching and learning strategies of MOOC-based college English teaching reform from the perspective of game theory

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Abstract. In China, a new round of college English teaching reform is being conducted in the way of integrating MOOC-based teaching mode. However, the effect is not ideal because lack of optimal strategies. In order to improve the efficiency, this article analyzed the teaching and learning strategies of using MOOC in college English teaching reform from the perspective of game theory. Teachers and students were set as the two sides of “teaching and learning” game. Potential game contradictions have been analyzed. As a result, many appropriate and imaginative strategies have been devised to achieve a “win-win” situation for teachers and students and maximize the efficiency of the teaching reform.

Keywords: MOOC, College English teaching reform, Game theory.

1 Introduction

In recent years, with the convergence of Internet plus education industry, more Internet technologies have been applied in English teaching and learning. After the concept of MOOC (Massive Open Online Course) been firstly put forward in 2008, many experts began to offer free and open courses and have also turn to MOOC teaching and research. As a new teaching mode in the digital information age, MOOC emphasizes the nature of interactivity in language teaching and learning, which requires both teachers and students to redefine their roles in English classroom. Teachers can use ICT technology to inspire students to actively participate in learning. Likewise, students transform from “passive learner” to “active learner”. MOOC teaching mode can not only stimulate students’ interest in learning, but also improve the effect of college English education. Therefore, integrating MOOC into language teaching is the inevitable trend of college English reform.

In order to improve the efficiency of this undergoing MOOC-based college English reform, this paper creatively applies game theory to analyzing teaching strategies of using MOOC in college English reform. From the perspective of game theory, the paper assumes teachers and students are the two sides of “teaching and learning” game and examines the

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potential contradiction during teaching and learning process. At last, appropriate teaching strategies are proposed in order to maximize teaching efficiency. Ultimately, it helps achieve a “win-win” situation for teachers and students in this MOOC-based college English reform.

2 Game theory applied in teaching reform

Game theory mainly studies the individual behavior, predictable behavior and actual behavior in the course of struggle and competition. Game theory is not only a new branch of modern mathematics, but also an important subject of operations research. It has been widely used in all fields, such as finance, artificial intelligence, biology, etc.

Introducing game theory into the field of education has resulted in new approaches to teaching reform. Mou et al. [1] established a game model for teachers and students in the teaching process. Teaching and learning is a game process which includes five basic elements: participants (teachers and students), resources (content), strategies (teaching methods and learning strategies), information (students' situation and teachers' background information), gains and losses (teaching effects). These five elements interact with each other, and finally achieve the “Nash equilibrium” in the game, that is, the win-win of teaching interaction. Moreover, Yao et al. [2] found the Nash equilibrium of reformation in Fundamentals of Computer Science course from the perspective of game theory. Shi et al. [3] conducted game model analysis of teachers and students in curriculum reform and concluded that schools should strengthen supervision and incentives and teachers should attach importance to the intensity of teaching reform. Above all illustrated that the teaching process is a behavioral game between teachers and students. It laid scientific foundation of game analysis of teaching reform.

Some game analyses only focus on the participants of teaching reform, but others summarize and propose constructive suggestions to promote the reform efforts. Duo [4] analyzed teaching influencing factors in local ethnic schools from the perspective of game theory, and constructed a new game model and relevant strategies. Wu et al. [5] studied the game model between teachers and students of IT-based English classes in primary school and concluded reasonable teaching strategies. Zeng et al. [6] presented the current situation of education technology and investigated how to reach the equilibrium state of teaching and learning. She believed starting with the prisoner's dilemma is the best choice of using game theory, furthermore, of achieving the optimal solution of teaching efficiency.

Even though the models of game theory have been extensively applied and studied, using game theory in English teaching is still quite rare, especially about the potential contradiction between teaching and learning. As an effective way to improve the efficiency of the MOOC-based college English reform, game theory needs to be applied. Once the conflicts between teachers and students are discovered, sound strategies will be proposed to maximize the teaching efficiency.

3 Game theory in MOOC-based college English teaching reform

3.1 Contradictions between teaching and learning

For the college students who use MOOC to study, the MOOC platform provides the students with a more interesting and convenient way to learn knowledge, which enables them to become active selectors of knowledge. The students can choose the content they need independently, which improves the students' autonomous learning ability. Compared with the traditional teaching mode, the channels for students to acquire knowledge through

MOOC are more abundant. Students can conduct in-depth study of certain knowledge in which they are interest. On the other hand, the benefits come with some risks. Although there are learning videos that students are interested in on MOOC, there are also some other contents. For the students who are not strong in self-management, it is possible for them to spend a lot of time on unimportant videos, which will affect learning efficiency and have adverse effects.

For the college English teachers who use MOOC to teach, a wide variety of knowledge from MOOC enriches the diversity of teaching. Good use of MOOC can convey knowledge more efficiently. By using MOOC, the forms of teaching are more colorful. Thus, students are attracted by the teaching contents and methods, and be more enthusiastic for learning. Students can learn the pronunciation and thinking of foreign teachers directly, which is very helpful for college English learning. Nevertheless, for some teachers who have used the traditional offline teaching mode for a long time, they probably have never had the opportunity to know MOOC. They may not have the awareness of using MOOC properly and. Therefore, it is necessary for them to overcome the difficulties and learn how to use MOOC. Both teachers and students must be interest-oriented, teaching and learning should promote each other mutually to achieve a “win-win” situation for teachers and students and maximize the teaching efficiency.

3.2 Game analysis of strategies in MOOC-based college English reform

In the college English teaching class, after the corresponding analyses and the simplification of the interaction relation between the model objects, there are income functions of both teachers and the students:

The teachers’ income function is mainly composed of the following three parts:

- Benefit **a**: the benefit brought to teachers when they use MOOC to teach.
- Benefit **b**: the benefit brought to teachers when they don’t use MOOC so that they can have more spare time to do what they want.
- Benefit **c**: the benefit brought to teachers when students are willing to use MOOC to learn.

The students’ income function is mainly composed of the following four parts: :

- Benefit **j**: the benefit brought to students when they use MOOC to learn.
- Benefit **k**: the benefit brought to students when they don’t use MOOC so that students can have more the spare time to do what they want
- Benefit **m**: the benefit brought to students when teachers and students use MOOC at same time
- Benefit **n**: the negative benefit brought to students when students fail to use MOOC, even if teachers use MOOC, which means the punishment.

Therefore, according to the Nash equilibrium model of game theory, when teachers choose to use MOOC in college English teaching, and if students also use MOOC, the teachers’ income function is $q=a+c$, and the students’ income is $s=j+m$; if the students don’t use MOOC, the teachers’ income is $q=a$, and the students’ income is $s=k-n$;

When teachers doesn’t use MOOC in English teaching, if students use MOOC, the teachers’ income function is $q=b+c$, and the students’ income is $s=j$; if students also don’t use MOOC, the teachers’ income is $q=b$, the students’ income is $s=k$;

Table 1. Game matrix of students and teachers.

Income Students/Teachers		Teachers	
		Use MOOC	No MOOC
Students	Use MOOC	$j+m ; a+c$	$j ; b+c$
	No MOOC	$k-n ; a$	$k ; b$

Based on the above analysis, the decision-making behaviors of teachers' teaching strategies and students' learning strategies in MOOC-based college English teaching reform can be summarized as the following situations:

For teachers, if students use MOOC, when $a+c-b-c>0$, which means when $a>b$, teachers are more inclined to use MOOC. If students don't use MOOC, when $a-b>0$, which means when $a>b$, teachers are more inclined to use MOOC. Therefore, whether or not students use MOOC, teachers are more inclined to use MOOC when $a>b$.

For students, if teachers use MOOC, students are more inclined to use MOOC when $j+m-k+n>0$. If teachers don't use MOOC, students are more inclined to use MOOC when $j-k>0$.

In a word, in order to make the benefits of teaching and learning strategies of MOOC outweigh the losses, teachers need to learn how to effectively apply MOOC to improve college English teaching reform. Otherwise, if losses outweigh the benefits, the reform will not only consume the enthusiasm of both students and teachers, but only reduce the teaching and learning effect, reinforcing a vicious cycle.

4 Feasible strategies for MOOC-based college English reform

4.1 Shifting mindset to arouse the initiative of students

We should recognize the composition and source of MOOC resources with a more open attitude, and establish the construction and improvement mechanism of teaching and learning resources based on collective participation [7]. We should allow students to fully realize their enthusiasm and initiative, establish various incentive mechanisms (such as publishing the ranking list of resource usage and resource provider, etc.), and make students become the providers and builders of MOOC resources.

The MOOC platform provides students with more colorful forms of English learning contents, students can not only study the courses of famous teachers at any time and place, but also learn the pronunciation directly from foreign teachers. So the students' enthusiasm for English learning will naturally increase, which further improves the efficiency of English teaching. On the other hand, students' learning ability and self-management ability will also get improved as long as MOOC resources can be continuously and dynamically enriched and updated, and the quality can be guaranteed.

4.2 Establishing student-centered teaching mode

As a major problem of traditional college English class, teachers impart a lot of information to students in limited classroom teaching, and mostly text students' mastery in the form of exercises. Only when this "school knowledge" is applied to practical life and integrated into students' cognition, "school knowledge" becomes "action knowledge" [8]. This also shows that the learning of knowledge is not only a cumulative process, to make knowledge meaningful must apply them to practice. However, the application and practice of such knowledge are lacking in college English teaching in China. MOOC has the advantage of being a fragmented learning tool to make up for this deficiency.

In daily teaching, teachers can divide students into groups according to their learning situation. Each group can choose learning time and place according to their own situation to practice the knowledge learned online. Practice includes situational dialogues and group discussions on different topics, key sentence patterns and vocabulary taught by the teacher. Students can also ask teachers for videos and exercises according to their own needs, so

that students can also participate in the teaching. As the ultimate goal of learning English is to communicate, the most effective way to achieve this is to communicate in real situations.

4.3 Operating diversified evaluation mechanism

Appropriate evaluation mechanism is beneficial to reflecting students' learning effect. MOOC-based college English teaching reform needs a set of diversified evaluation mechanism to guarantee the learning quality of students. The evaluation mechanism should combine formative evaluation with summative evaluation [9].

Formative assessment is an optional tool to ensure the implementation of web-based teaching and cultivation of learners' autonomy in web-based learning environment. Formative evaluation can be divided into two parts: online formative evaluation and offline formative evaluation. The online formative evaluation indexes include the number of times that students watch online courses and the self-study test of online courses. Offline formative evaluation indexes include students' performance and tests in class. Summative evaluation is also divided into online and offline tests. The diversified evaluation mechanism is conducive to cultivating good learning habits of students, stimulating the students' motivation and improving the quality of English learning.

5 Conclusion

Based on the Nash equilibrium model of game theory, this paper proposes that MOOC-based English teaching reform should focus on teachers and students as dual subjects, the educator and the educated, who are regarded as the object of cognition and practice. The result of the game depends on what appropriate strategies they use. Therefore, from the perspective of game theory, the "win-win" situation for teachers and students in this MOOC-based college English reform is achievable and very promising as long as rationale and effective reforming measures can be done.

This study was supported by Hubei Province Education and Science Planning Project, Grant No.: 2018GA054.

References

1. Y. Yong, F. Dong, G.M. Zhou, X.F. Huang, *Journal of Huainan Normal University*, **16**, 145-148 (2014)
2. Y. Yao, J.C. Wu, X.H. Li, Y. Yu, *University Education*, **1**, 41-43 (2014)
3. Y.F. Shi, *Vocational and Technical Education*, **35**, 39-41 (2014)
4. J.Z.X. Duo, *Science & Technology Vision*, **13**, 187+239 (2014)
5. J. Wu, *Ability and Wisdom*, **2**, 94 (2019)
6. Q.F. Zeng, Z.L.C.Zuo, J.B.Tan, *The Chinese Journal of ICT in Education*, **6**, 76-79 (2018)
7. L. Rao, S.P. Gong, *Journal of Higher Education Research*, **37**, 13-16 (2014)
8. L. Zhang, *Journal of Language and Literature Studies*, **9**, 135-138 (2015)
9. X.M. Lv, *Information Recording Materials*, **20**, 201-202 (2019)