The Impact of MOOCs on Teaching and Learning: an Exploratory Study of Students' Perceptions of MOOCs in Zhejiang Province of China

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Abstract: With the dawn of technology education, MOOCs (Massive Open Online Courses) has become the educational buzzword around the world. The purpose of this empirical study was to explore the learning behavior and experience of university students towards MOOCs in Zhejiang province of China, as well as to uncover possible factors that contribute to students' participation. This study applied binary logistic regression within the software package SPSS 19.0, among which "significance" in logistic model was to examine the biggest influencers in MOOCs participation. The study's conclusion is that the impact of MOOCs in Zhejiang IHE has yet to stir a revolution because most students consider them as a complement to, rather than a substitute for, traditional face-to-face education on a physical campus. Recommendations are given for practice in both higher learning and teaching aspects in coping with opportunities and challenges brought by this educational innovation.

1. Introduction

MOOCs have exhibited their fascination globally with course takers coming from a wide range of countries and regions around the world [1], among which China proves to be an important market in the traditional higher education industry.

The year of 2013 is regarded as the year of MOOC in China as renowned universities in China joined the international MOOC platforms [2]. In 2013, six leading Asian universities including Tsinghua University joined Edx program, also Shanghai Jiaotong University, one of the first mainland universities, incorporated with Cousera under the influence of MOOC mainstream. On the one hand, MOOCs in China are in rude health especially as colleges across China postponed normal classes due to the COVID-19 pandemic in 2020; on the other, IHE should keep sober and put the view more long-termly coping with the opportunities and challenges brought by MOOCs.

2. Report and Discussion on Findings

In order to unfold the real picture of MOOCs participation in Chinese IHE, this study was conducted in Zhejiang, China. As a result, questionnaires were returned by 400 university students with an overall response rate 100%, among which I ended up choosing 311 valid ones as some of them were uncompleted.

Table 1 Descriptive Statistics Of Questionnaires

Projection	option	Frequency	Percentage (%)
Gender	Female	156	50.2
	Male	155	49.8
Major	Science and Engineering	200	64.3
	Literature and History	91	29.3
	Art	11	3.5
	Other	9	2.9
Grade	Freshman	110	35.4
	Sophomore	71	22.8
	Junior	75	24.1

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	Senior	43	13.8
	Postgraduate	12	3.9
MOOC participation	No	186	59.8
	Yes	125	40.2

Table1 generally illustrates the basic information of respondents in the questionnaire survey. As is shown in the grade distribution, the vast majority of participants are undergraduates while a few were postgraduates who were not considered as the target population in this study. The percentage of MOOCs participation potentially presents the general impact of MOOCs in university environment of Zhejiang, from which we can see a lot of people have not hopped on the MOOC bandwagon accounting for almost 60%. Overall, the statistics above vividly reflects the basic characteristics of target population.

2.1 MOOCs Participation

2.1.1 Reasons for MOOCs Participation

Table 2 Statistics of Participating Factors

Reason	Frequency	Percentage (%)
Curiosity	19	15.0
Absorbing more knowledge	100	78.7
Obtaining certificates	51	40.2
Getting access to elite institutions	49	38.6
A supplement to physical campus study	41	32.3
Flexible teaching method of MOOC	74	58.3
Vibrant networking in MOOC	9	7.1

Table2 shows different factors trigger university students to participate in MOOCs learning, among which we can see “absorbing more knowledge” and “flexible modality” are relatively dominating reasons of all, covering 78.7% and 58.3% respectively. “Obtaining certificate” and “getting access to elite institutions” could be seen as “controlled motivation”, which cover equal proportion at around 40%. However, “vibrant networking” occupy quite a few compared with other reasons, in this light, it is tempting to say that Chinese university students are not ready to embrace the socialization-oriented mode of teaching and learning.

2.1.2 MOOCs Participation in Different Majors

Table 3 Comparison of Majors

Major	Have you ever participated in MOOCs platform?	
	No	Yes
Science and Engineering	126(63%)	74(37%)
Literature and History	46(51%)	45(49%)
Art	7(64%)	4(36%)
Other	7(78%)	2(22%)

It can be seen from table3, students majored in Literature and History are the major groups participating in MOOCs learning followed by those in Science and Engineering. However, students in Art are less likely to involve in MOOCs given that most of them focus less on academic attainments compared with other majors.

2.1.3 MOOCs Participation in Different Grades

Table 4 Comparison of Grades

Grade	Have you ever participated in MOOCs platform?	
	No	Yes
Freshman	79(72%)	31(28%)
Sophomore	44(62%)	27(38%)
Junior	43(57%)	32(43%)

Senior	14(33%)	29(67%)

Table4 presents MOOCs participation from the perspective of “grades”. The statistics show that seniors are more likely to attend MOOCs as they are occasionally busy with piloting future, during which they begin to equip themselves with fundamental and cutting-edge knowledge by getting access to different learning platforms to widen scopes and build a vibrant network.

2.2 MOOCs Learning: Registration, Input and Achievement

Although MOOCs have gained accolade and participation across Chinese universities, the learning experience of MOOCs vary from each other in terms of the registered courses, time input and attained certificates.

2.2.1 Registration

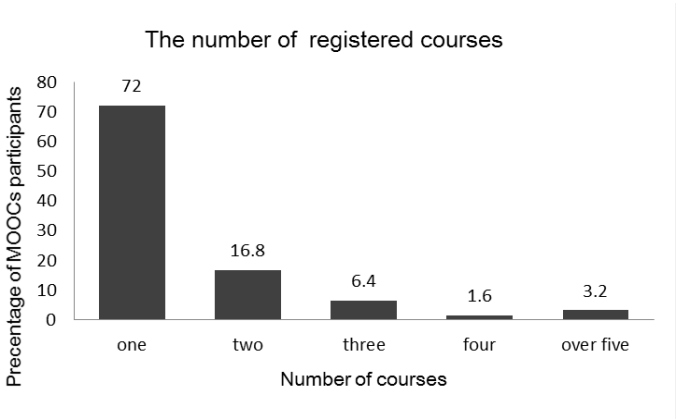

Fig.1 The Number of Registered Courses

As figure1 shows, many students registered only one course on MOOCs, accounting for 72% followed by those who enrolled themselves in two courses. The figures to some extent imply that the usage of MOOCs among Chinese university students has not become an astonishingly widespread phenomenon despite that MOOCs are widely known as massively open free courses without entry requirement.

2.2.2 Input

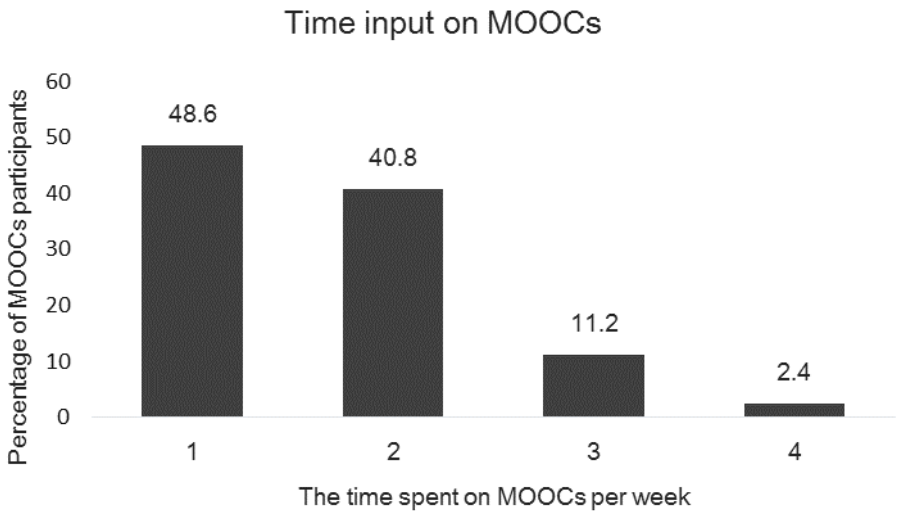

Fig.2 Time Input on Moocs

It can be seen from the bar that around a half university student within sample spend less than

one hour per week on MOOCs followed by those who spare 1-3 hours per week, however only 2.4% of students devote more than six hours per week to take MOOCs. From this sharp contrast we can conclude that nowadays students in China have not input too much time on MOOCs. Indeed, unlike traditional on-campus courses, the sessions are characteristics of visualized short videos combined with assignments, quizzes and papers. Usually the videos are no more than 10 minutes which seems quite suited to those who have limited attention span, and will not exert too much academic pressure on students.

2.2.3 Learning Attainment: Exit Qualification

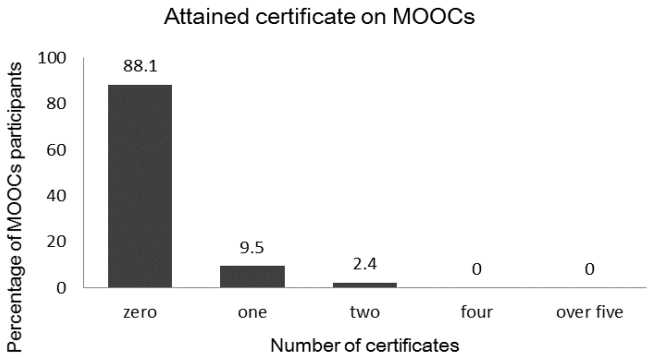

Fig.3 Attained Certificate on MOOCs

The “attainment” here is measured by the number of qualification certificates participants get on MOOCs platforms. As can be seen clearly from the statistics, the vast majority of students end up without attaining credentials, accounting for the percentage of almost 90. Only a few students succeed in obtaining certificates issued by MOOCs.

2.3 MOOCs Evaluation

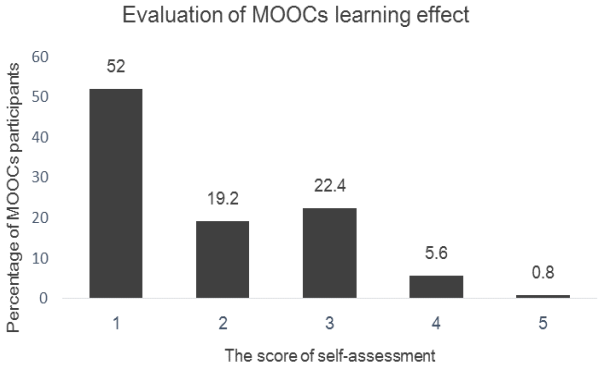

Fig.4 Evaluation of Moocs Learning Effect

When participants were required to assess and mark their MOOCs leaning, according to the statistics, half of the university students marked themselves as “1” while no more than 1% mark “5”. (Note: “1” is the worst; “5” is the best). Conceivably, there are issues in MOOCs which remains to be addressed.

From above we can see that the English language could be a barrier in MOOCs learning process for non-English majors. Hence, it is imperative for MOOCs designers to optimize the subtitle system. Besides, as plagiarism spreads among those with low self-consciousness and motivation, the supervision system has urgent needs to consummate and improve.

2.4 MOOCs Future

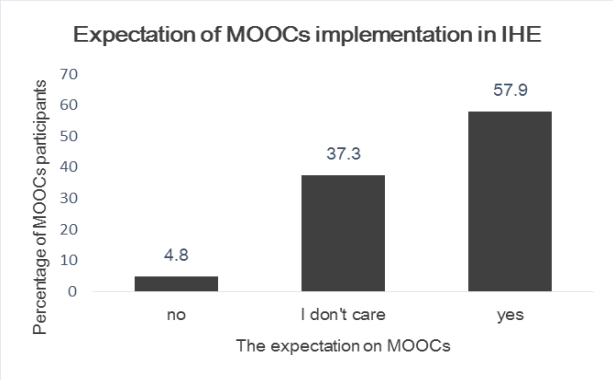

Fig.5 Expectation of Moocs Implementation in Ihe

The chart provides some statistics with respect to university students' attitudes in the question "whether Chinese universities should implement MOOCs in the future?" The attitudes consist of three options, from which we can see a bullish MOOC vision given that 57.9% of them tend to say "yes" to embrace this movement while only 4.8% of them shy away from this technology behemoth.

2.5 Likert-Scale of MOOCs Learning Experiences

The likert-scale also presents some interesting data about MOOCs learning among those MOOCs participants:

Table 5 Likert-Scale for MOOCs Participants

	1	2	3	4	5
The short recorded video and visualized contents in the MOOCs are appealing to me.	4.8%	4.8%	34.1%	50.0%	6.3%
The quizzes and exams promote my enthusiasm towards learning.	4.0%	7.1%	43.7%	42.1%	3.2%
MOOCs' pedagogy improves my study quality.	3.2%	10.3%	41.3%	43.7%	1.6%
The study forum and online community benefit my study.	3.2%	14.3%	46.0%	34.9%	1.6%
I enjoy the peer interaction in the process of MOOCs learning.	3.2%	27.8%	44.4%	22.2%	2.4%
MOOC is better than the courses I sit in my physical campus.	0.8%	23.8%	54.0%	19.8%	1.6%
MOOCs learning are more efficient than traditional face-to-face class.	1.6%	7.9%	55.6%	33.3%	1.6%
MOOCs develop my desire to knowledge and learning.	0.8%	16.7%	52.4%	29.4%	0.8%
I hope my university/campus could accept the credit of MOOCs	4.8%	9.5%	46.0%	34.1%	5.6%
I hope MOOCs could replace some courses in my physical institutes.	7.9%	23.0%	34.1%	30.2%	4.8%
I'm used to ending up quitting in MOOCs learning.	34.1%	19.0%	19.8%	26.2%	0.8%

Note:1 = Completely Disagree, 2 = Strongly Disagree, 3 = Neutral, 4 = Strongly Agree, 5 = Completely Agree.

The likert-scale also leads us to the common topics related to MOOCs such as "interaction", "autonomy", "attrition rate" and "expectation".

As for "attrition rate" in likert-scale, 26.2% of people categorized themselves into those who had no perseverance in MOOCs learning. As is illustrated in figure3, a majority of students failed to get the graduate certificates in MOOCs, among which are those who end up quitting half way or failing to turn in assignment or assessment required. However, there could also exist such situation where students just observe that class but refuse to do the quizzes and papers, which definitely make it impossible for them to get course completion certificates. Actually, this could be linked to "autonomy" and "motivation" based on the fact that autonomous participants with intrinsic motivations are more likely to engage in MOOCs learning and also persevere to the end [3].

3. Logistic Regression of MOOCs Participation Behavior

This study sets four models based on the experimental data of questionnaire. Regression model

was developed to examine the MOOCs participation behavior in current landscape of Chinese higher institutions.

3.1 Descriptions of Variables Used

Based on the questionnaire data, table6 examines the influencing factors and their level of effects with respect to MOOCs participation.

Table 6 Description of Variables

Variable class	Variable name	Description	Mean	Std.
Dependent variable	mooc_part	Have you participated in MOOCs?No=0;Yes=1	0.40	0.491
Individual factor	gender	Female=0;Male=1	0.50	0.501
	Major_lit	Not=0;Major in literature or history=1	0.29	0.456
	grade	Grade 1=1;Grade 2=2; Grade 3=3; Grade 4=4	2.28	1.192
	autonomy	Will you take the "shortcut" under the little supervision of MOOCs? Yes, I could ask one to sit in the course or exam for me=1; Yes, I could log on and do other things during the courses=2; No, I will take the online courses and assignments seriously=3.	2.42	0.996
Internet behavior	time_online	Less than 1 hours=1; 1-2 hours=2; 2-4 hours=3; 4-6hours=4; over 6 hours=5.	3.31	1.111
	cphone_use	No=0; Cellphone is my usual access to internet=1.	0.65	0.478
	social_online	No=0; I'm usual doing social networking=1.	0.55	0.499
About MOOC learning	mooc_exp	Do you hope your school (or other universities in China) launch the MOOC program? No=1; I don't care=2; Yes=3.	2.53	0.600
	mooc_camp	Have your university launched Mooc programs? No=0; Yes=1.	0.37	0.483
	com_mooc_camp	How about the MOOC in your university? There's no MOOC in my school=1; It's not good as expectation/too boring=2; Moderately good =3; It's so interesting=4.	1.56	0.828
Comments on traditional face-to-face classes	class_inter	How about the teacher-students interaction in your campus daily study? Almost no interaction in class=1; A little interaction in class=2; Moderately good =3; Very goods=4.	2.61	0.719
	att_edu	What is your attitude towards traditional face-to-face classes in your physical campus? Very bad=1; Not good=2; Moderately good=3; Very good=4.	2.01	0.565

As can be seen from the table6, the dependent variable is named as "mooc_part", representing the behavior of MOOC participation (i.e. whether or not participate in MOOCs learning; yes=1; no=0). Independent variables are categorized into four types- basic information (gender, major, grade, autonomy), internet behaviors (time input online; cellphone using; online socialization), MOOC learning (expectation of MOOC, MOOC in campus, and comments on MOOC in campus), comments on traditional face-to-face classes (class interaction, attitudes on traditional education).

3.2 Regression Results

Significance is statistically measured by a probability coefficient in social science, which can range from 0.001 to 0.05. From the regression results, it is safe to say that the model fitting is well qualified. It shows that grade, level of autonomy, time online, cellphone use, online socialization, MOOC expectation level, campus MOOC implementation all have significant influences on MOOCs participation behaviors.

Table 7 Regression Results

	(1)		(2)		(3)		(4)	
Variable name	B	S.E.	B	S.E.	B	S.E.	B	S.E.
gender	0.096	0.263					0.102	0.295
major_lit	0.381	0.284					0.440	0.329
grade	0.314***	0.108					0.271**	0.132
autonomy	0.618***	0.135					0.759***	0.155
time_online			0.285**	0.112			0.293**	0.133
cphone_use			-0.599**	0.257			-0.935***	0.317
social_online			0.754***	0.251			0.718**	0.298
mooc_exp					0.951***	0.230	0.819***	0.249
mooc_camp					1.184**	0.525	2.053***	0.609
com_mooc_camp					-0.244	0.302	-0.487	0.341
class_inter							-0.206	0.210
att_edu							-0.009	0.253
constant	-2.822***	0.476	-1.397***	0.450	-2.913	0.672	-5.453***	1.193

Notes: *, **, ***indicate significant coefficient (sig<0.1, sig<0.05, sig<0.01);

B represents the coefficient; S.E. represents standard error.

3.2.1 Basic Information: Gender, Grade, Major and Autonomy

There are many individual factors serve as independent variables influencing MOOCs participation. Comparatively, “grade” and “autonomy” are two factors significantly influencing the behavior of MOOCs participation.

The coefficient of the variable “grade” in model1 and model4 as we can see in table6, are 0.314 and 0.271 while the significance are below 0.01 and 0.05 respectively, which means that the “grade” has a significant positive impact on college students’ participation in MOOCs, which further justify the former description on MOOCs in different grades (table4.).

The coefficient of “autonomy” in model1 and model4 are 0.618 and 0.759 while the obtained significance is 0.01, herein we can draw a general conclusion that the level of autonomy also poses a positive effect on MOOCs participation behavior. Specifically, those who have higher self-discipline and motivation are more likely to participate in MOOCs. According to descriptive statistics in figure3, a majority of students failed to get the certificates in MOOCs, and also as is shown in likert-scale nearly a quarter of students categorized themselves into those who have no perseverance in MOOCs learning due to the lack of supervision mechanism in MOOCs system.

3.2.2 Internet Behavior

Internet behavior involves multiple variables such as time input, accessible ways and purposes. According to descriptive statistics in questionnaire (see table6), cellphone is the most popular access to internet while socialization is the most common purpose of net surfing.

Time online as one of the independent variables plays a significant role in university students’ MOOCs participation behaviors. As we can see from regression results, the coefficients are 0.285 in model 2 and 0.293 in model 3, and its significance both come up to 0.05. Accordingly, we can say that the more time one devotes online the higher possibility he/she will participate in MOOCs learning.

Cellphone using was one of the options in questionnaire items exploring university students’ usual access to internet. However, it can be seen from regression results that the coefficient of “cellphone use” (see table6. abbr “cphone_use”) plays a negative role in MOOCs participation behavior and its significance were high enough, which means that those who are getting used to holding cellphones in their palms are less likely to involve in MOOCs learning. In such an information explosion age, it is naturally that university students indulged in cellphone using, however students could be easily distracted when they are studying in MOOCs for lack of supervision especially for those with low self-control. Therefore, using cellphone to log on to MOOCs platform is not an ideal choice for university students as cellphone using could negatively influence the learning efficiency and attainment of MOOCs.

Combining the results of regression, table6 provides statistics of coefficient and significances, from which we can see the significant coefficient are less than 0.01 and 0.05 respectively in model 2 and model 4, which means online social networking, could bolster the expansion of MOOCs participation. I think the rationale lies with the connectivism and connected knowledge, which are the main theories in the distance education pedagogies that are applicable in the MOOCs context [4].

Overall, university students are supposed to make full use of online resources to cope with MOOCs at the dawn of technology and information age, otherwise cellphone and social media are nothing but hotbed of online education pitfalls.

3.2.3 MOOCs on Campus

As can be seen clearly from table6, the coefficient of expectation (see abbr "mooc_exp") are 0.951 and 0.859 in model3 and model4 respectively, and their significance are also well qualified, from which we would generally say that higher expectation to some extent advance university students to participate in MOOCs learning.

Based on data in table6, the coefficient of MOOCs on campus (see abbr "mooc_camp") reaches 1.184 and 2.053 respectively in model3 and model4 following positive significance. Hence, we can conclude that MOOCs on campus significantly accelerate the MOOCs participation on higher institutions, in other words, MOOCs practice on campus serves as driving force that encourage university students to participate in this movement.

3.2.4 Online Vs. Face-to-Face Education

Comparison between MOOCs and traditional class in physical campus has become a hit in MOOCs studies. When it comes to differences between MOOCs and traditional face-to-face classes, the importance of teacher-student interactions never falls into oblivion. As is shown in regression results, the coefficients of the two variables ("class_inter" and "att_edu") are negative and significant, which mean that less interactions and passive teaching mode of traditional higher education promote the MOOCs participation. Therefore, MOOCs serve as alternatives of learning tools to university students.

4. Conclusions and Recommendations

To conclude, variable elements influence students' tendency to participate in MOOCs learning including grades, level of autonomy, internet behavior, MOOCs expectation and quality of campus MOOCs. However, MOOCs have yet to pose dramatic impacts on higher teaching and learning in Zhejiang China given that the rate of participation and level of cognition on MOOC are not high at present. Therefore, institutions of higher education should pay full attention to the impact of MOOCs development, and advance the response to improve the core value of higher learning and teaching.

4.1 Teaching in Ihe

Although MOOCs have yet to give a facelift in higher institutions of Zhejiang China, education should be geared to the needs of modernization, of the world and future. In this aspect, teachers shoulder the responsibility to usher in a new era of technological education.

Above all, university teachers should support and guide MOOCs learning for students. As MOOCs got momentum in higher education with the development of technology, teachers need to promote students to adapt to the trend of digitalization to achieve personalized and lifelong learning. However, MOOCs should not be seen as a teacher replacement, instead, the use of MOOC should serve as a bridge to link students with teachers for the development of a positive rapport. To this end, teachers should try to build synergy between MOOCs learning and on-campus learning. For example, flipped classroom could be applied in higher institutions as a new class teaching mode, not only will it help students to develop independent learning and critical thinking abilities, but also it could improve teaching efficiency [5]. Meanwhile, teachers could guide students to make sensible

choices and set accessible goals in facing of various kinds of online courses, by which I mean teachers could supervise students in choosing appropriate courses, thereafter advancing both learning and teaching achievement.

Besides, institutions of higher education need to reform and improve the content and quality of the curriculum. The rise of MOOC could influence the original curriculum system given that some participants during the survey said that MOOCs widen the opportunities to attend various kinds of courses missing in university curriculum such as tests preparation, job training courses. In this light, universities should tailor the curriculum system and widen learning opportunities by setting selective courses to meet students' demands and interests. At the meantime, educators should attach great importance to curriculum collaborative construction, omitting the overlapped and monotonous courses and pay more attention to experimental and practical courses cater to diversified students. It has also been mentioned in this research that some students participate in MOOCS because that they think traditional college classes are insipid, therefore, higher teaching should pay attention to class vitality by applying multimedia, supervised conversation, experimental activities and etc., which could help diverse the teaching patterns, deepen the digital technologies application and promote exploratory and blended learning.

Teacher-student interaction also leverages a significant role in higher education. As was shown in questionnaire survey, most university students claimed that there was little interaction in lectures. At this point, university teachers should adjust the traditional lecture-oriented teaching mode, while exploring discovery-based heuristic education. MOOCs exactly provide higher institutions with more opportunities at this turning point, enabling them to conform to the trend of information age while investigate innovative educational models such as online learning, blended learning and flipped class, during which try to embed active and innovative teaching invisibly in classroom teaching and talents training. Accordingly, teacher-student interaction featuring critical thinking and active discussion has more advantages over spoon-feeding and cramming, just as the discussion forum in open online courses where questions and remarks from learners and lecturers could stir heated discussions. In this light, universities or colleges could focus on raising teaching standards by training "star teachers" and developing top-quality online courses while emphasizing the importance of teacher-student interaction: encouraging mutual exchanges and common development.

4.2 Learning in Ihe

Autonomy has been proved to be a key in MOOCs learning in this research [6]. However, as was illustrated in the earlier reporting, some admitted that they participated in MOOCs merely for credit hour, some acknowledged that they always quitting MOOCs half-way, some also pointed out that the cheating issues such as "ghost examinee" or "identity theft" loom large due to the inadequate inspection and supervision [7]. For ameliorating these issues, students should develop self-management skills and autonomous learning ability, during which motivation plays a significant role. Therefore, they could set up different goals to motivate themselves to learn, for instance, attaining certificates could commonly be the goad that gives students incentive to persevere in MOOCs learning and benefit both academically and emotionally. In other words, motivational learning could promote learning attainment and achievement, through which self-discipline and perseverance are also developed, which are both necessary qualities for university students.

Furthermore, university students should be encouraged to take good advantage of MOOCs to facilitate learning attainment and pick up learning passion. Meanwhile, they should also keep in mind that MOOC is not a replacement but supplement to on-campus courses; in fact, they should combine online courses with physical classes to create a powerful mix. While MOOCs offer students a great learning opportunity and convenience on the one hand, it also accelerates the differentiation of college students on the other. Specifically, some actively participate in MOOOCs learning might acquire more online, while others maintain the original way of learning and constrained in classroom might lag behind. In order to bridge the gap between these two groups, it

is imperative for university students to keep abreast with the MOOC revolution in the age of digital technology while at the same time create a powerful mix by combing MOOCs learning with on-campus learning.

Last but not the least, students should attach great importance to developing active learning habit in coping with MOOCs. For this goal, interactions, discussion and communication with peers and teachers should be assured in learning process. However, most university courses are lecture-oriented considering the class management and teacher assessment. Despite all this, students themselves could become active learners to initiate discussion or interaction in class. Besides, active learning is never confined to within the classroom therefore, for example, students should keep dialogue with teachers to get regular feedback and build rapport instead of shying away from peers and teachers without little interaction and discussion.

5. Conclusions

All in all, MOOCs have yet to pose a strong impact on higher institutions in Zhejiang China, however, both teachers and students should get ready to embrace both challenges and opportunities brought by this educational technology revolution. For university teachers, they should play instructive roles by supporting and guiding MOOCs learning, improve teaching skills, tailor curriculum, pedagogy and assessment; as for students, they should learn to develop independent and autonomous learning abilities. Moreover, there is quite inherently a lot of synergy between MOOCs and higher education, therefore, educators and designers could take advantages of both strengths while create a powerful mix by integrating MOOCs into institutions of higher education.

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