

# Research on the Teaching Effect of Online Courses in Universities during the Covid-19 Pandemic Period-Take Wuhan University of Technology as an Example

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**ABSTRACT.** The construction of online courses for tertiary education in the Internet era is an important issue concerned by the academic circle. The COVID-19 outbreak at the beginning of 2020 has pushed universities online courses to the forefront, which is a comprehensive test for the construction effectiveness. Taking Wuhan University of Technology as an example, this paper attempts to use the quantitative research method of sociology to analyze the current situation and problems of the online courses implementation in universities during the pandemic period, and puts forward relevant countermeasures, so as to provide reference for different teaching subjects.

**KEYWORDS:** Online courses, The covid-19 pandemic, Teaching mechanism, Learners center

## 1. Introduction

Educational informatization is facing great historical development opportunities. According to the 13th Five-year Plan of Education Informatization issued by the Chinese government, an information-based education system will be basically established by 2020 which ensures everyone can always learn scientific knowledge everywhere, and gets in line with the development goals of national education modernization.

The COVID-19 pandemic broke out in Wuhan city at the beginning of 2020. Chinese Education Ministry issued Guidance on The Organization and Management of Online Education in Institutions of Higher Learning during the Pandemic Prevention and Control Period, which asks the government, universities and society for working together to ensure smooth proceeding of online courses for universities, so that teachers can stop teaching in classrooms but keep teaching online and students can maintain learning during the period. According to the directive of the Ministry of Education, universities fully fulfill their main responsibilities and immediately set up special teams for online course management to link resources of all parties and coordinate the construction work. Under the guidance of the principle, "delay school time, start courses on schedule and ensure quality and quantity", most of the online courses of universities have been running smoothly so far, but it cannot be denied that great improvement space also exists.

## 2. The Implementation Circumstance of Online Courses in Universities during the Pandemic

Taking Wuhan University of Technology as an example, this paper adopts quantitative and qualitative research methods to explore the implementation circumstance of online courses in universities during the pandemic period. The questionnaire is divided into two parts of students and teachers. The survey content includes four dimensions of platform use, curriculum construction, teaching and learning during the pandemic. A total of 15,300 questionnaires were issued, and 15,258 valid questionnaires were collected, among which 14,331 were from students and 927 were from teachers, with an effective rate of 99.73%.

### 2.1 Platform Use Circumstance

#### 2.1.1 Use of Teaching Platform

There are many types of course teaching platforms available, which provide abundant teaching content. As shown in Table 1 below, nine platforms including Chaoxing and Tencent Meeting and so on are mainly used for online courses

during the pandemic, and the online teaching method by multi-platform is adopted. Among them, more people choose Tencent Meeting, Chaoxing, Chinese University MOOC, while the least people choose Ding Talk, WeChat group live and other platforms.

*Table 1 the Use Circumstance of Online Learning Platforms for Students.*

Platform Name	Number of Users	Percentage
Tencent Meeting	12978	90.56%
Chaoxing	12078	84.28%
Chinese University MOOC (Icourse)	11610	81.02%
MOOC Platform of WUT	10427	72.76%
QQ Group Live	9940	69.36%
Tencent Class	8275	57.74%
Zhidao	2671	18.64%
Ding Talk	639	4.46%
WeChat Group live	295	2.06%
others	801	5.59%

### **2.1.2 Platform Operation Guide**

During the pandemic, major online teaching platforms and universities issue specific instructions on the operation of platforms, and provide corresponding solutions to possible technical problems. As shown in Table 2 below, when encountering technical problems, more than half of students choose to consult teachers, classmates or customer service staff and solve them by themselves, while only less than one-third of students choose to refer to the use guide of the online teaching platform.

*Table 2 the Circumstance Of Student's Way of Solving Technical Problems.*

Ways of Solution	Number of Users	Percentage
Consult teachers, classmates or customer service	8509	59.37%
Look for solution on web search platforms by themselves	7209	50.30%
Refer to the instructions on the online teaching platform	3940	27.49%
No operational difficulties or technical problems	2138	14.92%
Put the problem aside and don't solve it	310	2.16%
Others	294	2.05%

## **2.2 Online Curriculum Setting Circumstance**

### **2.2.1 Course Offering**

Universities offer a wide variety of online courses. As shown in Table 3, except for some courses that cannot be taught online due to the special type, others have been set online. More than half of them are required courses of major, while general courses and experimental practice courses account for less than 20% of the total courses offered.

*Table 3 the Category Of Network Teaching Course.*

Course Category	Frequency	Percentage
Required Courses of Major	395	42.80%
Optional Courses of Major	192	20.80%
Subject Category Required Courses	119	12.89%
General Required Courses	112	12.13%
Experimental Practice Courses	40	4.33%
General Optional Courses	28	3.03%
Personal Courses	26	2.02%
Subject Category Optional Courses	11	1.19%

### **2.2.2 Teaching Evaluation Mechanism**

As can be seen from Table 4, more than half of the students say that they participate in the interaction because it

matters the performance score of the course. At the same time, most teachers and students express that the reference factors of the existing teaching evaluation mechanism are single and still require further establishment.

*Table 4 Statistical Tables Of Motivation for Participation in Interactions.*

Motivation Category	Frequency	Percentage(n=8945)
Get interested in some contents	5226	58.42%
Be called by teachers	4818	53.86%
Interaction is counted in the course's grade	4772	53.35%
Have the learning habits interactive	2050	22.92%
Others	602	6.73%

## 2.3 Teaching Circumstance

### 2.3.1 Online Teaching Methods

It can be seen from Table 5 that teachers mainly rely on online platforms for live broadcast and discussion teaching, but use less teaching methods such as students' independent learning and records playing.

*Table 5 the Primary Online Teaching Ways.*

Ways	Number of Users	Percentage
SPOC teaching on live or by playing record	368	39.70%
Online seminar teaching	267	28.80%
others	151	16.29%
The recorded teaching	124	13.38%
Students learn by themselves	17	1.83%

### 2.3.2 Online Teaching Interaction

The outbreak of COVID-19 is a pop test for the teaching ability of university teachers. With a positive teaching attitude of "curriculum as carrier and student as center", university teachers face the challenges brought by online courses. It can be seen from Table 6 that in the teaching process, teachers mainly adopt five ways of interactive online teaching including real-time discussion in online class, reply with chat software, and Q&A interaction on the teaching platform. At the same time, 82.20% of the surveyed teachers say that they interact effectively with students in each class.

*Table 6 the Main Interactive Ways of Online Teaching.*

Interactive Ways	Number of Users	Percentage
Interactive discussion in class	735	79.29%
Interactive reply in chat software	690	74.43%
Q&A interaction on the platform	551	59.44%
Assign homework in advance and discuss before class	387	41.75%
Regular group training	217	23.41%
other	45	4.85%
No interaction	1	0.10%

### 2.3.3 Preparation for Online Teaching

Universities teachers have made adequate teaching preparation for online courses containing careful design of online teaching programs and sufficient materials to ensure the smooth progress of online courses. However, according to Table 7, the problem of insufficient teacher resources still troubles most teachers at present. The electronic textbooks are mostly needed, followed by video teaching materials, test questions, exercises, homework, and other teaching materials and so on.

*Table 7 the Teaching Materials That Teachers Think Are Urgently Needed When Implementing Online Teaching.*

Teaching Materials	Number of Users	Percentage
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Electronic materials	549	75.31%
Instructional video materials	454	48.98%
Test	353	38.08%
Exercises	317	34.20%
Homework	181	19.53%
Others	309	33.33%

## 2.4 Students Learning Circumstance

### 2.4.1 Network Level of Students Living Area

According to Table 8, in the online learning process, 31.8% of the students live in rural areas and 32.85% in counties or towns. Compared with the city, the network signal in this kind of area is weak.

Table 8 Student's Living Area.

Area	Number	Percentage
City	5066	35.35%
Town or County	4708	32.85%
Countryside	4557	31.8%

### 2.4.2 The Circumstance of Independent Online Learning

While making full use of the advantages of online platforms for online learning, some students lack the ability of independent learning. As shown in Table 9, 41.24% of students think it difficult to keep up with the teaching progress of teachers. 65.59% of the students said that they sometimes, rarely or never actively preview before class.

Table 9 the Circumstance Of Students Independent Online Study.

Option	Completely keep up with teaching		Preview	
	Frequency	Percentage	Frequency	Percentage
Always	2351	16.40%	1563	10.91%
Often	6070	42.36%	3369	23.51%
Sometimes	4667	32.57%	6684	46.64%
Rarely	965	6.73%	2169	15.14%
Never	278	1.94%	546	3.81%

## 3. Problems of Online Courses in Universities during the Pandemic

### 3.1 The Safeguard Conditions of the Platform Aren't Equal to the Demands of Online Teaching

#### 3.1.1 The Diversity of Teaching Platforms Affects the Online Experience of Teachers and Students

After providing the use suggestions of online teaching platforms, universities have no uniform requirements for platform selection, which causes that the majority of teachers and students are using multiple online teaching platforms at the same time. Although the functions of different platforms may be complementary, differences in the use ways may make teachers and students unsuitable for the online teaching process and weaken the learning effect of students' online courses.

#### 3.1.2 The Platform Stability Still Needs Further Improvement

Sufficient servers and virtuous platform optimization are the foundation to ensure the smooth operation of online teaching. During the pandemic, universities and educational institutions across the country use a variety of online platforms for teaching, which leads to the overload of most online teaching platforms while the original servers could not meet the surging demand of users.

#### 3.1.3 Platform Functions and Supporting Services Still Need to Be Further Explored

Although the existing online course platform can meet the basic online teaching needs, it is still necessary to further

explore the man-machine interaction, user guidance, student management, teacher-student interaction and other functions that the online course platforms provide. When meeting the technical teaching problems or operational puzzle, teachers and students more on their own adopt the way of mutual discussion and consultation for teaching affair staff to seek the solution, rather than the guidance of platform technical personnel and use manual. This indicates that the existing platform still needs to be further probed in terms of user support and troubleshooting services.

### ***3.2 The Construction of Curriculum System is Incompatible with the Form of Online Teaching***

#### ***3.2.1 The Content of the Course Does Not Match the Form of Online Teaching***

According to the questionnaire, most of the courses have realized online teaching, but some special types of courses such as experimental operation and social practice cannot be carried out normally, so the courses can only be postponed.

#### ***3.2.2 The Teaching Evaluation Mechanism Fails to Motivate Students to Study Independently***

According to the survey, the lack of self-directed learning ability of students is a common problem in online teaching. However, the performance assessment of most courses lays its emphasis on attendance rate and online time, which fails to effectively achieve the purpose of facilitating students' learning status and effect.

### ***3.3 The Teacher's Teaching Ability Does Not Accord with the Student's Learning Needs***

#### ***3.3.1 The Form of Teaching Activities is Inconsistent with Students' Expectations***

According to the feedback from students, compared with the traditional Q&A interaction between teachers and students, students are more looking forward to adding diversified forms in the course, such as arranging pre-class preview and after-class learning tasks, adding online Q&A, group discussion and other diversified elements. In traditional offline courses, teachers have a relatively clear teaching system for teaching self-evaluation, student management and student learning effect analysis. However, the implementation of online teaching causes that the original teaching content and teaching system prepared by teachers for offline courses cannot well fulfill the needs of online teaching.

#### ***3.3.2 The Concept of Course Teaching Hasn't Changed in Time***

Teachers say that the sudden outbreak of the COVID-19 has turned offline classes into online ones. As a result, many teachers fail to timely change the traditional teaching concepts and transfer the focus of teaching from the course content to the needs of students. What's more, most of them do not establish the "learner-centered" teaching thinking, and still focus on the output of teaching content and the check of teaching attendance.

#### ***3.3.3 Lack of Teaching Resources Weakens Online Teaching Effect***

In the feedback of students, on the one hand, schools and teachers link most of the electronic textbooks, but a small part cannot be provided for some majors and courses due to copyright and access restrictions. On the other hand, it is still a problem for some students to organize their notes through electronic textbooks. The shortage of teaching materials affects teachers' teaching and students' learning results, and the access and utilization of online teaching resources still need to be further expanded.

### ***3.4 The Students' Web Condition and Personal Abilities Do Not Match the Online Teaching Requirements***

#### ***3.4.1 Students' Learning Conditions Need to Be Improved***

During the pandemic, online course learning breaks the original spatial pattern in the traditional classrooms. According to statistics, more than half of the students live in rural areas or counties, whose network signal is weaker than the urban city. These all affect the clarity and fluency of the video and audio during the course. Or some students' families face financial difficulties due to the pandemic. These objective conditions will inevitably exert influence on the actual learning effect of students.

#### ***3.4.2 The Ability of Autonomous Learning Needs to Be Improved***

It is not difficult to see from the survey of students' online independent learning that some students have not yet established the concept of online independent learning. They are passive in the online classroom, lazy in their

interactions, unaware of their ownership of online learning, and do not effectively integrate online learning with offline learning at home. Therefore, the autonomous learning ability of this kind of students needs to be further improved.

#### **4. Countermeasures to the Problems of Online Courses in Universities during the Pandemic**

##### ***4.1 Build the Support System of Information Service and Optimize Online Platform***

###### ***4.1.1 Coordinate Multidimensional Resources and Integrate Multiple Teaching Platforms***

The research ideas and design methods of university educational administrators and teachers for online courses are still based on the general mode of traditional course teaching. Usually, they move the previous offline courses to the Internet. Due to the influence of the solidified thinking of traditional teaching, there are limitations. The government and universities are supposed to coordinate multidimensional resources and explore the teamwork pattern for jointly building online teaching platform by multiple forces including college teachers, teaching affair personnel, teaching designers, platform programmers and network engineers. Simultaneously, the existing and new teaching platforms should be fully utilized and built for fulfilling the online courses demand. In this way, the integration of teaching resources decreases the cost and relieves the pressure on the teachers and students, further solving the operational problems caused by the diversified teaching platforms.

###### ***4.1.2 Optimize the Platform and Service to Enhance the Use Experience of Teachers and Students***

The design of the platform should simplify the online platform operating system as much as possible, reduce the level of operation, improve the resource storage directory, and set clear platform guidance function in the platform for the quick use by teachers and students.

In terms of user support services, on the one hand, universities select the teaching affairs staff and technical personnel at the school and college level to set up the teaching support group to implement the point-to-point and point-to-plane technical service support work; on the other hand, universities found teaching support groups, each of which arranges administrators according to the number of teachers and students. Educational administration management and related technical personnel will work online in advance and respond to and solve problems of teachers and students through working group, email and remote operation. Teaching affairs managers and technical staff all come to work online in advance, responsible for responding to problems of teachers and students through working group, email, remote operation and other ways.

##### ***4.2 Explore the Construction System of Curriculum Resources to Ensure the Supply of Teaching***

###### ***4.2.1 Pay Attention to the Curriculum Measures and Improve the Courses System***

The curriculum should be tailored to different types of courses. Universities should ensure the normal online teaching of courses based on theory, use virtual simulation to carry out courses based on experimental operation, and appropriately postpone courses based on social practice that require field research. In addition, students can change forms such as home exercise to complete physical education courses. Graduation thesis proposal and defense report meeting can be held on the online platform integrating voice, video and screen projection, such as Tencent Meeting. At the same time, platform builders should consult students, teachers with rich experience in online teaching, educational administrators, counselors and technical management personnel to jointly explore online course construction and improve the course system.

###### ***4.2.2 Develop Evaluation System to Fill the Shortage of Curriculum***

Universities can establish university-level and college-level inspection teams for daily teaching, organize and set up online teaching inspection centers, and implement the system of daily and weekly report, so as to do a good job in real-time quality monitoring of online courses. At the same time, relying on the learning management, universities can utilize the educational administration system to assist the service and teaching management of teachers and students, and make use of the online teaching platform to collect the immediate feedback of teachers and students in the classroom, and regularly select representative teachers and students to carry out questionnaires for collecting relevant suggestions in order to fill in the gaps of courses.

### **4.3 Grasp Teachers' Online Teaching Needs**

#### **4.3.1 Carry out Online Course Training to Improve Teachers' Operational Ability**

Universities offer these comprehensive guidance including online courses construction, adjustment, classes set, teaching, optimization, teaching plan, students management, quality monitor. Online teaching advanced training and teaching activities such as online teaching design, preparation and inspiring students should be carried out to enhance the level of information technology for teachers in a relatively short time and meet the needs of the online course.

#### **4.3.2 Combine with Communication and Assessment to Encourage Teachers**

Some teachers have conducted online teaching externally and mixed teaching combining online and offline teaching internally such as MOOC and SPOC courses on the platforms, and many examples have emerged. Universities can explore models who can play an exemplary role by opening an information meeting, so as to impart the teaching experience of model teachers to others. At the same time, relevant policies should be formulated to commend and reward teachers with high classroom assessment scores and good feedback from students, and the online teaching results should be included in the first assessment index, so as to encourage teachers to change their teaching concepts and actively explore methods which are suitable for online teaching.

#### **4.3.3 Encourage Students to Share Resources to Assist Teaching Improvement**

The solution to the shortage of online teaching resources can not only depend on the optimization of the platform and the integration of teaching resources, but also give full play to the power of students. In the assessment system, the quality and quantity of resource sharing should be added for encouraging students to share high-quality learning materials and notes so as to supplement teaching resources provided by teachers.

### **4.4 Identify Students' Needs for Online Learning and Facilitate Autonomous Learning**

#### **4.4.1 Investigate Students' Learning Needs and Help Students with Difficulties**

Before starting online courses, schools should make a comprehensive survey of students' online learning needs and difficulties, focusing on students in remote areas with poor Internet signal or those who are not qualified for online learning due to the pandemic. Based on this, the corresponding funding scheme should be designed to subsidize the Internet fees for students who have no wireless Internet at home and enough mobile phone fee. At the same time, universities should also provide financial support to students with financial difficulties caused by the pandemic, and develop special teaching programs for students living in remote areas with poor Internet signal, such as mailing playable equipment to store course resources, so as to ensure that every student can keep learning without the offline courses.

#### **4.4.2 Strengthen Students' Consciousness of Independent Study and Cultivate Their Independent Ability**

Schools can strengthen the training of learning techniques, methods and management of students' online learning, vigorously advocate the "learner-centered" online teaching mode, and guide students from the receiver of knowledge to the active seeker and sharer of knowledge. In addition, relevant assessment standards should be developed to include student attendance, length of online time, interaction and number of assignments handed in. Students who are active in class will receive extra performance points. At the same time, it is students who have good performance in independent learning during online courses that will be rewarded. What's more, teachers are also able to conduct tests and assign homework through the online teaching platform. These functions are conducive to the positive interaction between teachers and students in online learning, which can help teachers understand the learning situation of students, monitor their learning process, carry out necessary constraints and supervision, and promote students' independent learning.

## **5. Further Reflection**

The COVID-19 pandemic is a great test for the current online curriculum construction achievements of Chinese universities. With the development of Internet technology and the construction of online course platforms, the overall online course plan in universities during the pandemic has made great progress compared with the emergency teaching plan formulated during SARS epidemic period. In the future, the construction of online courses should pay attention to strengthening the top-level design of online courses, coordinating the development of multiple departments, forming a three-level hierarchical structure of "decision-making, management coordination, service and technology," and constructing more appropriate rules and regulations. At the same time, universities should explore the reconstruction

system of Internet curriculum, deeply integrate information technology and teaching, reshape online course teaching process and teaching space, set up learner-centered mode of mixed teaching, and cultivate students' lifelong learning ability.

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